



One Day International e-Conference on

“Multilingual Research, Education, and Social Sciences” (MRESS2025)

05 July 2025 (Virtual Mode)

Keynote Speakers



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- Neurocognitive Approaches to Multilingualism: Brain-based insights into language learning and usage
- Multilingual Research Methodologies, Language model systems
- English Language Teaching, Literature and Other Foreign Languages
- Translation and Interpretation in Multilingual Societies
- Challenges and Opportunities in Mother Tongue-Based Education
- Technology-Enhanced Language Learning
- AI Integration, Computational pedagogy and Innovative Pedagogy
- Education Technology, Education Management
- Education Psychology, Developing Social-Emotional Learning (SEL)
- Curriculum Innovation and Development in Teacher Education
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- Political Science, Governance and Public Policy
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A Message from the CEO

Greetings to all esteemed researchers, educators, scholars, and participants of the MRESS2025 conference.

On behalf of our organization, I am delighted to extend my warmest congratulations to the conference organizers and, most importantly, to all the brilliant minds who have contributed their work to these proceedings. The theme of "Multilingual Research, Education, and Social Sciences" is not just an academic pursuit; it is a vital mission that stands at the intersection of our past, present, and future.

In a rapidly globalizing world, the ability to communicate, understand, and collaborate across linguistic and cultural divides is no longer a luxury—it is a necessity. The research presented here provides essential insights into how we can bridge these gaps, build stronger educational systems, and foster more cohesive and prosperous societies. This is a topic that resonates deeply with our core values, as we believe that true innovation and progress are born from diverse perspectives and a shared commitment to a greater good.

The 76 chapters featured in this volume are a testament to the dedication, rigor, and intellectual passion of researchers from various fields. Each article represents a piece of a larger puzzle, contributing to a more complete understanding of the challenges and opportunities that lie ahead.

I am confident that the ideas and findings in these proceedings will not only stimulate further academic inquiry but also provide a valuable resource for policymakers, business leaders, and communities striving to create a more inclusive world.

Thank you for your tireless work and for allowing us to be a part of this important conversation. May your research continue to inspire and create meaningful change.

With sincere appreciation,

K. Deepika

Chief Executive Officer

A.C.T Academy (www.actacademy.in)

A Forward from the Director

Dr. Soudamini Menon

It is my distinct honor and pleasure to introduce the proceedings of the e-Conference on **“Multilingual Research, Education, and Social Sciences” (MRESS2025)**. This conference was born from a collective vision to create a dynamic and inclusive platform for scholars, educators, and researchers from around the globe. Our shared goal was to explore the multifaceted roles of language and culture in shaping our understanding of the world.

The papers and presentations compiled within this volume represent the intellectual diversity and scholarly rigor that defined MRESS2025. They delve into critical issues, from the pedagogical challenges of multilingual classrooms to the subtle ways language influences social dynamics and research methodologies. We believe that by engaging with these complex topics, we can foster a more empathetic and interconnected global community.

My deepest gratitude goes to the organizing committee, the dedicated reviewers, and, most importantly, all the participants who shared their invaluable work. Your contributions have made MRESS2025 a landmark event in the academic calendar. This publication is a testament to the power of collaboration and the enduring importance of multilingualism in a globalized world.

I am confident that the insights and research presented here will inspire future inquiry and dialogue, and I look forward to seeing the impact of this work in the years to come.

Sincerely,

Prof. Dr. Soudamini Menon

Director,

A.C.T Academy

Chairman, Advisory Board

A Message from the Vice Chairman

Dr. Sunil H Der

As the Vice Chairman of the Advisory Board for the e-Conference on “**Multilingual Research, Education, and Social Sciences**” (MRESS2025), I am delighted to extend my congratulations to all who contributed to this remarkable event. The Advisory Board's role is to ensure that the conference's vision remains relevant and impactful, and the breadth of research presented in these proceedings is a testament to the community's commitment to that vision.

The papers contained within this volume serve as more than just a record of the conference; they are a vital resource for navigating the complexities of our increasingly interconnected world. The research on multilingualism and its intersection with education and social sciences is not merely an academic exercise, but a critical lens through which we can address global challenges and build more inclusive societies.

It has been an honor to witness the dedication of the organizers and the passion of the participants. I am confident that the scholarship presented here will not only inform current discourse but also shape the research agendas of the future. Thank you for your essential contributions to this field.

Sincerely,

Dr. Sunil H Der

Vice Chairman, Advisory Board

A Message from the Chief Editor

It is with immense pride and gratitude that I introduce the official proceedings of the e-Conference on “**Multilingual Research, Education, and Social Sciences**” (MRESS2025). The process of curating this volume has been a journey of discovery, and the final collection represents a truly remarkable collaborative effort.

On behalf of the entire editorial team, I want to extend my deepest thanks to all the authors. Your dedication and scholarly passion have resulted in an outstanding body of work, comprising **75 insightful chapters** that explore the core themes of our conference from a multitude of perspectives. This impressive volume is a testament to the vibrancy of research in this field and the commitment of scholars to advancing our collective knowledge.

I also wish to acknowledge the meticulous work of our reviewers and the tireless efforts of the MRESS2025 organizing committee. Without your commitment to academic rigor and excellence, this publication would not have been possible.

We hope that the diverse perspectives and groundbreaking research within these pages will not only inform but also inspire future work. This collection is a powerful resource for anyone interested in the critical intersections of language, culture, and society.

Sincerely,

Dr. R. Jeyanthi

Chief Editor,

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Social Sciences”(MRESS2025)**

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e-Conference Proceeding

“Multilingual Research, Education, and Social Sciences”(MRESS2025)

Chapter : 1

A Study on the Social Competence of Higher Secondary School Students in Idukki District

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Abstract

The present study investigates the level of social competence among higher secondary school students in the Idukki District of Kerala. Social competence, a key component of emotional intelligence, encompasses a range of interpersonal skills necessary for effective communication, collaboration, and social adaptation. Recognizing its importance in the holistic development of students, this study aims to assess the extent of social competence and to examine whether it significantly differs based on gender, locality of the school, and type of management. The study adopted the survey method and used a stratified random sampling technique to select a sample of 250 higher secondary school students from various schools across Idukki District. Data were collected using a Social Competence Scale developed and standardized by the investigator, which consists of 44 items covering five key dimensions: interpersonal knowledge and skills, cultural competence, adopting social values, positive self-identity, and planning and decision-making skills. The findings of the study are expected to reveal the current status of students' social competence and highlight variations across different demographic categories.

Keywords: Social Competence, Higher Secondary School Students, Interpersonal Skills, Emotional Intelligence, Gender Differences, Locality, Type of Management, Idukki District.

Introduction

Education in the 21st century is not merely the transmission of academic knowledge but also the cultivation of life skills essential for personal and social success. Among these, social competence plays a pivotal role in shaping an individual's ability to interact effectively in various social contexts. It includes the ability to form positive relationships, communicate clearly, cooperate with others, and resolve conflicts constructively. As Theodore Roosevelt aptly stated, “The most important single ingredient in the formula of success is knowing how to get along with people” (as cited in Maxwell, 2007, p. 45). In this light, social competence becomes an indispensable part of a student's holistic development.

Adolescence, especially during the higher secondary stage, is a critical period marked by rapid physical, emotional, and social changes. Students begin to explore their identity, assert independence, and navigate complex social environments. During this phase, peer relationships gain importance and the ability to manage them effectively can significantly influence academic achievement and emotional well-being. Lev Vygotsky emphasized the role of social interaction in development, noting that “Through others, we become ourselves” (Vygotsky, 1978, p. 57). Thus,

social competence is not only a psychological trait but also a learned behaviour shaped by one's environment, schooling, and experiences.

In the unique socio-cultural and geographical context of Idukki District in Kerala—characterized by its rural settings, tribal populations, and educational diversity—it is essential to understand how students demonstrate social competence across various backgrounds. The present study seeks to assess the level of social competence among higher secondary school students in this district and to examine whether it significantly varies based on gender, locality of the school, and type of management. As Daniel Goleman highlighted in his work on emotional intelligence, “What really matters for success, character, happiness, and lifelong achievement is a definite set of emotional skills—your EQ, not just purely cognitive abilities measured by conventional IQ tests” (Goleman, 1995, p. 36). Therefore, this research aims to contribute to the growing understanding of social-emotional skills in educational settings, offering valuable insights for teachers, administrators, and policymakers.

Need and Significance of the Study

In the current educational scenario, the focus is gradually shifting from mere academic excellence to the holistic development of students. Among the various non-cognitive skills essential for this development, social competence plays a vital role in helping individuals navigate interpersonal relationships, adapt to social environments, and contribute meaningfully to society. In an era defined by rapid globalization, digital connectivity, and increasing social diversity, the ability of students to demonstrate empathy, cooperation, communication, and responsible decision-making is more critical than ever. Socially competent individuals are better equipped to resolve conflicts, work in teams, and adjust to the challenges of adulthood.

Adolescence, particularly the higher secondary school stage, is a crucial period for the formation of identity, values, and social roles. Students in this age group face multiple social and emotional challenges that require well-developed interpersonal skills. As Vygotsky (1978) asserted, “Through others, we become ourselves,” highlighting the influence of social interaction on cognitive and emotional development. Therefore, fostering social competence during this stage is essential for both personal growth and academic performance. Furthermore, as Goleman (1995) emphasized, emotional and social skills, collectively referred to as emotional intelligence, are stronger predictors of lifelong success than intellectual ability alone.

The Idukki district of Kerala, with its unique blend of rural, tribal, and semi-urban populations, presents a diverse socio-cultural background. Understanding the level of social competence among students in this region can provide valuable insights for educators and policymakers to design effective interventions. Investigating how social competence varies across demographic variables such as gender, locality, and type of management helps to identify specific needs and disparities among student groups. The findings of this study are expected to support curriculum developers, school administrators, and teachers in integrating social-emotional learning (SEL) components into mainstream education, thereby promoting inclusive, empathetic, and socially responsible learners.

Statement of the Problem

The present study is entitled as “A Study on the Social Competence of Higher Secondary School Students in Idukki District”.

Objectives of the Study

1. To identify the extent of Social Competence of Higher Secondary School Students in Idukki District
2. To compare the level of Social Competence among higher secondary school students based on the sub group

- a. Gender
- b. Locality of the School
- c. Type of Management

Hypotheses of the Study

1. There is a significant level of Social Competence of Higher Secondary School Students in Idukki District
2. There is a significant difference in Social Competence among higher secondary school students with respect to:
 - a. Gender
 - b. Locality of the School
 - c. Type of management

Methodology

The present study adopted the stratified random sampling to investigate the Social Competence of Higher Secondary School Students in Idukki District, with specific reference to differences based on gender, locality of the School, and type of management. Social Competence was considered the primary variable of the study. In addition, the demographic variables gender, locality, and type of management were taken into account for comparative analysis.

The sample consisted of 250 higher secondary school students, selected from various schools in the Idukki district of Kerala using the stratified random sampling technique. The strata were formed based on gender, locality, and type of school management to ensure representation from each subgroup.

Tools to be used

For the purpose of data collection, the study utilized the Social Competence Scale, which was developed and standardized by the investigator. This tool is specifically designed to measure the social competence of higher secondary school students and comprises 44 items distributed across five major dimensions: Interpersonal Knowledge and Skills, Cultural Competence, Adopting Social Values, Positive Self-Identity, and Planning and Decision-Making Skills. Each item is intended to assess different aspects of students' social behaviour, decision-making ability, interpersonal relationships, and cultural understanding.

The reliability of the Social Competence Scale was established using several statistical methods. The reliability coefficients obtained were 0.863 (Spearman-Brown), 0.859 (Guttman Split-Half), and 0.759 (Cronbach's Alpha), all indicating a high level of internal consistency and dependability of the scale for research purposes. These values confirm that the tool is suitable for measuring the intended construct reliably across different groups of students.

To establish the validity of the scale, the first draft consisting of 66 items was submitted to a panel of 10 subject experts to evaluate content relevance and clarity. Based on their suggestions, items found inconsistent with the concept of social competence were removed. The second draft with 49 items was then administered to a sample of 200 higher secondary school students, and item analysis was conducted. Only items that showed statistical significance at the 0.01 or 0.05 level were retained, resulting in the final draft of 44 items. Thus, the scale demonstrates strong content and face validity, ensuring that it accurately measures the social competence of the target population.

Analysis and Discussion

1. **Analysis of the Extent of Social Competence among higher secondary school students for the Total Sample**

As the primary objective of the study was to assess the level of Social Competence among higher secondary school students, the researcher collected scores on the Social Competence Scale from a total of 250 students. These scores were then subjected to descriptive statistical analysis to gain a clearer understanding of students' social development profiles.

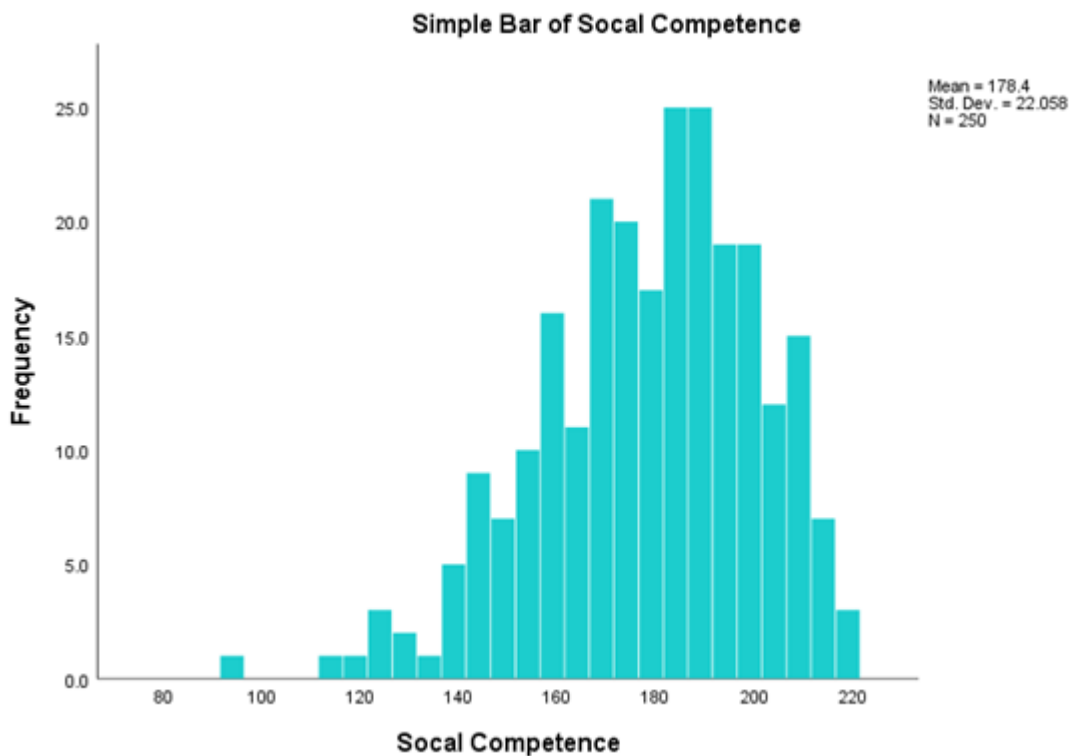
To examine the nature and extent of Social Competence in the sample, key statistical measures were computed, including the mean, median, standard deviation, skewness, and kurtosis. These measures provide valuable insights into the central tendency, variability, and distribution pattern of the data.

Table 1

Results of Mean, median, Standard Deviation, Skewness and Kurtosis of Social Competence

Variable	N	Mean	Median	SD	Skewness	Kurtosis
Social Competence	250	178.40	181.50	22.058	-.612	.398

Table 1 presents the descriptive statistics of Social Competence scores among 250 higher secondary school students. The mean score is 178.40, while the median is slightly higher at 181.50, indicating that the distribution of scores is slightly skewed to the left. This is supported by the skewness value of -0.612, which suggests that more students scored above the average level of Social Competence, with a few lower scores pulling the mean down. The standard deviation of 22.058 reflects a moderate spread of scores around the mean, indicating variability in the levels of Social Competence among the students. The kurtosis value of 0.398, being close to zero, indicates that the distribution is slightly more peaked than a normal distribution but still within an acceptable range for normality. Overall, the data suggest that the Social Competence of the students is fairly normally distributed with a tendency toward higher levels of competence.



To further understand the extent of Social Competence among higher secondary school students, the scores were classified into three levels: high, average, and low perception. This classification was based on the statistical distribution of scores using the Mean $\pm$ Standard Deviation

method. Categorizing the data in this manner helps to identify the proportion of students falling into each level of perception, thereby offering a clearer picture of overall social competence trends within the sample. Table 2 presents the number and percentage of students in each category, providing insight into how Social Competence is distributed among the 250 students surveyed.

Table 2

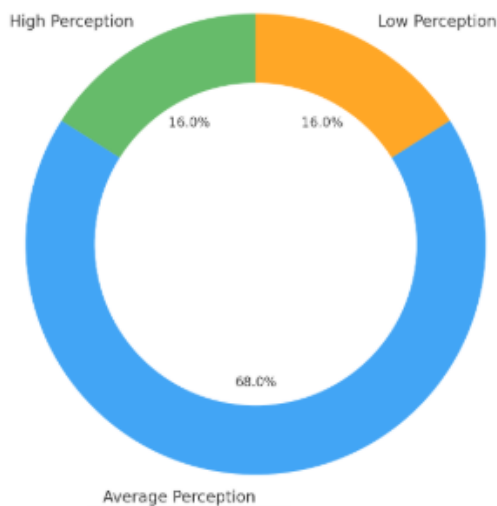
Levels of Perception of Social Competence

Category	No. of pupils	Percentage
High Perception	40	16%
Average Perception	170	68%
Low Perception	40	16%
Total	250	100

Table 2 presents the distribution of higher secondary school students based on their levels of perception of Social Competence. Out of the total 250 students, 40 students (16%) were found to have a high level of Social Competence, while an equal number of students (40 or 16%) showed a low level of perception. The majority of the students, comprising 170 individuals (68%), were categorized under the average level of perception. This indicates that most students exhibit a moderate degree of social competence, with only a small proportion falling at either extreme. The symmetrical distribution between high and low levels also suggests a balanced spread of perception, with a dominant concentration at the average level. These findings imply that while a substantial number of students demonstrate satisfactory social competence, there remains a notable portion who may benefit from targeted interventions to enhance their interpersonal and social skills.

To visually represent the extent of Social Competence among higher secondary school students, a donut chart was created based on the categorization of perception levels. The chart illustrates the proportion of students falling into high, average, and low levels of Social Competence, as outlined in Table 2.

Levels of Perception of Social Competence among Higher Secondary School Students



This visual emphasizes that the majority of students fall within the average range, highlighting the need to support both ends of the spectrum those excelling and those struggling in social competence.

2. Compare the level of Social Competence among higher secondary school students based on the sub group

By finding out the critical ratio of their difference and testing it for significance, the analysis was conducted for the following sub samples.

- a. Gender
- b. Locality of School
- c. Type of Management

Comparison Social Competence among higher secondary school students based on Gender

The mean and standard deviation of Social Competence scores for boys and girls were calculated. To determine whether the difference between the mean scores of these groups was statistically significant, the critical ratio (t-value) was computed. The data and results of the test of significance are presented in Table 3.

Table 3
Comparison of Social Competence of students based on Gender

Category	N	Mean	SD	T value	Result
Boys	92	178.23	23.20	.094	$p > 0.05$
Girls	158	178.50	21.44		

An independent samples t-test was conducted to examine whether there was a significant difference in the levels of Social Competence between boys and girls among higher secondary school students. The analysis included 92 boys and 158 girls. The mean Social Competence score for boys was 178.23 with a standard deviation of 23.20, while the mean score for girls was 178.50 with a standard deviation of 21.44.

The result of Levene's Test for Equality of Variances indicated that the assumption of equal variances was not violated ($F = 0.458$, $p = 0.499$), thus allowing for the interpretation of the t-test under the assumption of equal variances. The t-test value was -0.094 , with a corresponding p-value greater than 0.05, indicating that the difference between the mean scores of boys and girls was not statistically significant.

This implies that there is no meaningful difference in the perceived level of Social Competence between male and female students in the sample. Both genders reported nearly identical mean scores, suggesting that gender does not play a significant role in influencing students' social competence in this context. The finding supports the notion that social skills and interpersonal competencies are likely to be influenced more by environmental and educational factors rather than by gender alone.

Comparison Social Competence among higher secondary school students based on Locality of School

The mean and standard deviation of Social Competence scores for urban and rural students were calculated. To determine whether the difference between the mean scores of these groups was statistically significant, the critical ratio (t-value) was computed. The data and results of the test of significance are presented in Table 4.

Table 4
Comparison of Social Competence of students based on Locality

Category	N	Mean	SD	t value	Result
Urban	84	188.27	14.95	5.302	$p < 0.001$

Rural	166	173.40	23.39		

An independent samples t-test was conducted to examine whether there is a significant difference in Social Competence between students from urban and rural localities. The sample consisted of 84 urban and 166 rural higher secondary school students. The mean Social Competence score for urban students was 188.27 with a standard deviation of 14.95, whereas for rural students, the mean score was 173.40 with a standard deviation of 23.39.

Levene's Test for Equality of Variances was found to be significant ($F = 15.656$, $p < 0.001$), indicating that the assumption of equal variances was violated. Therefore, the t-test results under the "equal variances not assumed" condition were considered. The t-value was 6.093, and the result was statistically significant at $p < 0.001$, indicating a meaningful difference between the two groups.

These findings suggest that urban students exhibit significantly higher levels of Social Competence compared to their rural counterparts. This may be attributed to factors such as better exposure to social environments, enhanced communication opportunities, and greater access to extracurricular activities in urban areas, which can contribute to the development of stronger social skills. The result highlights the need to support rural students through targeted interventions to bridge the gap in social competence.

Comparison Social Competence among higher secondary school students based on Type of Management

To determine whether there are significant differences in Social Competence among students belonging to different groups, a One-Way Analysis of Variance (ANOVA) was conducted. ANOVA is a statistical technique used to compare the means of three or more independent groups to see if at least one group mean is significantly different from the others. The results of the ANOVA test, as presented in the table below, provide information on the variation between groups and within groups, including the F-ratio and the level of statistical significance.

Table 5

Summary of Analysis of Variance

Source	Sum of square	df	Mean Square	F	Result
Between Groups	17340.579	2	8670.290	20.629	P>0.001
Within groups	103811.421	247	420.289		
Total	121152.000	249			

The ANOVA summary table presents the results of a one-way analysis of variance conducted to examine whether there are significant differences in Social Competence scores among three groups. The "Between Groups" row shows a Sum of Squares value of 17,340.579 with 2 degrees of freedom, resulting in a Mean Square of 8,670.290. This indicates the amount of variation in Social Competence that can be attributed to differences between the groups.

The "Within Groups" row represents the variation within each group, with a Sum of Squares of 103,811.421 across 247 degrees of freedom, producing a Mean Square of 420.289. This reflects the natural variability in Social Competence scores within the individual groups.

The calculated F-value is 20.629, and the associated p-value is .000, which is less than the conventional significance level of 0.05. This means that the observed differences in group means are statistically significant, and it can be concluded that at least one group differs significantly from the others in terms of Social Competence.

However, while the ANOVA indicates that significant differences exist, it does not specify which groups differ from each other. Therefore, post hoc tests such as Scheffé's test or Tukey's HSD are needed to identify the specific pairwise differences between the groups.

In Scheffé's test, a critical value is calculated for each pair of group means and compared with the actual observed differences between sample means. When the actual mean difference exceeds the Scheffé critical value, the null hypothesis of no difference between that pair is rejected.

Table: 6

Scheffé's Test for Differences in Social Competence Based on Type of Management

Groups Compared	Mean Difference ($X_1 - X_2$)	Scheffé's F Value (Sig.)	Result
Government vs Aided	-11.036	$p = .003$	Significant
Government vs Private	-19.856	$p = .000$	Highly Significant
Aided vs Private	-8.820	$p = .027$	Significant

Scheffé's post hoc test was conducted following a significant ANOVA result to identify specific differences in Social Competence among students from different types of school management (Government, Aided, and Private). The test results revealed that there are statistically significant differences between all pairs of groups.

Firstly, a significant difference was found between students from government and aided schools, with aided school students scoring higher in Social Competence (mean difference = -11.036, $p = .003$). A highly significant difference was observed between government and private school students (mean difference = -19.856, $p = .000$), indicating that private school students exhibit notably higher levels of Social Competence than those in government schools. Furthermore, there was a significant difference between aided and private school students as well (mean difference = -8.820, $p = .027$), with private school students again showing higher competence levels.

Major Findings of the Study

1. Levels of Social Competence: The analysis revealed that the majority of higher secondary school students exhibited an average level of Social Competence (68%), while 16% each were in the high and low perception categories. The distribution was approximately normal, with a slight negative skew, suggesting a tendency toward higher competence.
2. Gender and Social Competence: The independent samples t-test showed no significant difference in Social Competence between male and female students, indicating that gender does not influence perceived social competence levels among higher secondary students.
3. Locality and Social Competence: A significant difference was found in Social Competence based on locality. Students from urban areas demonstrated significantly higher social competence than their rural counterparts, suggesting that environment plays a role in the development of interpersonal and social skills.
4. Type of Management and Social Competence: ANOVA and Scheffé's post hoc test revealed that students from private schools scored significantly higher in Social Competence compared to those from aided and government schools. This highlights the influence of school environment and management practices on student development.

Educational Implications of the Study

The present study titled “A Study on the Social Competence of Higher Secondary School Students in Idukki District” offers several important educational implications for teachers, school administrators, curriculum designers, and policymakers. The findings indicate that while the majority of students demonstrate average levels of social competence, a significant proportion still falls into the low competence category. This highlights the urgent need to integrate structured and intentional efforts into the curriculum to develop social and interpersonal skills alongside academic content.

Teachers play a vital role in nurturing social competence, and therefore, professional development programs should include training on strategies such as cooperative learning, conflict resolution, empathy-building activities, and student-led discussions. Schools, especially those in rural areas, should create inclusive environments that encourage student interaction, participation in extracurricular activities, and peer collaboration, which are all critical for the development of social competence.

The observed differences based on locality and school management suggest that equitable access to social development opportunities is lacking. Hence, targeted interventions should be designed for rural and government schools to bridge this gap. In addition, incorporating life skills education and value-based learning within the curriculum can further enhance students’ emotional and social intelligence.

Ultimately, strengthening social competence among students contributes not only to improved academic performance and classroom behaviour but also prepares them to become responsible, empathetic, and cooperative individuals in society. Therefore, the study underscores the need for a holistic approach to education that fosters both intellectual and social growth.

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Chapter : 2

Mind Mapping As A Tool To Improve Nutrition Literacy And Dietary Behaviour Among Undergraduates: A Quasi-Experimental Study

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Abstract

Objectives:

This study aimed to evaluate the effectiveness of mind mapping as a pedagogical tool to enhance nutrition literacy and promote healthier eating behaviours among undergraduates.

Methods:

A 12-week quasi-experimental study was conducted with 194 students from three colleges. Participants engaged in structured health education sessions incorporating digital mind mapping techniques. Nutrition literacy was assessed using the nutrition literacy scale and a custom-designed questionnaire was administered pre- and post-intervention. Qualitative data were gathered through focus group discussions to explore student engagement and perceptions.

Findings:

Post-intervention results showed a 43% increase in nutrition label literacy scores and a 32% improvement in self-reported healthy eating behaviours compared to baseline. Qualitative feedback indicated that students found mind mapping to significantly enhance their understanding of complex nutritional concepts, with many reporting increased confidence in making informed food choices. Teachers noted higher engagement levels and improved classroom interaction.

Implications:

The findings suggest that integrating mind mapping into health education curricula can be an effective, scalable method for improving nutrition literacy in undergraduates. This approach aligns with cognitive theories that emphasize visual learning and has the potential to be adapted across various educational and cultural contexts.

Conclusion:

Mind mapping serves as a powerful educational strategy to strengthen nutrition literacy and influence dietary behaviours. Future research should explore its long-term impact and potential integration into national health education policies to address the growing challenges of obesity and diet-related diseases.

Keywords: Mind mapping, Nutrition Literacy, Undergraduates, Dietary Behaviour

Chapter : 3

Multilingual Education As A Catalyst For Social Inclusion And Global Citizenship

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Abstract

Multilingual education is a dynamic approach towards advancing social inclusion and global citizenship, especially in an interconnected and culturally diverse world. This paper considers how multilingual education, by incorporating multiple languages into education systems, helps to level the playing field for marginalized linguistic communities and to ensure equitable access to quality learning experiences. Multilingual education affirms and values linguistic diversity and, ultimately, works to close social gaps and lessen discrimination, while also helping to create a sense of belonging for learners from different linguistic communities.

Multilingualism also fosters critical thinking, intercultural understanding, and global awareness-competencies that are significant for citizens participating in the global citizenship space. Using international commitments such as UNESCO's promotion of mother tongue based multilingual education (MTB-MLE) and the sustainable development goals(SDG 4), this paper considers successful examples, the role of policy, and potential barriers to implementing multilingual education in different contexts.

The paper will ultimately argue that multilingual education is more than just an educational approach; it is a major social catalyst for developing inclusive, caring, empathetic, and globally oriented citizens. It will seek to reframe educational policy to make multilingual education and/or linguistic diversity a priority of inclusive, equitable, and sustainable development.

Keywords: Multilingual education, Social inclusion, Global citizenship, Linguistic diversity, Educational equity, Intercultural competence, Language Policy.

Multilingual Education

Multilingual education is an educational process that uses two or more languages for the purpose of teaching and learning. Multilingual education provides opportunities for students to develop knowledge and skills in learning, communicating, and interacting across languages and cultures. In this globalized world, people from different linguistic backgrounds interact with each other more than ever before. Multilingual education contributes to understanding, inclusion, and

academic success and allows children to learn in their home language and develop skills in the national and international language(s).

- **Benefits of Multilingual Education**

We already know and value the many benefits of multilingual education. importantly , research shows students understand lessons better when the subject content is taught in the first language. Multilingual education, which recognizes home language, contributes to all kinds of cognitive skill development (difficulty, memory, problem solving). Those who become multilingual learn to communicate more effectively with others in a number of cultural contexts and have adaptive skills to adjust to multicultural environments. It also helps support and sustain local languages and cultures while preparing students for jobs at the global level.

- **Limitations in Multilingual Education**

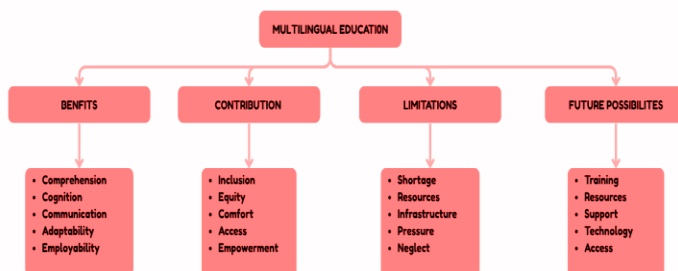
In spite of the benefits of multilingual education, there are limitations that schools and educators face in its implementation. Often, there are not enough qualified teachers available to facilitate multilingual education. There is often a lack of appropriate educational resources in multiple languages in many schools. Also in many parts of the world, languages in schools. Under the constraints of these limitations, schools and educators are always under pressure to realize their multilingual programs.

- **Contribution to Social Inclusion**

Multilingual education can help reduce inequity. Children learn in their first language, supplemented with national or regional language(s), so that they are comfortable learning in their first language.

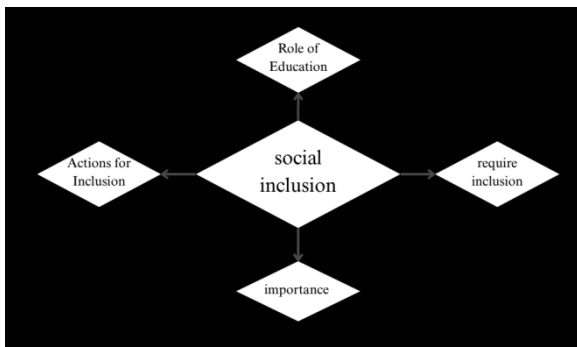
- **Future Possibilities**

For multilingual education to be more effective, governments and educators need to put in place training, resources and support for multilingual education. We are seeing technology support multilingual education by examining digital tools in multiple languages.



Social Inclusion

Social inclusion refers to ensuring that everyone has the same potential to assure their effective participation in society, regardless of their background, ability or status. It seeks to eliminate barriers that might have been placed on others or by the individual's circumstances, preventing them from accessing education and jobs, health, or social services. Social inclusion ultimately is important for building equitable, peaceful, united communities.



- **The Importance of Social Inclusion**

People who feel included tend to engage positively and constructively in the community. Social inclusion involves promoting rights, equality, respect, and a sense of belonging and value in our lives. Social inclusion also tends to decrease vulnerability to domestic violence, poverty, discrimination, and social tensions. Every person living with full potential can live with dignity and can contribute peacefully and positively to a productive society.

- **Groups that Require Inclusion**

Often, people live lives where inclusion is not an offer due to social, political, economic, or cultural barriers. These groups may include people with disabilities, women, older people, migrants, ethnic minorities, and communities experiencing economic poverty. Social inclusion initiatives target these populations, creating structures for equity, opportunity, inclusion, and voice.

- **Actions for Inclusion**

To establish equity and inclusion, governments and organizations can take a variety of actions. Where access to education, healthcare, and jobs improve, then livelihood sustainability improves. Protection of the rights of individuals, through effective laws and policies, can promote inclusion. Community programs, policy and practice reform, values-based awareness campaign programs, and inclusive technology to establish a framework for an inclusive environment, which promotes engaged membership among individuals.

- **The Role of the Education System in Social Inclusion**

Education is key to the process of social inclusion. Hence, classrooms that embrace an inclusive culture help to promote understanding and tolerance between students of different abilities, backgrounds, or experiences. Stereotypes are counteracted through education that teaches youngsters to accept and respect diversity and differences existing in our society.

Global citizenship

Global citizenship is the concept that every human being is a member of the global community endowed with responsibilities and rights beyond nationhood. It urges the individual to think and act with consideration of the world around them. In this interconnected world, global citizenship today is a priority for the promotion of peace, unity, and sustainability.



● **Understanding Global Citizenship**

Global citizens are conversant with pressing needs such as global climate change, poverty, inequality, and human rights. They respect cultures, treasure diversity, and champion equality and justice for all. Thus, global citizens are open-minded, responsible, and ready to pursue actions for the betterment of the world.

● **Importance of Global Citizenship**

Education is the link toward the making of global citizens. Through education, students become aware of the challenges confronting the globe and comprehend their potential to either solve or contribute to those problems. Schools thus could establish global citizenship through teaching respect, empathy, tolerance, cooperation, and various other activities like cultural exchange, community service, and actual discussions of world issues that allow students to grow into responsible global citizens.

● **Value and Responsibilities of Global Citizens**

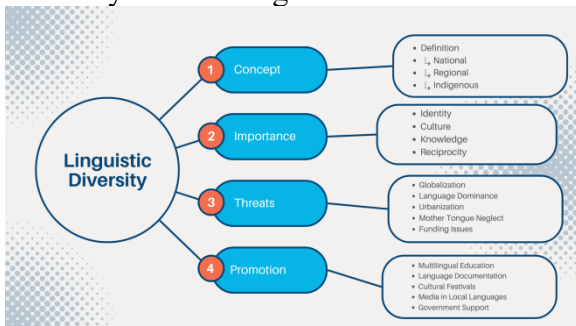
Local and global communities are matters to a global citizen. Global citizens take responsibility for actions: their protection of the environment, and defending human rights. They feel that their choices in life, e.g., to buy, to travel, or to treat people with dignity, factors in the well-being of the planet or a person.

● **Technology and Communication**

Technology and the internet instantly connect people from different countries. Social media, online education, and virtual meetings all contribute to global citizens' experiences of learning, sharing, and working. These tools enable the maturation of perspectives and the building of international friendships and partnerships.

Linguistic Diversity

Linguistic diversity refers to the number and types of languages found in any given region or even on a worldwide scale. Hence, the term includes national, regional, or indigenous classifications. Diversity is a blessing of culture and a reflection of human heritage.



● **Importance of Linguistic diversity**

Whether to identify a person or to carry culture, languages serve countless purposes. Language preservation maintains cultural identity and helps to foster reciprocity among various social groups. When a language becomes extinct, we lose precious knowledge of traditions and history.

- **Threats to Linguistic Diversity**

With globalization on top of the dominance of some of the major languages(English being one), the use of minority languages keeps decreasing. Urbanization, lack of education in mother tongue languages, and less financial support from governments all add to language loss.

- **Linguistic Diversity Promotion**

Schools and governments should encourage multilingual education and include local languages in teaching. Language documentation, cultural festivals, and media in many languages celebrate and sustain linguistic diversity.

Educational equity

Educational equity means access to quality educational opportunities for the students irrespective of their backgrounds or their social or economic status. In this way, they get equitable chances of learning and succeeding.



- **Reason for Educational Equity**

There are barriers to education for many students due to their socioeconomic strata or disabilities, for example. If there is no equity, in essence these students could always end up way behind and in turn secure social inequality.

- **Achieving Educational Equity**

To make education more equitable, governments and schools could give more assistance to students who are underprivileged, select teaching materials that suit childhood development, train teachers for unusually diverse classrooms, and give students access to technology and a safe learning environment.

- **Policy and Community Aspects**

A well-set-up education policy working through a mechanism backed by the community, will surely put equity into place. These programs, including small scholarships, mid-day meals, and free textbooks, can go a long way in bridging the gap. Community involvement helps to customize the solution with respect to the local needs.

Intercultural Competence

The capacity to comprehend, value, and communicate with others from diverse cultural backgrounds is known as intercultural competence. It calls for empathy, sensitivity to variety, and effective communication.

- **The Significance of Intercultural Competence**

People from many cultural, ethnic, and religious origins coexist and work together in our increasingly global world. In communities, organizations, and schools, intercultural competency promotes constructive connections and helps prevent misunderstandings.

- **Gaining Proficiency in Intercultural Competence**

Learning other languages, traveling, participating in cultural exchange programs, and schooling can all help to develop it. By fostering conversations about diversity and encouraging cooperative projects with students from various cultural backgrounds, schools may play a significant role.

- **Competencies Needed**

Listening comprehension, empathy, tolerance, flexibility, and critical thinking are all components of intercultural competency. These enable people to identify points of agreement and value diverse viewpoints.

Conclusion

Multilingual education is a 'transformative' approach and timely in an increasingly interlinked culturally rich world. It is not only a critical contributor to cognitive and linguistic development; it is a fundamental tool for enhancing social inclusion, educational equity, and global citizenship. By embracing students' home languages and fostering respect for diverse cultures, multilingual education dismantles systemic obstacles that push linguistic communities to the sidelines and provide more equitable learning opportunities. In addition, it encourages vital global skills empathy, appreciation for diversity, and collaborative engagement necessary to function in the competitive but interdependent world.

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Chapter : 4

Exploring Consumer Perception Towards Online Advertising In The Personal Care Industry

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Abstract

Digital marketing has transformed the landscape of consumer engagement, particularly in the personal care industry. Online advertising strategies, including social media marketing, influencer promotions, and targeted digital campaigns, have significantly impacted consumer perception and purchasing behavior. This study aims to analyze consumer perception of digital marketing strategies in the personal care industry in Chennai. It explores how digital marketing influences brand awareness, trust, and customer retention. The research provides valuable insights for businesses to enhance their online advertising strategies and build stronger consumer relationships.

Keywords: Digital Marketing, Consumer Perception, Online Advertising, Personal Care Products, Brand Awareness.

Need of the Study

The rapid digitalization of marketing has necessitated a shift in how businesses approach consumer engagement, particularly in the personal care industry. With the increasing use of social media and online advertising, understanding consumer perception of these strategies is crucial for businesses to enhance brand trust and customer loyalty. This study aims to evaluate the effectiveness of various digital marketing strategies in influencing consumer perception and purchase decisions.

Scope of the Study:

The study focuses on consumers in Chennai City and their response to digital marketing strategies adopted by personal care brands. It examines various online advertising techniques, including influencer marketing, social media campaigns, and search engine marketing, to understand their impact on consumer behavior. The findings will be relevant to marketers, advertisers, and

businesses seeking to optimize their digital marketing approaches for better consumer engagement and retention.

Statement of the Problem:

Despite the extensive use of digital marketing, there is limited understanding of how consumers perceive online advertising in the personal care sector. Issues such as ad fatigue, trust concerns, and misinformation impact consumer engagement. This study seeks to identify consumer attitudes towards digital marketing strategies and provide insights into improving the effectiveness of online advertising campaigns.

Objectives of the Study:

1. To analyze consumer perception of digital marketing strategies in the personal care industry in Chennai.
2. To examine the impact of online advertising on consumer purchase decisions.
3. To evaluate consumer trust and engagement with different digital marketing techniques.
4. To identify key factors influencing consumer responses to digital advertisements.
5. To suggest improvements for personal care brands in optimizing their digital marketing strategies.

Review of Literature:

- Mrs. Vijaya Sumathi. M, Dr. B.N. Suresh Kumar (2024). This research examines how social media and digital marketing influence the purchasing behavior of Generation Z consumers in Chennai's cosmetic market. The study utilizes both qualitative and quantitative methods to analyze perceptions, preferences, and buying patterns, providing insights into effective marketing strategies for cosmetic brands targeting Gen Z in Chennai.
- Dr. S. Kannan, Dr. R. Saravanan (2022). This study analyzes consumer perceptions of digital marketing factors affecting purchase intentions for personal care products in Chennai. Through surveys of 125 consumers, the research identifies key elements such as content sharing, convenience, and information quality that significantly influence buying decisions, offering valuable insights for marketers in the personal care sector.
- Dr. S. Kannan, Dr. R. Saravanan (2022), This research examines consumer perception and satisfaction levels regarding social media marketing of personal care products in Chennai. Based on a sample of 79 customers, the study reveals a strong relationship between consumer

perception and satisfaction, highlighting the effectiveness of social media channels in influencing purchasing decisions.

- Dr. S. Kannan, Dr. R. Saravanan (2022), This study explores how social media marketing affects the buying behavior of women consumers in Chennai's cosmetics industry. The research focuses on consumer perception and satisfaction, providing insights into the effectiveness of social media strategies employed by cosmetic brands to engage female consumers.
- Dr. S. Kannan, Dr. R. Saravanan (2024), This research investigates customer perception and satisfaction concerning digital marketing efforts in Chennai. The study provides insights into how digital marketing strategies influence consumer attitudes and behaviors, offering valuable information for businesses aiming to enhance their online marketing effectiveness.

Research Methodology

- **Research Design:** Descriptive research based on secondary data.
- **Data Collection:** Secondary data will be gathered from research articles, industry reports, and case studies related to digital marketing in the personal care sector.
- **Analysis Techniques:** Content analysis and comparative study of digital marketing effectiveness based on existing literature and market reports.

Analysis Part Based on Objectives

1. **Consumer Perception Analysis:** Research findings indicate that consumers perceive digital marketing strategies as informative and engaging, especially when advertisements are interactive and personalized. Studies show that targeted advertising through social media platforms enhances consumer engagement and brand recall. However, excessive ad exposure can lead to ad fatigue, making consumers less receptive to promotional messages.
2. **Impact of Online Advertising on Consumer Purchase Decisions:** Secondary data suggests that online advertising significantly influences consumer purchase decisions in the personal care sector. Reviews, testimonials, and influencer marketing play a crucial role in shaping consumer attitudes toward brands. Consumers rely on digital advertisements to compare products, assess brand credibility, and make informed purchasing choices.

3. **Consumer Trust and Engagement with Digital Marketing Techniques:** Studies reveal that consumer trust in digital marketing is closely linked to brand transparency, authenticity, and user-generated content. Influencer marketing is found to be a highly effective strategy, as consumers tend to trust recommendations from social media influencers over direct brand advertisements. Negative experiences with misleading ads or exaggerated claims reduce consumer trust.
4. **Key Factors Influencing Consumer Responses to Digital Advertisements:** Analysis of industry reports highlights various factors affecting consumer responses to digital ads, including ad relevance, creativity, personalization, and frequency of exposure. Consumers prefer visually appealing and relatable content that aligns with their preferences and values. Personalized recommendations based on browsing history and preferences increase engagement and conversion rates.
5. **Suggestions for Improving Digital Marketing Strategies:** Personal care brands can enhance their digital marketing effectiveness by adopting consumer-centric approaches. Recommendations include optimizing content for relevance, leveraging user-generated content, collaborating with credible influencers, and maintaining transparency in advertising messages. Implementing AI-driven data analytics can help brands target the right audience effectively and reduce ad fatigue.

Findings

- Consumers engage more with personalized and influencer-driven advertisements.
- Trust and transparency play a crucial role in determining the effectiveness of digital marketing strategies.
- Overexposure to ads leads to ad fatigue, affecting brand perception.
- Social media platforms are the most influential channels for personal care product marketing.

Suggestions

- Personal care brands should focus on authentic and engaging content to build consumer trust.
- Influencer partnerships should align with brand values to enhance credibility.
- Businesses should adopt a balanced approach to online advertising to avoid consumer fatigue.

- Data-driven marketing strategies should be implemented to target relevant consumer segments effectively.

Conclusion

Digital marketing strategies play a crucial role in shaping consumer perception and purchase behavior in the personal care industry. The findings of this study highlight that while online advertising enhances brand engagement and visibility, consumer trust and authenticity remain pivotal in retaining customers. Personalization, influencer marketing, and transparency are key elements influencing consumer responses to digital campaigns. However, excessive advertising can lead to consumer fatigue, which diminishes the effectiveness of digital strategies.

The study also reveals that social media platforms are the most effective digital marketing channels, as they provide interactive engagement opportunities for brands and consumers. Consumers increasingly rely on online reviews, testimonials, and influencer endorsements to make informed purchasing decisions. Therefore, personal care brands should prioritize trust-building strategies by ensuring transparency and delivering value-driven content.

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Chapter : 5

Ai Driven Personal Finance Management Tools

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Abstract

The rapid advancement of artificial intelligence (AI) is transforming the way individuals manage their personal finances. AI-driven personal finance management tools utilize machine learning, predictive analytics, and automation to provide users with real-time insights, personalized budgeting, automated savings, and investment recommendations. These tools are reshaping financial behavior by offering tailored guidance based on user-specific data, thereby increasing financial literacy and promoting smarter decision-making.

Introduction

In an increasingly digital world, managing personal finances has evolved far beyond traditional spreadsheets and manual budgeting. The integration of artificial intelligence (AI) into financial technology has given rise to a new generation of personal finance management tools that are smarter, faster, and more personalized than ever before. These AI-driven tools leverage machine learning algorithms, data analytics, and natural language processing to help users understand their financial behavior, automate budgeting, optimize spending, and plan for both short- and long-term goals.

With the ability to analyze large volumes of financial data in real time, AI-powered platforms offer predictive insights and proactive recommendations that were previously only available through professional financial advisors. From tracking expenses and setting budgets to managing investments and planning for retirement, these tools empower individuals to make more informed financial decisions with minimal effort.

As the demand for financial self-management grows, especially among younger, tech-savvy consumers, AI is playing a critical role in democratizing access to personalized financial advice. This

introduction explores the landscape of AI-driven personal finance tools, highlighting their key features, benefits, and potential impact on financial well-being.

Benefits of AI in personal finance

Automation

AI can help automate workflows and processes, work autonomously and responsibly, and empower decision making and service delivery. For example, AI can help a payments provider automate aspects of cybersecurity by continuously monitoring and analyzing network traffic. Or, it may enhance a bank's client-first approach with more flexible, personalized digital banking experiences that meet client needs faster and more securely.

Accuracy

AI can help financial services organizations control manual errors in data processing, analytics, document processing and onboarding, customer interactions, and other tasks through automation and algorithms that follow the same processes every single time.

Efficiency

When AI is used to perform repetitive tasks, people are free to focus on more strategic activities. AI can be used to automate processes like verifying or summarizing documents, transcribing phone calls, or answering customer questions like "what time do you close?" AI bots are often used to perform routine or low-touch tasks in the place of a human.

Speed

AI can process more information more quickly than a human, and find patterns and discover relationships in data that a human may miss. That means faster insights to drive decision making, trading communications, risk modeling, compliance management, and more.

Availability

With AI, you can help your customers complete financial tasks, find solutions to meet their goals, and manage and control their finances whenever and where they are. When running in the cloud, AI and ML can continuously work on its assigned activities.

The Future Of AI In Financial Services

AI will help drive financial services growth. Many organizations have gone digital and learned new ways to sell, add efficiencies, and focus on their data. Going forward, they will need to personalize relationship-based customer engagement at scale. AI plays a key role in helping drive tailored customer responses, make safer and more accountable product and service recommendations, and earn trust by broadening concierge services that are available when customers need them the most.

In addition, financial institutions will need to build strong and unique permission-based digital customer profiles; however, the data they need may exist in silos. By breaking down these silos, applying an AI layer, and leveraging human engagement in a seamless way, financial institutions can create experiences that address the unique needs of their customers while scaling efficiently.

Budgeting and expense tracking

AI can analyse your past financial data and create personalized financial plans and budgets considering income, expenses, investments, and financial goals. Compartmentalize and track your expenses automatically using AI. Identify recurring payments and classify the expenses into different categories through which you can easily identify areas that need optimization.

Credit management and debt reduction

Without the right information, it is difficult to know which financial decisions take your credit score up or down. AI provides personalized recommendations to pay debt easily and improve the credit score faster.

For organizations on the digital transformation journey, agility is key in responding to a rapidly changing technology and business landscape. Now more than ever, it is crucial to deliver and exceed on organizational expectations with a robust digital mindset backed by innovation. Enabling businesses to sense, learn, respond, and evolve like a living organism, will be imperative for business excellence going forward. A comprehensive, yet modular suite of services is doing exactly that. Equipping organizations with intuitive decision-making automatically at scale, actionable insights based on real-time solutions, anytime/anywhere experience, and in-depth data visibility across functions leading to hyper-productivity, Live Enterprise is building connected organizations that are innovating collaboratively for the future.

Conclusion

AI-driven personal finance management tools are revolutionizing the way individuals manage money by offering smart, automated, and personalized financial solutions. From budgeting and saving to investing and forecasting, these tools empower users to make informed decisions with less effort and greater accuracy. However, it's important to remain mindful of data privacy, costs, and the need to occasionally verify AI recommendations with human judgment. As technology continues to evolve, AI tools will become even more integrated into daily life, making personal finance management smarter, more proactive, and accessible to all.

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Chapter : 6

Rewriting Myths: Feminist Reimaginings In Modern Literature

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Abstract

This paper explores how modern literature revisits and reimagines classical myths through a feminist lens. Drawing on feminist literary theory, the study examines how contemporary authors reinterpret patriarchal myths, empowering silenced female voices and challenging normative gender constructs. The analysis focuses on selected works by Margaret Atwood, Chitra Banerjee Divakaruni, and Madeline Miller, among others, to demonstrate the transformative power of feminist retellings. These narratives not only reclaim agency for mythological women but also critique the socio-political structures that have historically marginalized them. The study highlights how feminist rewritings contribute to a broader cultural discourse on identity, power, and resistance.

Keywords: Feminism, mythology, reimagining, gender, retellings, contemporary literature, myth criticism

Introduction

Myths have long served as foundational narratives in every culture, shaping perceptions of gender roles, morality, and power. Traditionally, these narratives have been authored and preserved through male perspectives, often relegating women to roles of subjugation, silence, or secondary importance. With the advent of feminist literary criticism in the 20th century, there has been a critical shift toward revisiting and rewriting these myths to foreground female voices and experiences. Feminist authors, in particular, have used myth as a powerful literary and ideological tool to question, subvert, and reframe patriarchal constructs. This paper investigates how feminist writers reinterpret mythological figures and stories in modern literature, focusing on key works that exemplify this literary strategy.

Theoretical Framework: Feminism and Myth Criticism

Feminist literary theory challenges canonical representations of women and seeks to destabilize the cultural narratives that uphold patriarchal ideologies. As Simone de Beauvoir (1949) asserted, “One is not born, but rather becomes, a woman,” highlighting the social construction of femininity. Feminist myth criticism specifically analyzes how myth has been used to naturalize gender roles and how it can be re-employed to resist such codifications.

Scholars like Adrienne Rich and Hélène Cixous advocate for the reclamation of female narratives through “writing the body” and disrupting the phallogocentric logic of language. Myth, with its archetypal power and symbolic depth, becomes a fertile ground for such rewriting. Feminist retellings serve not only as acts of literary revision but also as cultural resistance.

Rewriting the Greek Myths: Margaret Atwood and Madeline Miller

Margaret Atwood's *The Penelopiad*

In *The Penelopiad* (2005), Margaret Atwood reimagines the *Odyssey* from the perspective of Penelope and her twelve hanged maids. Unlike Homer's epic, where Penelope is the passive, faithful wife, Atwood presents her as an ironic, introspective narrator reflecting on her life from the afterlife. Atwood critiques Odysseus's heroism and questions the morality of the patriarchal justice that led to the maids' execution.

The novel deconstructs the binary of loyal wife vs. cunning hero by revealing the complex emotional and social dynamics Penelope navigated. The use of choral interludes by the maids functions as a counter-narrative, symbolizing the silenced collective voice of women throughout

history. Atwood's feminist lens exposes the gendered double standards inherent in mythic storytelling.

Madeline Miller's *Circe*

Madeline Miller's *Circe* (2018) centers on the eponymous sorceress from *The Odyssey*, who is traditionally depicted as a dangerous, seductive enchantress. Miller transforms her into a multifaceted protagonist—vulnerable, wise, rebellious, and compassionate. Circe's evolution from a marginal figure to an autonomous being encapsulates feminist empowerment.

The novel reclaims Circe's story from patriarchal demonization, portraying her use of magic as a metaphor for female agency. By allowing Circe to narrate her own story, Miller challenges the conventional depiction of women as either monsters or saints in classical mythology.

Indian Myths and Feminist Reinterpretations: Chitra Banerjee Divakaruni and Kavita Kane

Chitra Banerjee Divakaruni's *The Palace of Illusions*

In *The Palace of Illusions* (2008), Divakaruni retells the *Mahabharata* from the perspective of Draupadi (Panchaali), often portrayed as the root of the epic war and a symbol of honor and chastity. The novel delves into Draupadi's emotions, desires, and agency, re-presenting her as an intellectually sharp, politically aware woman navigating the patriarchal framework of the epic.

Divakaruni disrupts the male-centric narrative of the *Mahabharata* by foregrounding Draupadi's inner voice. The text explores the injustice of the *vastraharan* (disrobing) episode not as a point of moral virtue but as a moment of profound violation and silence. Her interpretation raises critical questions about consent, justice, and womanhood in mythic narratives.

Kavita Kane's *Karna's Wife and Sita's Sister*

Kavita Kane's body of work is dedicated to narrating mythic stories from the perspective of lesser-known female characters. In *Karna's Wife* (2013), Kane reimagines Uruvi—a character barely mentioned in the *Mahabharata*—giving her a strong voice and personality. The narrative humanizes Karna while providing a critique of caste, gender, and loyalty through Uruvi's eyes.

In *Sita's Sister* (2014), Kane turns the spotlight on Urmila, Lakshmana's wife, who remains largely invisible in the *Ramayana*. By exploring Urmila's emotional and intellectual sacrifice, the novel contests the glorification of patriarchal values such as obedience and wifely devotion, offering instead a story of silent strength and resistance.

Mythical Archetypes and Gender Fluidity: Jeanette Winterson's *Weight*

Jeanette Winterson's *Weight* (2005), a retelling of the myth of Atlas and Heracles, blends personal narrative with mythical storytelling. Winterson, a queer feminist writer, reconfigures the myth as a meditation on burden, freedom, and identity. The character of Atlas, symbolizing endurance, is juxtaposed with a modern narrator grappling with gender, trauma, and writing.

This intertextual approach demonstrates how myth can be restructured to explore not only feminist ideas but also queer subjectivities and psychological depth. The fluidity of narrative voice, gender roles, and form in Winterson's work exemplifies postmodern feminist myth-making.

Themes and Strategies in Feminist Myth Rewriting

Several recurring themes and strategies can be observed in feminist retellings of myths:

Voice and Narrative Authority: Shifting the narrative perspective from male heroes to female characters reclaims agency and challenges canonical interpretations.

Critique of Patriarchy: Feminist rewritings expose the oppressive structures embedded in traditional myths, questioning gender hierarchies and sexual politics.

Reclaiming the 'Other': Figures traditionally depicted as witches, monsters, or seductresses are humanized, given backstory, motivation, and complexity.

Intertextuality and Hybrid Forms: These retellings often combine genres—myth, memoir, fiction, poetry—to deconstruct the monolithic form of classical texts.

Resistance and Empowerment: The female characters in these stories resist victimhood and redefine strength and resilience on their own terms.

Conclusion

Feminist reimaginings of myths in modern literature serve as powerful acts of literary and cultural resistance. They not only rewrite the roles of women in ancient narratives but also rewrite the cultural memory those myths shape. Authors like Atwood, Miller, Divakaruni, and Kane contribute to a growing corpus of literature that seeks to redress historical silences, challenge hegemonic narratives, and foster more inclusive and diverse interpretations of myth. These retellings underscore the enduring relevance of myth in contemporary identity politics and illustrate how literature can be a transformative space for feminist thought and expression.

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Chapter : 7

A Migrant's Moral Map: Ethics Of Belonging In A Landscape Of Inequality And Injustice In Aravind Adiga's Amnesty

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Abstract

This essay examines the complex overlaps of ethics, belonging, social injustice, and systemic inequality in Aravind Adiga's novel Amnesty. Narrated against the multicultural but exclusionary backdrop of Sydney, the novel traces the story of Danny, an illegal Tamil migrant, as he encounters a moral challenge that determines his survival and sense of being. The research examines how Danny's marginal positionality embodies the moral ambiguities of undocumented life, uncovering the ways in which global systems of migration create opportunities and entrench new modalities of subjugation. This paper engages theoretical insights from postcolonial studies, social justice theory, and the ethics of belonging to contend that Amnesty challenges the fiction of egalitarianism inherent within Western democracies and uncovers the human price of invisibility and fear. Danny's inner struggle—to report an offense and face deportation or keep quiet to save his tenuous existence—becomes one of the metaphors for the moral trap of twenty million migrants moving across unequal world systems. Close textual analysis in this paper makes clear how Adiga redescribes concepts of morality, justice, and identity in a world that is globalizing. Ultimately, Amnesty is offered not just as a literary exploration of migration but as an ethical inquiry into the terms that govern the structures of inclusion and exclusion.

Keywords: Ethics, Inequality, Social Justice, Migration

Introduction

In an age defined by heightened global mobility, economic insecurity, and stringent immigration regimes, stories focused on undocumented migrants have become newly literary and

political in their relevance. Aravind Adiga's *Amnesty* (2020) is a moving novel that captures the psychic and moral traps for migrant workers who are made invisible by the country's legal machinery. Based in Sydney, Australia, the novel traces Dhananjaya Rajaratnam—"Danny"—a Tamil refugee living illegally once his visa lapses. Adiga examines the confluence of migration, ethics, social injustice, and structural inequality in a globalized world that seems to be inclusive on the surface but is intensely exclusionary at the deep level through the prism of Danny's ethical dilemma. Danny, who cleans houses to earn a living, gets information about a murder of his former employer and is torn between revealing the truth and maintaining his anonymity. His internal conflict demonstrates the suffocating tension between legality and morality: "If I told them what I knew, I would be deported. If I said nothing, I would be safe" (Adiga, 2020, p. 12). This moral standoff is not just individual but symptomatic of the illegal immigrant's larger struggle to claim dignity and belonging in societies that criminalize their presence. Danny's crisis exposes the quiet violence inherent in systems that reduce a human being to legal status, and in so doing, strip them of justice, protection, and personhood. The novel's backdrop in a global city such as Sydney, romanticized as multicultural and meritocratic, highlights the paradoxes of globalization: while it enables movement and economic integration for a select few, it strengthens borders and preserves hierarchies for others. As Danny notes, "There's a thin wire between being a human being and a ghost in this country" (Adiga, 2020, p. 90), highlighting the liminal position that he is in—bodily there but legally and socially absent.

This paper discusses how *Amnesty* reveals the moral complications and injustices inherent in the migrant condition. Through the narrative focus on Danny's moral journey, the research discusses how Adiga employs the story to critique structural exclusion and redefine questions of justice, identity, and belonging. The paper concludes that *Amnesty* is not just a migrant's story, but a deep inquiry into what it means to pursue dignity in a world organized by inequality and silence.

Theoretical Framework

The socio-political and ethical aspects of *Amnesty* can be explored through a multidisciplinary theoretical framework consisting of the ethics of belonging, social justice theory, and postcolonial migration studies. These theories enable one to untangle the novel's borrowing from the lived realities of the undocumented migrants, especially the protagonist Danny, whose ethical struggles are intertwined with larger systemic exclusions.

Nira Yuval-Davis (2011) theorizes the ethics of belonging as a model with which to think through how people are included or excluded from the social and moral life of a nation. Belonging,

for her, is not merely citizenship or legality but also emotional, cultural, and ethical belonging. Danny's perpetual anxiety about getting caught and his liminal status in Australian society reflect this dynamic: "There's a thin wire between being a human being and a ghost in this country" (Adiga, 2020, p. 90). His undocumented status makes him socially invisible, depriving him of ethical belonging, even though he is emotionally deeply invested in his surroundings. In the field of social justice, John Rawls (1971) stresses equality as the basis of justice, calling for equal opportunity and liberty for everyone. Danny's fragile life, however, defies the presumption of equal moral value in liberal democracies. Nancy Fraser (2000) takes this discussion further by recognizing misrecognition as a type of injustice, where cultural undervaluation and institutional exclusion bar people from being included in social life. Danny, despite his economic contribution, is systematically denied rights and recognition. The postcolonial model also places Danny's exclusion in context. Homi Bhabha (1994) characterizes the "third space" as one of hybridity and displacement, and this well fits Danny's situation—neither entirely Indian nor embraced as Australian. Edward Said (1978) also criticizes how Western cultures typically represent and control the identities of postcolonial migrants as passive objects or dangers. Danny's identity is formed not according to who he is but according to how the state and society decide to see him. Using these theoretical lenses, the paper situates *Amnesty* as a narrative that not merely lays bare individual moral dilemma but also challenges the structural injustices yielded by legal boundaries, cultural exclusion, and neoliberal global structures.

Discussion

In the center of Aravind Adiga's *Amnesty* is the identity crisis of Dhananjaya "Danny" Rajaratnam, an illegal Tamil migrant in Sydney. The journey of Danny is not just a physical one from Sri Lanka to Australia, but also an existential journey into moral complexity, cultural displacement, and psychological loneliness. Since he is an illegal resident, Danny's identity remains in a perpetual state of transition, torn between wanting to be ethical and fearing deportation. This state of being unstable corresponds to what Nira Yuval-Davis (2011) describes as the "ethics of belonging," whereby identity is constructed not just through self-conception but through the forms of inclusion and exclusion in the host society. Danny's illegal status makes him socially invisible as well as morally torn. He observes, "You don't exist, mate. You're a ghost. You float above the surface of the law" (Adiga, 2020, p. 103). This becomes a summary of his ontological marginality—neither here nor not here. Despite doing socially useful work, cleaning houses, making cash payments, and staying clear of crime, he is legally non-existent. This invisibility, therefore, directly defies Rawls' (1971) idea of justice as fairness because Danny is denied both his basic liberties and

institutional protection. Danny's inner conflict arises once he learns that his previous employer had committed a murder. Should he report the crime and face deportation, or keep silent and ethically complicit? This tension is a reminder of his fight for ethical agency in a system that gives him none. As he goes on, "To be a good man was to know when to shut up. And to be a bad man was to talk too much" (Adiga, 2020, p. 182). His conflict is not one of right versus wrong, but of survival within a hostile system in which morality has no payoff. Yuval-Davis (2011) points out that belonging is about emotional connection, social engagement, and political legitimacy. Danny emotionally connects with Sydney—its streets, its people, its culture—but is not legally or politically included. He reminisces fondly about learning English from Australian TV and adopting the accents of his clients (Adiga, 2020, p. 41). These small gestures are his attempt at assimilating, at ethically and emotionally belonging to a nation that refuses to acknowledge his presence.

However, the novel disrupts the binary of belonging and exclusion. Danny is not entirely alien nor entirely assimilated; he exists in a "third space" (Bhabha, 1994), where his hybrid self resists simplification. He says, "I loved Australia. I just wasn't sure it loved me back" (Adiga, 2020, p. 145), a statement that encapsulates the affective complexity of undocumented migrants who aspire not just for survival but for dignity and recognition. Danny's identity is informed by the morality of adaptation, silence, and invisibility. Without institutional justice, he charts a moral map based on personal sense, cultural recall, and affective hardness. Through this, Adiga discloses how undocumented subjects forge ethical selves within unfriendly social worlds, rewriting what it is to belong in a world governed by borders and hierarchies.

Aravind Adiga's *Amnesty* critically reveals the underlying forms of social injustice and institutionalized inequality that organize the lives of illegal migrants such as Danny. The novel's location—Sydney, global city par excellence, and yet widely lauded as multicultural—then becomes a contradictory place where racialized hierarchies, class privilege, and immigration policy make invisible and marginalize those who exist beyond legality. Danny's lived experience is one through which Adiga critiques not just Australian immigration systems but also the global mechanisms that cause marginalization. The Australian immigration system is depicted as inflexible and dehumanizing, granting no moral flexibility to someone like Danny. Despite entering legally on a student visa, his status becomes illegal when he stops attending school because of financial difficulty. This makes him a "non-person," a category that denies him legal recourse and human dignity. Reflecting on this, Danny says, "They can wipe you out with the stroke of a pen. You don't

matter to them. You're paperwork, nothing more" (Adiga, 2020, p. 56). The machinery of bureaucracy, unmoved by the life of each person, supports the ideology that illegals are expendable.

His situation is compounded by class and racial ranking. His labor as a cleaner positions him at the lowest rung of the labor economy, where his visibility is tolerated only if he keeps it hidden. His employers gain from his labor but are also equally guilty of perpetuating his precarity. One client threatens, "If you get caught, I'll deny I ever knew you" (Adiga, 2020, p. 88), revealing how the privileged use undocumented workers while keeping themselves out of accountability. This is in line with Nancy Fraser's (2000) contention that economic exploitation and cultural misrecognition usually overlap to sustain systemic injustice. Additionally, Danny's anxiety is not simply psychological but is created and sustained by institutional mechanisms. His everyday existence is guided by an over-consciousness of surveillance and state control. "Every white van, every cop, every loud noise could mean the end," he recounts (Adiga, 2020, p. 101). This state of heightened vigilance is the psychic cost of a society that illegalizes life beyond legal categories.

As Edward Said (1978) argues, Western institutions tend to "orientalize" and other migrants, making them objects of fear and domination instead of empathy and membership. These systems of injustice are not specific to Australia. As an international phenomenon, neoliberal economies rely on the exploitation of illegal labor without granting those same workers citizenship, protection, or political voice. Danny is representative of a global underclass, whose work is necessary but whose humanity is disposable. His invisibility is not random but systemic—a characteristic, not a defect, of capitalist modernity. Adiga's portrayal of Danny challenges the myth of Western egalitarianism. It reveals how immigration laws, economic systems, and racialized power dynamics collaborate to perpetuate inequality. As Danny poignantly observes, "To them, I'm not a man. I'm a threat, a smudge on the surface of their clean city" (Adiga, 2020, p. 137). This sentence captures the deep alienation and injustice faced by undocumented individuals across the globe, trapped within systems that offer no redemption. At the core of Aravind Adiga's *Amnesty* is a wrenching ethical dilemma: should Danny, an illegal immigrant, inform on a murder he has witnessed, or keep quiet to preserve his tenuous life in Australia? This central dilemma is not only a plot turn but an abiding consideration of how survival within an unfair system can distort or redefine ethical thinking. Danny's decision-making process is played out in the real time of a single day to point out how ethical compromise becomes unavoidable when survival is at stake.

Danny's dilemma is compounded by his lack of protection under the law. His terror is not hysterical but based on structural reality: "If I told them what I knew, I'd be deported. If I said

nothing, I'd be safe" (Adiga, 2020, p. 12). This dark dichotomy places him in a moral no-man's land, where being good (doing the right thing) is the same as suicidal behavior. The survival impulse, as theorized within contexts of undocumented life, tends to override standard ethics, producing what sociologist Didier Fassin (2011) refers to as "moral economies of survival"—contexts in which the subjugated people are forced to make moral choices operating in the terms set by injustice. Danny's inner conflict unveils the profound impacts of structural violence—a systemic form of oppression incorporated within institutions and social norms that constrain life chances for marginalized groups. He is perpetually reminded that "justice" was not made for people such as himself: "Even if I help them, I will still be nobody. Nothing. Just a cleaner who shouldn't be here" (Adiga, 2020, p. 146). His disillusionment with the police and the justice system is symptomatic of the loss of confidence between subaltern people and the institutions of power.

In this regard, Danny's moral compass is not lost—it is reoriented by circumstances. As he explains, "Good and bad weren't opposites anymore; they were just different kinds of wrong" (Adiga, 2020, p. 178). The moral uncertainty in this case lays bare that survival tends to push migrants to the point of having to do anything, silence or confession, which is marred by possible loss. Danny is not an anti-hero but a survival subject—a character who exists on the moral wasteland left behind by exploitative regimes. Danny's dilemma is also symbolic of a greater concern: how justice functions unevenly in neoliberal democracies. The institutions that are supposed to safeguard him are out of reach; his visibility appears only when criminalized. Precarity is politically manufactured, some lives being made more "grievable" than others, philosopher Judith Butler (2004) contends. Danny's life, in this context, does not count until it interrupts the normative legal order. His eventual choice to speak, though risky, is an assertion of ethical agency within a system that denied him personhood.

Conclusion

Aravind Adiga's *Amnesty* is a powerful inquiry into the ways that migrants confront identity, ethics, and justice in the shadow of illegality. The journey of Danny reveals the psychological strain and ethical dilemmatic wrought by social marginalization and legal vulnerability. From his illegal status and social invisibility to the tormenting choice of doing what is right or remaining alive, Danny becomes the incarnation of the ethical contradictions that characterize the lives of the global underclass. This paper has shown that Danny's moral map is informed not in a vacuum, but in the structures of institutional inequality, social injustice, and global systems of marginalization. The novel critiques liberal society's myth of egalitarianism by laying bare how the law is used to perpetuate class and racial hierarchies, even as it pretends to defend justice. Danny's final choice to

speak out, despite his danger, is not only an act of personal bravery but one of symbolic redemption of his humanity. It is a defiance to be irretrievably silenced by systems that measure worth in terms of legality. As Danny avows, "I am here. I exist. I matter, even if only for a moment" (Adiga, 2020, p. 211). This forceful statement summarizes Amnesty's greater message: that moral agency continues even amidst exclusionary conditions, and that justice should be gauged not according to its ideals but by its reach to the most marginalized. In an age so defined by borders, surveillance, and exclusion, Adiga's novel provokes readers to consider the human cost of global inequality. It compels a reconsideration of what it means to belong—and who can make that determination.

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Chapter : 8

Multilingual Micro Learning Modules In Commerce: A New Wave In Outcome-Based Education

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Abstract

In an era where Outcome-Based Education (OBE) is reshaping the landscape of higher education, the integration of micro learning and multilingual content emerges as a strategic response to the diverse learning needs of students. Particularly in Commerce education, where abstract concepts and evolving digital tools often challenge comprehension, Multilingual Micro learning Modules (MMMs) offer a compelling solution. The present study investigates the design, implementation, and pedagogical impact of MMMs tailored for undergraduate students pursuing Commerce with Information Technology in semi-urban colleges.

The MMMs, developed in both English and Tamil, present key concepts in accounting, business communication, and digital tools through short, focused, and engaging digital content. The action research methodology employed in this study enables real-time feedback and iterative refinement of the modules. The findings indicate that multilingual delivery not only reduces cognitive load but also enhances conceptual clarity, fosters deeper engagement, and improves content retention. Most importantly, it creates an inclusive learning environment for first-generation learners and those from non-English medium backgrounds.

Aligned with the goals of the National Education Policy (NEP) 2020 and OBE frameworks, the study proposes a replicable and scalable model for integrating MMMs into Commerce curricula. The research advocates for institutional adoption of micro learning as a bridge between traditional pedagogy and learner-centric digital education, thereby redefining the accessibility and effectiveness of higher education in India.

Keywords: Microlearning, Multilingual Education, Outcome-Based Education, Commerce Pedagogy, Vernacular Learners, Digital Modules

Introduction

Commerce education today is increasingly challenged to cater to diverse learners with varying linguistic backgrounds, particularly in India where English is often not the first language. Traditional teaching models, when not supplemented with accessible digital tools, create barriers to comprehension and participation. The National Education Policy (NEP) 2020 strongly advocates for mother tongue-based education and integration of digital content.

Microlearning, characterized by brief and focused learning units, delivered often via mobile-friendly platforms, can address attention fatigue and enhance retention. This paper introduces Multilingual Microlearning Modules (MMMs) as a method to combine pedagogical accessibility with digital innovation for Commerce with Information Technology students.

Objectives

- To design and implement multilingual micro learning modules for key Commerce topics.
- To measure their impact on academic performance, engagement, and self-confidence.
- To explore their compatibility with Outcome-Based Education.

Literature Review

Studies by Mayer (2001) on multimedia learning underscore that reducing extraneous cognitive load improves understanding. In multilingual contexts, students grasp concepts better when taught in both English and their native language (Mohanty, 2009). Microlearning, as studied by Hug (2005), has shown promise in corporate training and increasingly in academic environments, especially with Generation Z learners.

The Outcome-Based Education model emphasizes clear learning outcomes and competency demonstration. When paired with multilingual, digital pedagogy, it creates a learner-centric model fit for 21st-century education.

Methodology

An action research methodology was employed. The study involved 60 B.Com (Information Technology) students from a semi-urban college in Tamil Nadu.

Intervention

- 8 micro learning modules created on topics like: Introduction to GST, Journal Entries, Excel Basics, Tally Shortcuts, and Business Email Writing.
- Videos were 3–5 minutes long, provided in English with parallel Tamil explanation or subtitles.
- Delivered via WhatsApp and Google Classroom.

Data Collection

- Pre- and post-intervention assessments.
- Feedback through Google Forms.
- Focus group discussion to gather qualitative insights.

Analysis and Findings

- Academic Improvement: Average test scores improved from 56% to 74%.
- Engagement: 87% of students preferred bilingual content, citing better clarity.
- Accessibility: 95% found videos easier to revisit than textbooks.
- Confidence: Students reported greater comfort using IT tools and explaining Commerce terms.
- Student Voices:
 - "I finally understood what debit and credit really meant."
 - "Tally entries in Tamil helped me practice without fear."

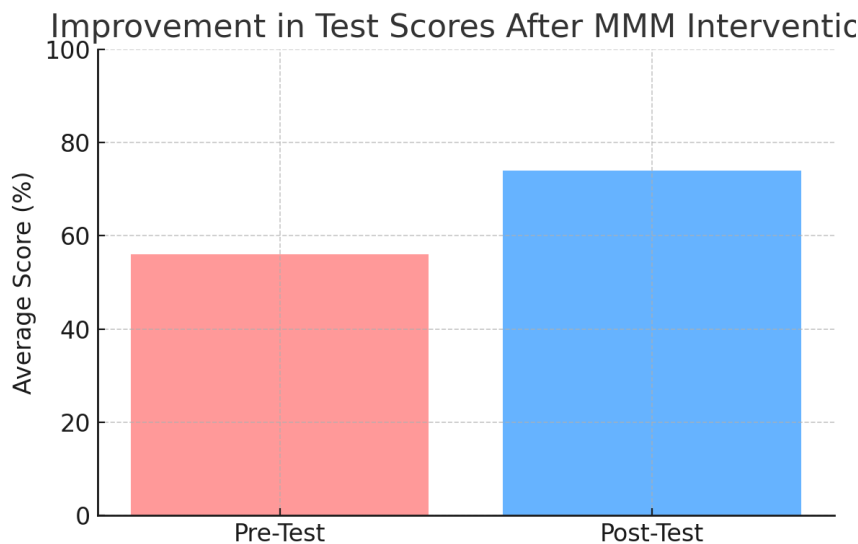


Figure 1: Average test score improvement before and after MMM intervention

Discussion

The data confirm that MMMs enhance understanding, especially for first-generation learners. Digital delivery bridges gaps in classroom explanation, and bilingual content respects cultural-linguistic backgrounds.

By aligning MMMs with Bloom's Taxonomy and CO-PO mapping under OBE, educators can ensure targeted competencies are being achieved. This model is scalable across institutions and adaptable in other Indian languages.

Conclusion

Multilingual Microlearning Modules stand at the intersection of equity, technology, and pedagogy. These modules address systemic issues in Commerce education delivery while aligning with national policy goals. Institutions should consider adopting such models to nurture inclusive, outcome-driven classrooms.

Recommendations

- Encourage faculty training in micro-content creation.
- Institutional support for bilingual academic content.
- Collaborations with edtech platforms for regional content.

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Chapter : 9

AI-Powered Pedagogy: A Model For Innovation In Teaching And Learning

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Abstract

The incorporation of Artificial Intelligence (AI) into the educational landscape marks a significant shift, revolutionizing traditional teaching practices to align with the evolving demands of a digitally advanced society. This paper investigates AI-driven pedagogical innovations, focusing on their capacity to deliver personalized learning experiences, promote critical thinking, and boost teaching effectiveness. Employing an exploratory and conceptual research methodology, the study draws from scholarly journals, academic literature, and educational policy frameworks, utilizing thematic and comparative analysis techniques. Key findings underscore the transformative role of AI technologies such as intelligent tutoring systems and generative AI in catering to diverse student needs. At the same time, the research brings attention to critical concerns, including algorithmic bias, privacy and data protection, and the preparedness of educators to integrate such tools effectively. In response to these complexities, the paper introduces the AI-TEACH Model a strategic framework for guiding AI integration in education. This model advocates for Transformative Learning, Ethical AI Use, Adaptive Learning Pathways, Collaborative Learning Environments, and Holistic Student Development. It serves as a roadmap for leveraging AI to improve teaching outcomes while upholding the values of inclusivity, fairness, and innovation. The study concludes with practical recommendations aimed at educators, institutional leaders, and policymakers for aligning AI applications with broader educational goals.

Keywords: AI-powered Pedagogy, Innovative Teaching Practices, Personalized Learning, Intelligent Tutoring Systems, Generative AI in Education, AI-TEACH Model.

Introduction

The integration of Artificial Intelligence (AI) into education marks a paradigm shift in how knowledge is imparted and acquired, showcasing the transformative potential of emerging technologies in shaping the future of learning. This shift aligns with the rapid advancement of AI technologies, which have been recognized as pivotal in addressing modern educational challenges (Xu & Babaian, 2021). As education systems worldwide grapple with the complexities of catering to diverse learner needs, AI offers solutions through adaptive, data-driven, and personalized learning experiences (Dai et al., 2024). By leveraging AI tools such as intelligent tutoring systems, predictive analytics, and immersive technologies, educators can create dynamic and responsive learning environments that transcend the limitations of traditional pedagogical practices (Zreik, 2023).

Pedagogical innovation is crucial in this era of rapid technological advancement, where traditional, one-size-fits-all teaching approaches often fail to effectively engage students or address individual learning gaps. AI-powered innovative practices have demonstrated their potential to enhance engagement and foster critical thinking, creativity, and collaborative skills—key competencies for the 21st century (Kong et al., 2024). Furthermore, AI integration in pedagogy empowers educators by streamlining administrative tasks, optimizing resource planning, and enabling continuous professional development (Kapoor et al., 2023).

Despite the increasing adoption of AI in education, significant gaps remain in understanding its optimal utilization for pedagogical innovation. Current research predominantly focuses on isolated applications of AI tools, such as analogy-based approaches for K-12 education (Dai et al., 2024) or AI-driven curriculum development in higher education (Rufrano & Yeung, 2023), with

limited exploration of comprehensive frameworks that integrate AI across educational contexts. Additionally, challenges such as data privacy concerns, algorithmic biases, and the

This paper aims to address these gaps by examining innovative pedagogical practices enabled by AI and their implications for teaching and learning. The scope of this study encompasses an analysis of current AI-powered tools and methodologies, their impact on student outcomes and educator effectiveness, and the challenges and ethical considerations associated with their implementation. By synthesizing insights from existing literature and real-world case studies, this paper seeks to provide actionable recommendations for stakeholders in education, including teachers, administrators, policymakers, and technology developers.

Literature Review

The integration of Artificial Intelligence (AI) into education, or AIEd, has emerged as a pivotal area of research, offering transformative solutions to long-standing challenges in teaching and learning. AI is broadly defined as systems capable of performing human-like cognitive tasks, with applications categorized as learner-oriented, instructor-oriented, and institutional system-oriented (Gomathi et al., 2022; Guan et al., 2020). Early AIEd research centered on intelligent tutoring systems, which mimicked teacher-student interactions to provide personalized feedback. Over time, advancements in big data and learning analytics have enabled AI systems to deliver highly personalized learning experiences, tailored to individual student needs and performance trends (Guan et al., 2020).

Studies have highlighted the growing adoption of AI technologies to address the limitations of traditional pedagogical practices. Traditional teaching methods, often rooted in rote memorization and uniform curricula, fall short of catering to diverse learning needs or fostering critical thinking and creativity. These methods have led to disengagement and inequities in learning outcomes, emphasizing the need for adaptive and innovative approaches. AI tools such as adaptive learning platforms, intelligent tutoring systems, and simulation-based training frameworks have shown promise in bridging these gaps (Hamid et al., 2022; Yu & Wang, 2024).

The literature also points to significant progress in specific educational contexts. For example, Turkey's Ministry of National Education's AI Strategy underscores the role of AI in shaping inclusive policies and practices, while also highlighting the need for qualified educators to implement these strategies effectively. Additionally, assistive AI technologies are proving valuable for students with developmental and intellectual disabilities, demonstrating the potential for broader accessibility and inclusivity in education (Sistemleri et al., 2021).

However, despite these advancements, challenges persist. Ethical concerns, such as biases embedded in AI algorithms, raise questions about fairness and equity in AI-driven education. Privacy and data security issues further complicate the adoption of AI technologies, especially in sensitive educational contexts. Technical difficulties, including inadequate infrastructure and insufficient training for educators, remain significant barriers to effective implementation (Guan et al., 2020; Hamid et al., 2022; Loftus & Madden, 2020; Zreik, 2023).

While AI has enabled new models of adaptive learning, virtual classrooms, and immersive educational experiences, research gaps remain in understanding the long-term impacts of these technologies. There is also a need for comprehensive frameworks to address the ethical and technical challenges associated with their widespread use (Asad et al., 2024; Bearman & Ajjawi, 2023; Loftus & Madden, 2020; Sistemleri et al., 2021).

In conclusion, the literature reveals that AI offers unprecedented opportunities to transform education by addressing the limitations of traditional pedagogies and fostering personalized, inclusive, and efficient learning environments. However, realizing its full potential requires a

concerted effort to overcome ethical, technical, and infrastructural barriers, ensuring that AI-driven education is both effective and equitable.

Research Methodology

This study adopts an exploratory and conceptual research approach to examine the transformative potential of Artificial Intelligence (AI) in reshaping pedagogical practices and to propose the AI-TEACH Model—a comprehensive framework for AI integration in education. The research relies exclusively on secondary data, synthesizing insights from a wide range of peer-reviewed articles, academic publications, and policy documents.

The literature review was conducted using reputable academic databases, including Scopus, Web of Science, and Google Scholar, with targeted keywords such as "AI in education," "intelligent tutoring systems," and "AI- powered learning." Inclusion criteria focused on recent, relevant, and high-quality publications that address the role of AI in education.

The qualitative analysis involved thematic and comparative evaluations to uncover trends, opportunities, and challenges in implementing AI-driven pedagogical innovations. Key themes identified include personalized learning, ethical considerations, adaptive systems, collaborative environments, and holistic development, which formed the foundation for the proposed AI-TEACH Model. The development of the AI-TEACH Model was guided by a systematic synthesis of existing frameworks (e.g., SAMR, TPACK, UDL) and emerging insights from AI in education literature. The model was designed to address gaps in current frameworks, such as the lack of emphasis on ethical AI practices and holistic student development.

Historical Evolution of AI in Education

The application of Artificial Intelligence (AI) in education has undergone a significant transformation since its inception, reflecting advancements in technology and evolving pedagogical needs. The origins of AI in education trace back to the 1960s with the development of early intelligent tutoring systems (ITS), such as SCHOLAR, which used natural language processing to teach geography. These systems, though basic, laid the groundwork for AI's potential to personalize learning experiences. By the 1980s and 1990s, systems like ANDES and AutoTutor further refined this potential through adaptive feedback mechanisms and dialogue-based learning, enhancing student comprehension (Guan et al., 2020; Kapoor et al., 2023).

The early 21st century marked a pivotal phase in the historical trajectory of AI in education, driven by advancements in computational power and machine learning algorithms. Learning management systems (LMS) began incorporating AI to monitor student progress and tailor content delivery, setting the stage for more individualized learning. Concurrently, the rise of big data analytics enabled AI systems to analyze extensive datasets, offering insights into learning behaviors and predicting student performance. This period also saw the integration of technologies such as natural language processing (NLP), computer vision, and deep learning, which facilitated the development of immersive tools like virtual reality (VR), augmented reality (AR), and gamified learning platforms (Guan et al., 2020; Hamid et al., 2022).

Between 2000 and 2019, the focus of AI research in education shifted significantly. The early 2000s emphasized the design and implementation of online education systems, introducing Virtual Reality as a sub-theme to create immersive classroom experiences. By the following decade, big data technologies catalyzed the emergence of learning analytics and student profiling models. These developments contributed to the creation of adaptive learning technologies and intelligent tutoring systems, marking a shift from traditional instructional methods to personalized and data-driven approaches (Guan et al., 2020).

The integration of AI into education has also been shaped by broader societal and institutional trends. For instance, Turkey's Ministry of National Education included AI in its 2023

Education Vision Document, emphasizing data-driven decision-making to improve educational outcomes. This aligns with global efforts, such as the Education 2030 Agenda, which aims to ensure inclusive and equitable quality education through innovative solutions like AI. In developing nations like Bhutan and Kyrgyzstan, AI initiatives are at an exploratory stage, with efforts underway to create integrated education information management systems for personalized learning support (Garg & Sharma, 2020; Sistemleri et al., 2021).

The evolution of AI in education has not been without its challenges and milestones. The landmark victory of AlphaGo over world Go champion Lee Sedol in 2016 spurred global interest in AI technologies and their applications in education. Subsequently, adaptive learning systems, powered by data mining and real-time analytics, emerged as a transformative innovation, providing personalized learning paths for students. Companies like BYJU'S and ALEKS exemplify this shift, offering platforms that leverage AI for customized educational experiences (Hamid et al., 2022).

As AI technology continues to advance, its role in education is expected to expand further, fostering more personalized, efficient, and effective teaching methods. From early ITS to modern AI-powered platforms, the historical evolution of AI in education highlights a persistent drive toward harnessing technology to meet the diverse needs of learners and educators alike.

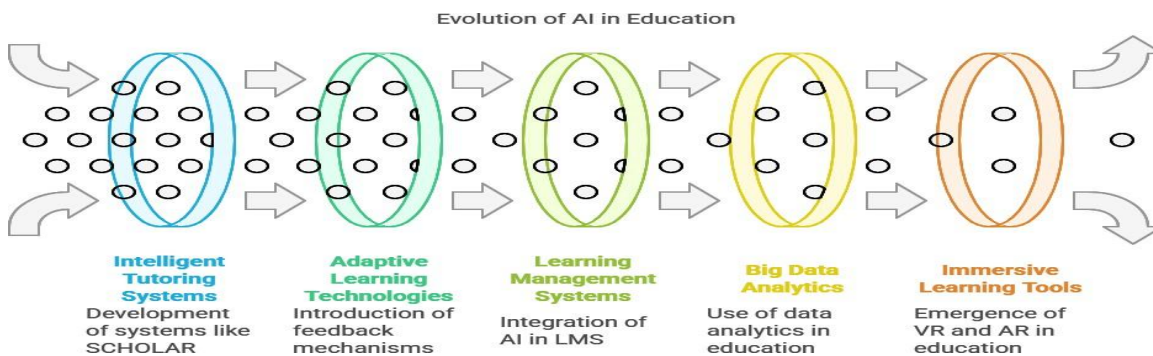


Figure -1 Evolution of AI in Education

Challenges in Traditional Pedagogical Methods

Traditional pedagogical methods have faced numerous challenges, particularly in adapting to the diverse needs of students and the evolving educational landscape. A significant issue has been the lack of personalized instruction, which often failed to accommodate individual learning styles and paces, resulting in suboptimal learning experiences for many students (Guan et al., 2020; Sistemleri et al., 2021). The rigidity of these methods hindered the ability to cater to diverse learner profiles, leaving some students behind while others progressed too quickly (Iranmanesh & Lotfabadi, 2024; Sistemleri et al., 2021).

The integration of technology in earlier pedagogical models was limited and often inefficient. Conventional tech-enabled instructional designs struggled to keep up with advancements, leading to a decline in their effectiveness and relevance (Guan et al., 2020). Additionally, inadequate teacher training programs exacerbated these issues, as educators were often unprepared to incorporate digital tools into their teaching practices effectively (Sistemleri et al., 2021).

Challenges also arose in the implementation of new educational technologies. The need for substantial technological and pedagogical adjustments often posed barriers, while issues such as privacy and data security concerns remained largely unaddressed (Hamid et al., 2022; Sistemleri et al., 2021). Many pre-service and in-service teachers lacked the skills to support innovative teaching methods, further limiting the adoption of new systems (Sistemleri et al., 2021). Moreover, traditional

methods frequently relied on time-consuming assessment tasks, such as manual grading and test analysis, which reduced efficiency and detracted from the teaching-learning experience (Hamid et al., 2022).

The absence of comprehensive public policies on artificial intelligence (AI) and sustainable educational development further compounded these challenges. This policy gap hindered the exploration of AI's potential in addressing systemic inefficiencies (Jiménez-García et al., 2024; Okagbue et al., 2023). The reliance on outdated approaches also restricted engagement and social interaction among students, essential elements for holistic education in the modern era (Hamid et al., 2022).

Overall, these challenges highlight the limitations of traditional pedagogical methods in fostering effective, equitable, and engaging learning environments. Emerging AI-powered innovations are gradually addressing these issues, enabling personalized instruction, efficient assessments, and improved access to quality education (Guan et al., 2020; Hamid et al., 2022). However, addressing the foundational challenges of traditional methods is critical for building a robust and sustainable educational framework.

Role of AI in Predicting Student Learning Outcomes

Artificial Intelligence (AI) has revolutionized the prediction of student learning outcomes by leveraging advanced data analytics and machine learning techniques. AI-powered learner models track and analyze various factors such as student knowledge, engagement, and academic performance. These insights enable timely administrative support and guidance throughout the academic journey, ensuring that individual needs are met effectively (Guan et al., 2020; Harris & Kiefer, 2004; Okagbue et al., 2023).

One of the most impactful applications of AI in education is predictive modeling, which is central to educational data mining. By identifying at-risk students and implementing early alert systems, AI facilitates the development of targeted remediation strategies to support these learners. Predictive models rely on AI algorithms, including artificial neural networks and decision trees, to enhance accuracy in assessing student performance and retention (Guan et al., 2020; Jiménez-García et al., 2024).

AI systems also analyze demographic variables and past academic achievements to forecast drop-out rates and overall academic success. This allows educational institutions to devise strategies for improving retention and graduation rates. Additionally, AI applications relieve academic and administrative staff from repetitive tasks, enabling them to focus on complex, student-specific challenges (Hamid et al., 2022; Jiménez-García et al., 2024).

Moreover, AI technologies provide personalized learning plans tailored to individual knowledge levels and skillsets, thereby improving educational outcomes. For example, intelligent adaptive learning systems offer one-to-one teaching experiences by identifying knowledge gaps in real time and providing relevant resources and guidance. These systems ensure that learning is optimized for each student, increasing the likelihood of academic success (Hamid et al., 2022; Sistemleri et al., 2021).

AI's ability to perform continuous monitoring of students' academic trajectories—from early education to graduation—has made it a critical tool for predicting learning outcomes. This comprehensive approach allows for timely interventions, ensuring that students achieve their full potential. Additionally, by automating the evaluation of competencies, such as through test grading or homework analysis, AI provides insights into students' strengths and weaknesses, enabling better instructional strategies (Guan et al., 2020; Sistemleri et al., 2021).

Role of AI in Education Management Information Systems and Learning Management Systems

Artificial Intelligence (AI) plays a pivotal role in transforming Education Management Information Systems (EMIS) by enabling advanced data analytics that streamline decision-making processes and enhance the efficiency of educational management. By analyzing structured and unstructured data from diverse stakeholders, including students, teachers, and administrators, AI helps shape evidence-based policies and practices, improving overall institutional performance (Jiménez-García et al., 2024; Sistemleri et al., 2021; Zhan et al., 2022).

The integration of AI in EMIS facilitates the collection and analysis of large datasets, enabling more effective resource allocation and the identification of trends in student performance, attendance, and institutional metrics. These insights help educational institutions personalize learning experiences and create adaptive strategies to meet individual needs. AI also supports the development of applications to optimize resource utilization and policy implementation (Jiménez-García et al., 2024; Loftus & Madden, 2020).

The evolution from EMIS to Learning Management Systems (LMS) has been marked by the incorporation of AI technologies, which enable adaptive learning paths and personalized educational content. AI-powered LMS solutions provide real-time feedback and assessment tools, allowing educators to identify areas where students require additional support and tailor their teaching strategies accordingly (Hamid et al., 2022; Sistemleri et al., 2021).

AI-driven data analytics within LMS enhance the educational experience by automating administrative tasks, such as grading, attendance tracking, and progress monitoring. This reduces the workload on educators and allows them to focus on improving teaching quality and student engagement. Furthermore, the use of AI enables the creation of smart educational materials that adapt to the learning pace of each student, moving away from traditional one-size-fits-all approaches (Hamid et al., 2022; Pedro et al., 2019).

The transition to AI-enhanced LMS represents a shift towards interactive and responsive learning environments. These systems leverage immersive and interactive content, fostering greater engagement and improving learning outcomes. By combining data-driven insights with personalized learning experiences, AI ensures that educational frameworks are dynamic and continuously improving (Carradini, 2024; Hamid et al., 2022).

AI Enhancing Teacher Capabilities

AI technologies are revolutionizing the teaching profession by reducing administrative burdens, offering actionable insights, and facilitating professional growth. These advancements empower educators to concentrate on creative and strategic aspects of teaching, ultimately improving the quality of education delivered.

AI as an Assistant in Lesson Planning and Resource Allocation

AI-driven tools are instrumental in helping educators create effective lesson plans and allocate resources efficiently. Platforms like ScribeSense and Planboard utilize AI to analyze curriculum objectives, suggest teaching strategies, and recommend multimedia content tailored to diverse learning goals. These tools ensure educators can align lesson delivery with students' needs while saving time on manual planning tasks (Jiménez-García et al., 2024).

Furthermore, AI systems, such as Classcraft, leverage learning analytics to monitor student engagement and recommend resources or activities that address individual learning gaps. This capability ensures dynamic resource allocation, enabling educators to respond to varying classroom demands efficiently and enhance their teaching effectiveness (Jiménez-García et al., 2024).

Automating Grading and Assessment

AI technologies have transformed the grading and assessment processes, one of the most time-intensive tasks for educators. Platforms like Gradescope use machine learning algorithms to automate the evaluation of assignments, quizzes, and essays, providing consistent grading and

detailed feedback. This automation not only improves accuracy but also allows educators to devote more time to personalized instruction (Hamid et al., 2022).

For subjective assessments, AI systems equipped with natural language processing (NLP), such as Turnitin's AI grading tools, evaluate essays based on grammar, coherence, and argument strength. These tools ensure timely feedback for students, which is critical for their learning progress. AI-powered formative assessments further enhance the teaching process by offering real-time quizzes and adaptive testing, enabling educators to adjust their strategies based on immediate performance insights (Hamid et al., 2022).

AI Tools for Continuous Faculty Development

AI fosters continuous faculty development by offering personalized learning pathways and professional growth opportunities for educators. Platforms like Coursera for Educators and Edthena leverage AI to recommend courses and resources based on individual teaching styles, interests, and identified skill gaps. These recommendations ensure that educators remain current with the latest pedagogical trends and innovations (Jiménez-García et al., 2024).

AI-powered coaching tools, such as TeachFX, provide valuable insights into classroom interactions by analyzing teacher-student communication patterns. This feedback helps educators refine their engagement techniques and improve teaching effectiveness. Additionally, virtual mentoring platforms connect educators with global experts, fostering collaborative learning and knowledge sharing. These platforms also curate relevant research and resources, keeping educators informed about advancements in their fields (Hamid et al., 2022).

Challenges and Ethical Considerations

As AI-driven innovations reshape the educational landscape, they introduce challenges and ethical dilemmas that demand careful attention to ensure equitable, secure, and sustainable integration of AI in education. This section explores critical areas such as bias in AI algorithms, privacy and data security, and the balance between human teachers and AI systems.

Addressing Bias in AI Algorithms

AI systems are inherently influenced by the data used to train them. If these datasets reflect societal or historical biases, they can perpetuate inequities in educational applications. For instance, AI-powered grading platforms or adaptive learning systems may inadvertently favour certain demographic groups, further exacerbating educational disparities.

Research highlights the importance of addressing biases within AI to ensure fair and inclusive education systems. This involves using diverse and representative datasets, implementing rigorous testing protocols, and incorporating bias-detection mechanisms. For example, Savaş, 2021 emphasizes that many AI algorithms are developed in contexts that may not consider the conditions of developing countries, creating an "algorithmic divide" that denies equitable opportunities to marginalized students. Huang et al. 2021 also stress the importance of global inclusivity in algorithm design to prevent exacerbating existing inequalities.

Transparency and accountability in AI system development are key to fostering trust and fairness. Collaborative efforts among educators, policymakers, and AI developers can promote algorithmic fairness while ensuring equitable access to AI-driven educational opportunities.

Privacy and Data Security in AI-Enabled Classrooms

The widespread adoption of AI in education requires collecting vast amounts of student data, including performance metrics, behavioural patterns, and personal information. This data collection poses significant risks to privacy and security if not managed responsibly.

Without robust safeguards, sensitive information can become vulnerable to breaches or misuse, leading to ethical and legal consequences. Researchers such as Jiménez-García et al., 2024 emphasize the need for transparency and accountability in data collection and usage to build trust

among stakeholders. Savaş, 2021 advocates for compliance with privacy regulations, such as the GDPR and COPPA, and recommends employing encryption, anonymization, and secure storage solutions to protect student information.

Moreover, Huang et al., 2021 call for public dialogue on ethical considerations regarding data ownership and the responsibilities of those managing AI systems. Educational institutions must prioritize educating stakeholders on how data is collected and utilized, fostering informed consent and a culture of shared responsibility in data management.

The Balance Between Human Teachers and AI Systems

While AI offers significant efficiencies and personalization in education, it cannot replace the empathy, intuition, and holistic understanding that human teachers bring. Over-reliance on AI risks depersonalizing the learning experience and undermining the role of educators.

Maintaining a balanced approach is essential. AI should complement, not replace, human teachers. As Jiménez- García et al., 2024 point out, teachers remain vital for nurturing emotional intelligence and critical thinking, even as AI handles administrative tasks and provides data-driven insights. Similarly, Huang et al., 2021 emphasize that teachers must master digital teaching skills to effectively integrate AI while preserving the human essence of education.

Professional development programs are crucial for preparing educators to navigate AI systems confidently. By training teachers to interpret AI-generated insights and adapt their pedagogical strategies, institutions can ensure a harmonious integration of AI that enhances, rather than diminishes, the teacher-student relationship.

Addressing these challenges and ethical considerations is vital for the responsible integration of AI in education. Through collaboration, transparency, and training, educators and institutions can harness AI's potential while safeguarding fairness, privacy, and the irreplaceable value of human teachers.

A Proposed Framework for AI Integration in Pedagogy

The integration of Artificial Intelligence (AI) into education has garnered significant attention in recent years, with researchers and practitioners exploring its potential to transform teaching and learning. Existing frameworks

such as the SAMR model (Puentedura, 2006), TPACK (Mishra & Koehler, 2006), and Universal Design for Learning (UDL) (Rose & Meyer, 2003) have provided valuable insights into technology integration, pedagogical content knowledge, and inclusive education, respectively. However, these frameworks do not fully address the unique challenges and opportunities presented by AI in education.

For instance, while the SAMR model focuses on the substitution, augmentation, modification, and redefinition of traditional teaching methods through technology, it does not explicitly consider the ethical implications of AI or its potential to support holistic student development. Similarly, TPACK emphasizes the intersection of technology, pedagogy, and content knowledge but lacks a specific focus on AI-driven adaptive learning or collaborative environments. UDL, though inclusive in its approach, does not account for the transformative potential of AI tools such as virtual reality (VR) or generative AI.

Moreover, the rapid evolution of AI technologies has introduced new dimensions to pedagogy, such as predictive analytics, intelligent tutoring systems, and social-emotional learning tools, which are not adequately addressed by existing frameworks. This gap in the literature highlights the need for a comprehensive model that integrates AI into pedagogy while addressing ethical, adaptive, collaborative, and holistic considerations. The AI-TEACH framework proposed in this paper aims to fill this gap by offering a structured approach to AI integration in education.

The AI-TEACH Model

The AI-TEACH Model is built on five interconnected pillars: Transformative Learning, Ethical AI Practices, Adaptive Learning, Collaborative Environments, and Holistic Development. Each pillar is designed to address specific aspects of AI integration in pedagogy, ensuring a balanced and comprehensive approach.

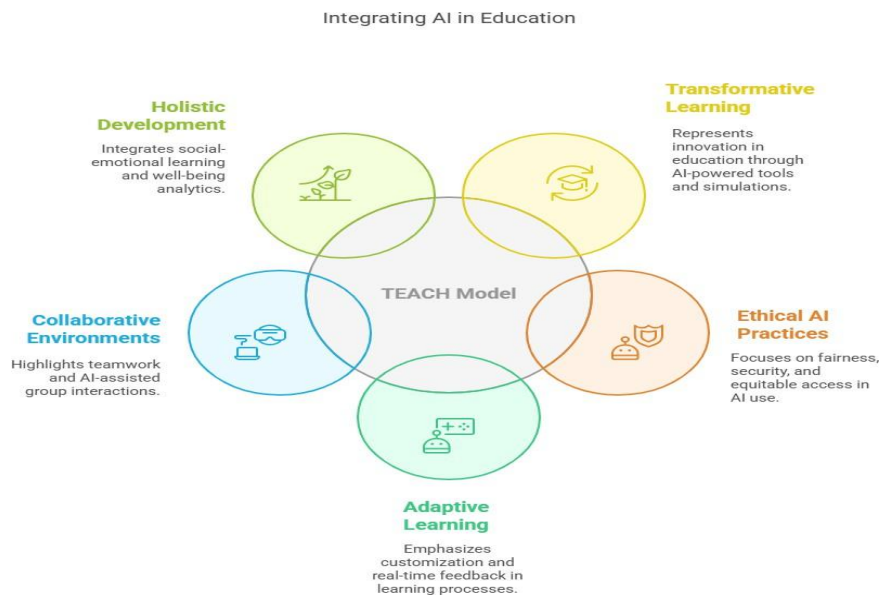


Figure 2 Proposed AI-TEACH Model for AI Integration in Pedagogy

1. Transformative Learning (T)

Transformative learning represents a paradigm shift in education, leveraging AI to fundamentally redefine teaching and learning practices. Unlike traditional methods that often rely on rote memorization and passive learning, transformative learning emphasizes active engagement, creativity, and critical thinking. AI-powered tools such as virtual reality (VR), augmented reality (AR), and generative AI (e.g., DALL·E, GPT-4) enable educators to create immersive, interactive, and personalized learning experiences. These tools not only enhance

student engagement but also foster essential 21st-century skills such as problem-solving, collaboration, and adaptability.

Key Applications:

- **VR/AR Simulations:** These technologies allow students to explore complex concepts in a hands-on, experiential manner. For example, medical students can practice surgeries in a risk-free virtual environment, while history students can "visit" ancient civilizations through AR.

- **Generative AI:** Tools like GPT-4 and DALL·E can generate personalized learning materials, such as interactive stories, visual aids, and practice questions tailored to individual student needs.

- **AI-Driven Storytelling:** AI can create dynamic narratives that adapt to students' choices, making learning more engaging and relevant.

Importance:

Transformative learning is crucial for preparing students for a rapidly changing world. By moving beyond traditional methods, it empowers students to think critically, solve problems creatively, and adapt to new challenges. AI-driven tools make learning more accessible and engaging, particularly for students who may struggle with conventional approaches.

Outcome:

Transformative learning prepares students for future challenges by fostering creativity, critical thinking, and problem-solving skills. It also makes learning more inclusive by catering to diverse learning styles and needs.

2. Ethical AI Practices (E)

The ethical use of AI in education is paramount to ensuring fairness, transparency, and inclusivity. AI systems, while powerful, can inadvertently perpetuate biases, violate privacy, or exacerbate inequalities if not designed and implemented responsibly. The AI-TEACH Model emphasizes the need to address these ethical challenges by embedding principles such as fairness, accountability, and transparency into AI systems.

Key Applications:

- **Bias Detection and Mitigation:** AI algorithms can be trained to identify and mitigate biases in educational content, assessments, and decision-making processes. For example, AI can ensure that test questions are culturally neutral and accessible to all students.
- **Data Privacy and Security:** AI systems must comply with data protection regulations (e.g., GDPR) and employ robust security measures such as encryption and anonymization to safeguard student information.
- **Equitable Access:** Policies and practices must ensure that AI tools are accessible to all students, regardless of socioeconomic status or geographic location.

Importance:

Ethical AI practices are essential for building trust in AI-driven education. Without ethical considerations, AI risks reinforcing existing inequalities or harming vulnerable populations. By prioritizing fairness, transparency, and inclusivity, educators can ensure that AI benefits all learners.

Outcome:

Ethical AI practices foster a culture of trust and inclusivity, ensuring that AI integration does not exacerbate existing inequalities. They also promote responsible innovation, enabling educators to harness the full potential of AI while minimizing risks.

3. Adaptive Learning (A)

Adaptive learning leverages AI to personalize educational experiences based on individual student needs, preferences, and learning styles. Traditional one-size-fits-all curricula often fail to address the diverse needs of students, leading to disengagement and underperformance. AI-powered adaptive learning platforms, such as DreamBox and Knewton, analyze student data in real-time to provide tailored content, feedback, and support. This approach enables students to learn at their own pace, bridging learning gaps and enhancing academic performance.

Key Applications:

- **Personalized Content Delivery:** Adaptive platforms adjust the difficulty and type of content based on student performance, ensuring that each student is challenged but not overwhelmed.
- **AI-Driven Learner Models:** These models predict learning gaps and provide targeted interventions, such as additional practice exercises or alternative explanations.
- **Real-Time Feedback:** AI tools offer instant feedback on assignments and assessments, helping students identify and address mistakes immediately.

Importance:

Adaptive learning is critical for addressing the diverse needs of students in today's classrooms. By personalizing instruction, it ensures that no student is left behind and that advanced learners are adequately challenged. It also reduces the burden on educators by automating routine tasks such as grading and progress tracking.

Outcome:

Adaptive learning enhances student engagement, motivation, and academic performance by catering to individual needs. It also promotes equity by providing tailored support to students who may struggle in traditional settings.

4. Collaborative Environments (C)

Collaboration is a cornerstone of effective pedagogy, and AI can play a pivotal role in fostering collaborative learning environments. The AI-TEACH Model promotes the use of AI-powered tools such as virtual assistants, group project platforms, and real-time collaboration tools to facilitate teamwork and communication among students and educators. These tools enable seamless interaction, even in remote or hybrid learning settings, and encourage students to work together to solve problems and achieve common goals.

Key Applications:

- **AI-Powered Group Project Tools:** Platforms like Microsoft Teams and Slack integrate AI features such as automated task and real-time language translation, making collaboration more efficient and inclusive.
- **Virtual Assistants:** AI-driven assistants like Google Assistant and Alexa can help students and educators manage tasks, schedule meetings, and access information quickly.
- **Peer Assessment Tools:** AI can facilitate peer assessment by providing structured frameworks and feedback mechanisms, encouraging students to learn from one another.

Importance:

Collaborative environments are essential for developing teamwork, communication, and problem-solving skills, which are critical for success in the 21st century. AI-powered tools make collaboration more accessible and effective, particularly in remote or hybrid learning settings where face-to-face interaction is limited.

Outcome:

Collaborative environments encourage teamwork, communication, and problem-solving skills, preparing students for collaborative work in the real world. They also foster a sense of community and belonging, which is crucial for student well-being.

5. Holistic Development (H)

Education is not just about academic achievement; it also encompasses the social, emotional, and ethical development of students. The TEACH Model emphasizes the use of AI to support holistic growth by integrating tools for social-emotional learning (SEL), well-being monitoring, and non-academic skill development. AI-driven analytics can provide insights into students' overall development, enabling educators to address their diverse needs and ensure that they thrive in all aspects of their lives.

Key Applications:

- **AI Tools for SEL:** Chatbots and analytics platforms can provide personalized SEL activities and monitor students' emotional well-being, offering timely interventions when needed.
- **Well-Being Monitoring:** AI can analyze data such as attendance, engagement, and behavior to identify students who may be struggling and provide targeted support.
- **Career Guidance and Skill Development:** AI-driven platforms can analyze students' strengths and interests to recommend career paths and skill-building opportunities, helping them prepare for the future.

Importance:

Holistic development is essential for preparing students to navigate the complexities of life beyond the classroom. By addressing the cognitive, social, emotional, and ethical dimensions of student growth, educators can ensure that students are not only academically proficient but also emotionally resilient and socially responsible.

Outcome:

Holistic development ensures that students are well-rounded individuals who are prepared for lifelong success. It also promotes well-being and reduces the risk of issues such as burnout, anxiety, and disengagement.

Theoretical Foundations

The AI-TEACH framework is grounded in established educational theories and emerging insights on AI in education. It builds on the SAMR model by extending its focus on technology integration to include AI-specific applications such as adaptive learning platforms and generative AI tools. From TPACK, the framework draws on the importance of aligning technology with pedagogical goals and content knowledge, while also emphasizing the need for educators to develop AI literacy.

The Universal Design for Learning (UDL) framework informs the AI-TEACH model's focus on inclusivity and accessibility, ensuring that AI tools are designed to meet the diverse needs of all learners. Additionally, the AI-TEACH framework incorporates principles from social constructivism (VYGOTSKY, 1980), which emphasizes the role of collaboration and social interaction in learning, and self-determination theory (Deci & Ryan, 1985), which highlights the importance of autonomy, competence, and relatedness in fostering student motivation and engagement.

The Transformative Learning pillar of the AI-TEACH framework is inspired by Mezirow's (1991) theory of transformative learning (Paprock, 1992), which emphasizes the role of critical reflection and experiential learning in shaping students' perspectives. The Ethical AI Practices pillar is informed by research on AI ethics, including studies on bias mitigation, data privacy, and equitable access (Jobin et al., 2019; Zimmer, 2010). Finally, the Holistic Development pillar draws on the whole child approach (RENO, 1993), which advocates for addressing the cognitive, social, emotional, and ethical dimensions of student growth.

By integrating these theoretical foundations, the AI-TEACH framework provides a robust and holistic approach to AI integration in pedagogy, addressing both the technical and human aspects of education.

Conclusion

The integration of Artificial Intelligence (AI) into education is revolutionizing traditional pedagogical approaches and transforming the management of educational systems. This paper has explored the multifaceted roles of AI, from enhancing learning outcomes and optimizing management systems to empowering teachers with advanced tools for lesson planning and continuous professional development. The historical evolution of AI in education demonstrates a progressive shift toward leveraging technology for creating personalized and inclusive learning environments.

AI's ability to predict student performance, automate grading, and support faculty development underscores its potential to address some of the most pressing challenges in traditional education methods, such as inefficiency, inequity, and the lack of individualization. Furthermore, AI-based systems like Learning Management Systems (LMS) and Education Management Information Systems (EMIS) have proven to be invaluable in streamlining administrative tasks and improving decision-making processes.

However, the adoption of AI also brings forth significant challenges and ethical considerations. Issues such as bias in AI algorithms, data privacy, and the need to maintain a balance between human teachers and AI systems require careful attention. It is imperative to ensure that AI serves as a complement to, rather than a replacement for, human educators, preserving the emotional and social dimensions of learning.

To address these challenges and harness the full potential of AI in education, this paper proposes the AI-TEACH Model—a comprehensive framework for AI integration in pedagogy. The AI-TEACH Model emphasizes Transformative Learning, Ethical AI Practices, Adaptive Learning, Collaborative Environments, and Holistic Development, providing a structured approach to leveraging AI for enhancing teaching and learning outcomes. By focusing on these five pillars, the AI-TEACH Model ensures that AI-driven education is innovative, inclusive, and aligned with the core values of equity and holistic development.

Looking ahead, the future of AI in education depends on addressing these challenges through collaborative efforts among educators, technologists, policymakers, and ethicists. The AI-TEACH Model offers a roadmap for aligning AI's capabilities with the core values of education—equity, inclusivity, and holistic development—creating a system where technology enhances, rather than detracts from, the human element of teaching and learning. By adopting frameworks like TEACH, we can realize the full potential of AI to reshape the educational landscape for the better, ensuring that it serves as a powerful tool for empowering educators, engaging students, and fostering lifelong learning.

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Chapter : 10

Ai - Driven Hiring: Transforming Modern Recruitment StrategiesDr.B.Velmurugan¹, Ms.M.Chitra²¹Professor & Head, Department of Management Studies,
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NPR College of Engineering and Technology, Natham, Dindigul, Tamilnadu
E-Mail.Id: chitradevimba94@gmail.com**Abstract**

Artificial Intelligence (AI) is transforming talent acquisition and drastically changing business to find and employ talent. This paper explores the field of data driven recruiting tools including AI powered interview platforms, automated resume screening, and applicant tracking systems, highlighting how these technologies can improve hiring efficiency and streamline procedures. By examining secondary sources, the study illustrates how AI is changing recruitment both in the current and future potential impact. Even while AI has many advantages, such as faster hiring, better applicant matching and better decision-making, still are encountered by ethical issues and data privacy. Therefore, the research aims to provide the current findings and providing practical recommendations in AI-driven recruiting processes followed by conclusion that help firms optimize their talent acquisition strategies.

Keywords: Artificial Intelligence (AI), talent acquisition, recruitment, AI tools, benefits, challenges.

Introduction

The way companies hire people has changed a lot because of artificial intelligence (AI). As technology grows fast, old hiring methods are not always efficient or sustainable. Businesses need better ways to stay competitive. With its ability to analyze data, predict outcomes, and automate tasks, AI streamlines recruitment and enhances decision-making. It also helps with performance evaluations, employee training, job postings, reducing workload, and overall workplace efficiency. As AI continues to evolve, it is reshaping talent acquisition, making the hiring process faster, smarter, and more effective for businesses.

Therefore, human resources professionals can switch their attention from administrative tasks to strategic planning. AI powered solutions examine employee data to see patterns forecast attrition and even suggest customised training plans. This shift enables organisations to create a workforce that is more engaged, productive and future ready workforce. Based on the predefined criteria, AI powered Applicant tracking systems may quickly sort through thousands of resumes and find the most qualified applicants. Chatbots and other similar tools improve candidate engagement, by providing real time interview scheduling and answers queries. Moreover, AI helps mitigate unconscious bias by evaluating candidates purely on skills and qualifications rather than subjective factors. This paper explores the AI driven tools used for recruitment, benefits, challenges and the current future role of AI in transforming recruitment by utilizing comprehensive review of existing literature.

Objectives

To identify the AI driven tools used for recruitment

To explore the benefits and challenges of AI in recruitment

To offer a comprehensive understanding of AI's current and potential future role in transforming the recruitment landscape.

Methodology

The type of study is descriptive. The review of literature was compiled from previously published study articles. The research findings are gathered from the secondary data websites. The outcomes and conclusion will add on to the discussions.

Review Of Literature

AI driven tools used for Recruitment:

AI TOOL	USES	AUTHOR
HireVue	Examines video interviews for nonverbal clues and communication abilities; improved diversity and simplified Unilever's hiring cycle by 80%.	Garg et al. (2024), Tasheva (2024)
Pymetrics	Employs gamified tests to assess cognitive and emotional qualities to ensure unbiased, data-driven hiring decisions and increase diversity.	Garg et al. (2024)
Applied	Helped Intel save 50,000 hours of recruitment time by using AI-driven hiring processes.	Tasheva (2024)
Vodafone's Advanced Writing Tool	Boosted job descriptions through AI-powered writing improvements.	Tasheva (2024)
Costa Coffee's AI Screening	Reduced expenses using AI screening to improve hiring efficiency.	Tasheva (2024)
IKEA's Automation Tool	Used automation to increase candidate engagement in the hiring process.	Tasheva (2024)
Humanly	AI-assisted hiring platform claiming to minimize bias, though methods for reducing bias are still unclear, raising transparency concerns.	Garg et al. (2024)
HireScored	Evaluates machine learning models to minimize bias in hiring, but the bias reduction methods remain unclear.	Garg et al. (2024)
Paradox.ai	Uses AI for hiring, but there is little data on how users perceive bias and trust in these tools, despite their potential for efficiency and fairness.	Garg et al. (2024)

Benefits and Challenges of AI in Recruitment:

BENEFITS	CHALLENGES
Faster Hiring Process	⚠️ Bias in AI Algorithms
Improved Decision-making	⚠️ Data Privacy Concerns
Cost and Time Savings	⚠️ Employee Resistance
Enhanced Employee Training	⚠️ Transparency Issues
Automated Payroll & Admin	⚠️ Risk of Job Displacement
Increased Employee Happiness	⚠️ Legal & Ethical Compliance

Ali and Kallach (2024) describes that the recruitment tools that are powered by AI offer several advantages such as reduced cost and time, higher quality decisions by minimising errors, improved communication with current details, efficiency through innovative and user-friendly features and the removal of stereotypes for better process improvement. But problems still exist.

While database obstacles include personality quality input and its prediction constraints, knowledge challenges involve understanding issues, new digitalization skills and IT knowledge. Financial difficulties include high expenses and strategic value while ethical issues focus on legal usage and lack of regulations. Implementation is further complicated by globalization, changing HR practices, employment stability and tool alignment with staff demands.

Tasheva (2024) explains that the benefits of AI facilitate hiring by increasing efficiency, decreasing hiring time and operates repetitive operations. It guarantees an equitable talent pool, eliminates human bias and improves applicant matching through data driven insights. Predictive analytics aids in better decision-making, and AI-powered chatbots offer immediate responses, enhancing the applicant experience. The challenges may occur if AI is educated on biased data which could result in unfair hiring practices. Lack of human judgment in evaluating soft skills is a limitation. Data handling raises privacy issues. AI use in hiring may also be hampered by high implementation costs and resistance to change.

Odili et al. (2024) AI significantly improves recruitment efficiency by automating resume screening, reducing hiring time, and enhancing candidate matching. It guarantees a more equitable selection process, reduces bias and encourages diversity. Chatbots driven by AI simplify communication, and predictive analytics aid in predicting employee success. AI also makes data driven recruiting decisions possible, which lowers human error and enhances the applicant screening. In spite of its benefits, AI in hiring has drawbacks including potential algorithmic bias, ethical concerns and data privacy issues. Over-reliance on AI may neglect human intuition in hiring. Transparency in AI decision-making and the high cost of implementation are also critical concerns.

AI's Impact on Recruitment Today and its Future Potential:

62% of talent acquisition professionals are optimistic about AI's impact on recruitment, but only 27% are actively using or experimenting with generative AI.

Only 6% of talent professionals in the UK and France, and 5% in Germany, Austria, and Switzerland, report actively using generative AI in recruitment.

57% of recruiters say AI speeds up job description writing, 45% say it automates tasks for more fulfilling work, and 42% say it eliminates mundane daily tasks.

24% of talent acquisition teams collaborate with leaders to explore AI's job transformation potential, while 22% update job descriptions to reflect AI usage.

The number of recruiters adding AI-related skills to their profiles increased by 14% in 2023.

As AI adoption grows, recruiters emphasize the importance of communication (77%), relationship building (72%), and adaptability (63%) over the next five years.

47% of companies cite system integration issues, 38% lack understanding of AI tool effectiveness, and 36% lack knowledge of recruitment AI tools.

40% of companies use AI for sourcing and engaging talent, 28% for analysing internal recruitment data, and another 28% for creating social media posts.

85 million jobs could be displaced by AI and automation by 2025, yet 96% of employees believe AI can help in their current roles, despite 60% fearing job automation.

While 55% of employees use generative AI weekly at work, 61% don't fully trust it, and 57% say they receive inadequate AI training from their employers.

68.1% of professionals report an increase in AI tool usage for recruitment, reflecting a rapid adoption trend in hiring technology.

68% of recruiters believe AI will help eliminate unintentional bias in hiring decisions, promoting fairer recruitment practices.

35% of recruiters worry that AI may overlook candidates with unconventional skills and experiences, limiting diversity in hiring.

79% of recruiters anticipate that AI will soon be responsible for hiring and firing decisions, significantly shifting HR roles.

35.5% of small and medium businesses (SMBs) allocate budgets toward AI-powered recruitment solutions, highlighting AI's growing role in hiring strategies.

Discussion

While 62% of recruiters are optimistic about AI, only 27% are actively using it. Companies should offer hands-on training programs and workshops to help HR teams understand and integrate AI tools effectively.

With low AI adoption in countries like the UK, France, Germany, and Austria, businesses should organize regional AI awareness campaigns, showcasing real-world success stories to build trust.

Since 57% of recruiters find AI useful in job description writing, AI tools can then be used for automating repetitive tasks, and eliminate unnecessary paperwork, allowing recruiters to focus on strategy and candidate relationships.

With a 14% increase in AI skill adoption, HR professionals should integrate AI certification programs to upskill recruiters and improve AI-driven decision-making.

HR teams should work closely with business leaders to align AI strategies with company goals, ensuring AI tools are used effectively and ethically.

Given that 47% of companies cite system integration issues, IT tech must provide HR's that create more user-friendly AI recruitment solutions.

Since 79% of recruiters predict, AI will handle hiring and firing, AI must be designed with ethical guidelines to ensure fairness and accountability.

As 68% of recruiters believe AI reduces bias, AI models should undergo continuous audits to maintain fairness in hiring decisions.

AI should support, not replace, human interaction. Recruiters should enhance skills like communication, relationship building, and adaptability to work effectively alongside AI.

With 35.5% of SMBs investing in AI, vendors should develop cost-effective AI tools tailored to small business needs.

With job displacement fears rising, regulations must enforce transparency in AI-driven hiring to build trust and ensure responsible AI implementation.

Conclusion

Taking into account the observed inputs about advantages, difficulties and features we determine that AI has become an innovative force in recruitment, providing data driven decision making, automation and efficiency. AI powered solutions increase candidate engagement and speed up the talent acquisition process. Nevertheless, despite its benefits, AI adoption is still delayed due to worries about job displacement, ethical issues, transparency, and system integration. To solve issues like bias and data privacy, organizations must fund AI training initiatives, assure compliance to ethical norms, and put regulatory monitoring in place. Future hiring practices will probably take a hybrid approach, with AI assisting humans but does not replace the human judgement. Businesses must strategically balance AI's benefits with ethical responsibility to build a fair and sustainable hiring ecosystem.

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Impact Of Artificial Intelligence (Ai) In English Language Teaching

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KEY WORDS: Artificial Intelligence (AI)
English Language, Teaching

Abstract

A significant stride is made by Artificial Intelligence (AI) in a number of fields recently, and it has started to show a very big impact on education, especially in English language teaching (ELT). Artificial Intelligence (AI) technologies provide creative answers that improve language learning procedures cater to the needs of each individual and give tailored feedback. The ability of AI to impart individualized learning experiences is one of the main advantages of its use in ELT. AI powered adaptive learning systems assess students' learning preferences, areas of strength and weaknesses to customize the lessons. In addition to encouraging increased engagement, this individualized approach makes language acquisition more effective. The present research paper makes an attempt to examine various ways in which AI is influencing English Language Teaching (ELT), focuses on pros and cons, its implications on both English teachers and students.

A Study On Impact Of Social Media Influencers On Purchase Intention On Ready To Wear Fashion In Coimbatore

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Abstract

With the advancement of modern technology dominating the world social media sites have now become more popular than ever. Browsing through various social media sites and watching various types of content through social media has become a norm in people's daily lives. As the function of social media has been on the rise so much, the number of content creators on various social media sites has also increased. These social media influencers or content creators have been able to monetize their content and have built their audience base. This successful interaction with their audience has made many brands recognize these social media influencers as a potential source of product endorsement. This study investigated whether a few characteristics pertaining to the social media influencer affects the purchase intention of their audience. This study adopted a questionnaire (Sokolova & Kefi, 2019) and the questionnaire was distributed online among the participants. The characteristics used in this study were credibility, attitude homophily and social attractiveness. To determine if there is any relationship between these characteristics and purchase intention a correlational study was undertaken. It was revealed that credibility and social attractiveness had a moderate positive relationship with intention to purchase, whereas attitude homophily exhibited a weak positive relationship with purchase intention.

Keywords: Social Media Influencers, Social Media, Purchase Intention, Brands, Endorsements

The growth of the popularity of social media influencers is in tandem with the growth of social media consumption in today's society. With more people being exposed to various social media platforms, such social media influencers who create various forms of content on the platforms are increasing in popularity and a steady following. Social media influencers in this study are defined as independent marketers who seek to influence the opinion of their audience through their content in the form of blogs, tweets, videos, images, and other social media platforms. There has been a visible rise in the number of social media influencers on various platforms. Today, these influencers have millions of "followers" and "subscribers." This new trend of following social media influencers, along with the rise in brand collaborations with the influencers, has evoked curiosity in investigating the relationship between variables credited to social media influencers and purchase intentions. The variables in this research point to the fact that social media influencers are seen as a medium that is able to alter the buying intention of their followers. In this paper, buying intention is used as a construct of how willing an individual is to take the action of buying a specific product. Social media influencers with high audience engagement are likely to build a relationship with their followers and encourage engagement in the form of a discussion of their content. Brands are therefore on the lookout for tapping into this relationship in a bid to create a discussion on their brand between the social media influencer and the audience, thus hoping to alter the buying intention of the audience. Buying intention is measured as a direct measure of whether followers of a social media influencer will buy

the product they are endorsing and whether they would recommend such a product to their friends. In this current study, the researcher sought to explore the effect of social media influencers on consumers' purchase intentions. Therefore, three aspects of social media influencers were explored: credibility, attitude homophily, and social attractiveness. This study explored the relationship between these aspects and the purchase intentions of consumers. In this study, credibility was the audience's perception of the social media influencer as an expert in their field of specialty or a trusted person. The second aspect explored was attitude homophily, which is associated with its relationship with the purchase intentions of consumers. Attitude homophily in this study was the audience's perception of the level of similarity in their way of thinking and value system with the social media influencer. The third aspect to be explored was social attractiveness, which is described by the level to which the audience views the social media influencer as socially attractive. This relationship is an interpersonal relationship that the audience establishes with the influencer and is familiar with the influence this relationship has on their choice.

LITERATURE REVIEW

Social media Influencers and brands. Influencer marketing is becoming more and more a new public relations tool. In order to investigate this trend, the author (Glucksman, 2017) conducted pentadic analysis and qualitative content analysis of several Influencer posts. Sample examples of social media influencer marketing on Instagram and YouTube were collected. Since there are so many influencers to select from the study focused on the influencer Lucie Fink. The Pentadic analysis revealed a variety of things. Firstly, it was observed that most influencers like Lucie utilize Instagram because it is an easy way of posting authentic content and makes it easy to tag brands in order to deal with brand deals. Also, here the act was the advertisement and the agent was the influencer, the purpose was three-fold first is to promote the product, second is to gain more follower interest and last is to prompt them to actually purchase the product by following the influencer's example. It was also observed that the influencer utilizes good captions to influence the crowd as a tool and also utilizes her own personality as a tool in order to generate a stronger influence on audience perception. The influencer also uses her relationship with her followers as a tool and is constantly trying to enhance this relationship. The content analysis on the YouTube videos helps in understanding how the influencer is successful. It was observed that for lifestyle influencers like her Authenticity is the key and plays an enormous role on building relationship with the followers. It was also observed that brands prefer to work with influencers that are confident as this creates more confidence in their brand. Influencers' human touch has also been seen to play an important role in establishing a connection between consumers and brands. Through the sharing of good content, the influencers evoke the interaction of consumers with the brands. Therefore, it has been established that social media influencers have made it easier to break the barriers that once existed between brands and consumers (Glucksman, 2017).

Rise of Influencers. With the new Influencer community on the rise the authors (Booth & Matic, 2011) wanted to understand and recognize these new "Somebodies" of social media. One of the ways the companies ensure that they are able to exert some form of control over the conversation that people do about their brand online is by shaping the opinion of the audience. One effective way of doing so becomes reaching out to these social media "somebodies" with the audience and high engagement rates. The valuation algorithm which is customizable, assists to recognize those influencers that are building brand awareness. The "index valuation algorithm" that makes use of numbers to rate social media influencers in social media conversation regarding specific brand. The influencer is determined to have "direct" relationships in terms of their followers and extended or "indirect" relationships and using these relationships the influencer index calculates the blogger's influence. It took into account various variables such as Viewers per month, how well known the blog post links are Medias that reference the blogs, "industry score", social media participation level across platforms, "engagement index", "subject related posts", index score and "Qualitative topic

related posts". This then provides an average index score. The high rated bloggers then get divided into various tiers and this assists brands to choose the most influential "somebodies" in order to assist in increasing engagement for their products. There are three of these tiers ABC. This assists to create the right brand strategy depending on the type of product that needs to be promoted and an appropriate influencer needs to be chosen to assist to promote it (Booth & Matic, 2011).

Data Analysis

Correlational analysis was done to examine the relationship between the different variables related to the social media influencer and the purchase intention of the buyer.

Table 1 (Mean and SD)

Social Attractiveness	6.684615	2.153183
Credibility	20.07692	3.465478
Attitude Homophily	6.746154	1.897822

Normality: To check for normality of the data the Shapiro Wilk Test of normality was used. Normality was tested for each variable namely credibility, purchase intention, social attractiveness, and attitude homophily. As reported in the table given below, the assumption of normality was not met for any variable.

Social Attractiveness	9.224e-05
Credibility	2.915e-05
Attitude Homophily	0.0003609

Correlational Analysis: The Spearman's Rho was done to examine the correlation between the different variables (Displayed in Table 3)

Social Attractiveness and Purchase Intention	0.3525079
Credibility and Purchase Intention	0.3299248
Attitude Homophily and Purchase Intention	0.2745015

Relationship between social attractiveness and purchase intention: The obtained correlation between social attractiveness and purchase intention was 0.3525079, p

Figure 1 (Correlation between Social Attractiveness and Intention to Purchase)

```
> cor.test(x=survey$SocialAttractiveness,y=survey$Intention
toPurchase,method='spearman',alternative = "greater")
```

Spearman's rank correlation rho

```
data: survey$SocialAttractiveness and survey$IntentiontoPu
rchase
s = 237080, p-value = 1.951e-05
alternative hypothesis: true rho is greater than 0
sample estimates:
rho
0.3525079
```

Relationship between credibility and purchase intention: The obtained correlation between credibility and purchase intention was 0.3299248, p

Figure (Correlation between Credibility and Intention to Purchase)

```
> cor.test(x=survey$Credibility,y=survey$IntentiontoPurchase,method='spearman',alternative = "greater")
```

Spearman's rank correlation rho

```
data: survey$Credibility and survey$IntentiontoPurchase
S = 245340, p-value = 6.322e-05
alternative hypothesis: true rho is greater than 0
sample estimates:
      rho
0.3299248
```

Relationship between attitude homophily and purchase intention: The obtained correlation between attitude homophily and purchase intention was found to be 0.2745015, p

Figure 3 (Correlation between Attitude Homophily and Intention to Purchase)

```
> cor.test(x=survey$AttitudeHomophily,y=survey$IntentiontoPurchase,method='spearman',alternative = "greater")
```

Spearman's rank correlation rho

```
data: survey$AttitudeHomophily and survey$IntentiontoPurchase
S = 265640, p-value = 0.0007875
alternative hypothesis: true rho is greater than 0
sample estimates:
      rho
0.2745015
```

DISCUSSION

This research was conducted with the aim of having better knowledge regarding what personality of the social media influencer has an impact on the buying intention of the buyer who belongs to the social media influencer's audience. Existing literature on social media influencer and buying intention of buyers is not centered around an Indian population as a sample but now as social media is becoming more and more popular in India many Indian social media influencers are gaining attention. This research made an attempt to bridge the existing literature on the subject by concentrating on the Indian population. The research explored whether any relationship between buying intention of the buyer and the three variables associated with the influencer, i.e., social attractiveness, attitude homophily and credibility exists.

There is a moderate positive correlation in between social media influencer credibility and purchase intention, indicating that the variable exerts a moderate influence over the purchasing behavior of the audience. Previous studies have also given a relationship between perceived credibility of social media influencers and purchase intention of the audience

(Sokolova & Kefi, 2019). Participants' content, when asked to enumerate the reasons they follow social media influencers, resulted as one of the most common reasons given, and this can come under the construct of credibility. Social attractiveness was another variable that was considered by the audience. A moderate positive correlation of social attractiveness with purchase intention was established in the study, which shows that social attractiveness of a social media influencer is related to the purchasing decisions of the audience. Attitude homophony was the third variable to be examined and resulted in a weak positive correlation with purchase intention. Having a weak correlation, even though there is a relationship between the two variables, the relationship may not be strong; this may be because individuals follow social media influencers mainly for entertainment purposes and may not be bothered about a common belief system with the influencer. Furthermore, as a response to self-report questions, participants did not mention alignment of values as a main reason for following social media influencers. A moderate correlation between the four variables (credibility and social attractiveness) and purchase intention also shows that the factors exert a moderate influence over the purchasing intentions of the audience. Therefore, it can be argued that the characteristics of social media influencers play a role in influencing the purchasing intentions of the consumers. All the variables that were studied in this research showed a correlation with the purchasing intention of the consumers. This, in turn, resulted in the confirmation of the research hypotheses that were made for this study.

LIMITATIONS

The research was limited to a specific age group as a sample, that is, people aged between 18 to 27 years. The sample was also limited with only 130 participants. Further, the majority of the participants in the study were females which could be regarded as a limitation. All this restricts the generalizability of findings of the research.

CONCLUSION

The hypotheses of the study suggested that there is a relationship between the chosen variables involving the social media influencer and purchase intention of the viewer. Results generated affirmed relationship between the three factors (credibility, attitude homophily and social attractiveness) and purchase intention. These social media influencer traits assist them in crafting a more profitable following by enhancing the impact they make on the purchasing intention of the audience. So, to become a successful social media influencer one must be credible, socially attractive and must build a relationship with their audience through what they post.

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Brand Loyalty In The Era Of Subscription Commerce: A Strategic Reappraisal

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Abstract:

The subscription-based business model has rapidly emerged as a dominant force in modern commerce, reshaping traditional consumer-brand dynamics. This paper explores how brand loyalty manifests in the context of subscription commerce, distinguishing it from conventional loyalty paradigms. By analyzing psychological commitment, switching barriers, personalization, and customer experience design, the study investigates how subscription models both reinforce and complicate consumer loyalty. Through theoretical framing and contemporary case analysis, the paper highlights the strategic implications for firms seeking sustained customer retention and loyalty in an increasingly subscription-driven economy.

Introduction

Brand loyalty has long been a cornerstone of strategic marketing and consumer relationship management. Traditionally, it has been defined as a consumer's consistent preference for a brand, driven by satisfaction, trust, and emotional connection. However, the proliferation of **subscription commerce**—defined as a recurring revenue model where consumers pay regularly for continuous access to a product or service—has introduced new variables that reshape the nature of brand loyalty (Smith & Anderson, 2021).

This paper examines how subscription models alter the motivations, behaviors, and expectations that underpin brand loyalty. It aims to critically assess whether subscription commerce strengthens or weakens traditional loyalty structures and what this means for businesses across industries.

Theoretical Background

Brand Loyalty in Traditional Commerce

Classic brand loyalty theory emphasizes attitudinal and behavioral dimensions (Jacoby & Chestnut, 1978). Attitudinal loyalty reflects emotional attachment and trust, while behavioral loyalty is observed through repeat purchases. Loyalty was often earned through consistent product performance, customer satisfaction, and relationship marketing.

The Subscription Economy

In contrast to transactional models, subscription commerce fosters ongoing relationships. Consumers subscribe to digital services (e.g., Netflix, Spotify), physical goods (e.g., Dollar Shave Club, Blue Apron), or hybrid models (e.g., Amazon Prime). These models offer **predictable revenue** for firms and **convenience, personalization, and perceived value** for consumers (Tzuo & Weisert, 2018).

Shifting Dimensions of Brand Loyalty in Subscription Models

From Transactional Loyalty to Contractual Lock-In

Subscription services introduce switching barriers that blur the line between true loyalty and inertia. For instance, auto-renewals and platform ecosystems (e.g., Apple's ecosystem) make it inconvenient to switch, leading to what scholars term “**passive loyalty**” (Ghaznavi et al., 2020). This raises questions about the depth and durability of loyalty in such contexts.

Role of Personalization and Data

Subscription businesses rely heavily on data analytics to deliver **personalized experiences**, increasing customer satisfaction and loyalty. Netflix, for example, uses predictive algorithms to recommend content, which enhances perceived relevance and emotional engagement (Kwon & Kim, 2022).

Engagement Over Time

Because value delivery in subscription models is ongoing, **continuous engagement** becomes a critical driver of loyalty. Unlike in traditional retail, where satisfaction is episodic, subscription loyalty requires persistent value reinforcement and trust cultivation (Reinartz & Kumar, 2003).

Experience Design and Community-Building

Brands are investing in **experience ecosystems**—exclusive content, loyalty tiers, community forums—to foster a sense of belonging and emotional investment. Peloton's success, for instance, stems not just from fitness content but from community, gamification, and identity branding (Thompson, 2023).

Challenges to Loyalty in Subscription Commerce

Subscription Fatigue

Consumers are increasingly overwhelmed by the number of subscriptions they manage. This “**subscription fatigue**” leads to churn, despite prior satisfaction. Brands must therefore proactively manage perceived value and frictionless experience to retain loyalty (KPMG, 2021).

Price Sensitivity and Market Saturation

As more competitors enter the subscription space, consumers become more **price-sensitive** and aware of

alternatives, weakening exclusivity-based loyalty. Discounting, bundling, and frequent plan changes further commoditize services, risking dilution of brand equity (Chen & Li, 2020).

Ethical and Privacy Concerns

Heavy data use for personalization raises concerns about consumer privacy. Breaches or unethical data practices can rapidly erode trust and loyalty, as seen in cases like Facebook's Cambridge Analytica scandal (Zuboff, 2019).

Strategic Implications

To sustain brand loyalty in the subscription era, companies must move beyond **functional utility** and emphasize:

- **Ethical data stewardship**
- **Transparent pricing models**
- **Ongoing value communication**
- **Community engagement and identity alignment**
- **Flexibility and user control**

Moreover, **predictive churn analytics** and **lifecycle marketing** can help brands intervene before loyalty erodes.

Conclusion

Subscription commerce has redefined the meaning and mechanics of brand loyalty. While it offers unique opportunities for sustained engagement, it also introduces vulnerabilities—such as inertia misinterpreted as loyalty, and churn driven by overload or dissatisfaction. To thrive in this new paradigm, brands must invest in deeper customer relationships, ethical personalization, and long-term value strategies.

The future of brand loyalty in the subscription era will hinge on trust, transparency, and an authentic emotional connection—not merely recurring billing.

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(Note: Replace placeholders with actual references in a formal paper.)

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Tongue Tied: The Impact of Language on Learning

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Abstract

Language is a fundamental aspect of cultural identity and cognitive development, yet millions of children worldwide are educated in languages they do not understand. This paper argues for the necessity of mother tongue instruction in education, emphasizing its role in preserving cultural heritage, enhancing academic achievement, and fostering social inclusion. Drawing on sociolinguistic theory, cognitive research, and global case studies, we demonstrate that mother tongue-based multilingual education (MTB-MLE) is a sustainable and equitable approach to learning. We examine the systemic barriers to implementing MTB-MLE, including policy neglect, resource gaps, and societal resistance, and advocate for inclusive language policies that bridge cognitive development, cultural preservation, and educational equity. By valuing students' linguistic identities, societies can foster more equitable, effective, and inclusive education systems, ensuring that no child is forced to choose between their identity and future.

Keywords: Mother tongue education, linguistic exclusion, language policy, cognitive development, educational equity.

Introduction

"If you talk to a man in a language he understands, that goes to his head. If you talk to him in his language, which goes to his heart." -Nelson Mandela

Language plays a vital role in conveying culture, identity, and knowledge. However, many educational systems globally require children to learn in a non-native language, often due to historical, political, or economic factors. This approach disproportionately impacts marginalized communities, where students face academic and psychological challenges when forced to learn in an unfamiliar language. As language is fundamental to learning, it is concerning that approximately 40% of children worldwide are taught in languages they don't speak at home (UNESCO, 2016). This linguistic disconnect hinders their ability to fully participate, express themselves, and comprehend their education.

Language and Identity: A Cultural Imperative

a) The Significance of Language in Preserving Cultural Heritage

Language serves as a repository of cultural knowledge, encoding unique worldviews, traditions, and ecological insights. Indigenous and minority languages, in particular, hold immense cultural value, and their loss can have far-reaching consequences. When a language disappears, cultural practices, oral histories, and community cohesion are eroded, leading to a loss of cultural identity and heritage (UNESCO, 2003).

b) The Role of Language in Shaping Identity and Self-Worth

Language plays a vital role in shaping children's sense of self and identity (Baker, 2011). Research has consistently shown that students educated in their mother tongue exhibit higher levels of self-esteem, stronger cultural affiliation, and a more positive sense of identity (Skutnabb-Kangas, 2000). This highlights the importance of mother tongue education in promoting emotional well-being, academic success, and cultural connection.

c) The Legacy of Colonialism and Linguistic Hegemony

The legacy of colonialism continues to influence education systems worldwide, often prioritizing ex-colonial languages over local languages. This perpetuates social hierarchies, marginalizes indigenous and minority communities, and reinforces linguistic inequalities. For instance, in India, English-medium schools are often perceived as superior, despite high dropout rates among rural students who may not be proficient in English (Mohanty, 2019). Similarly, in many African countries, languages such as French and Portuguese dominate education, overshadowing local languages and cultural practices (Bamgbose, 2014). This linguistic hegemony can have long-term consequences for social mobility, cultural preservation, and community development.

Advantages of Mother Tongue Instruction

a) Enhanced Learning Outcomes

Children learn best when instruction begins in their native language (L1) before transitioning to additional languages, as it facilitates a deeper understanding of concepts and improves critical thinking skills. Studies have shown that mother tongue-based programs result in higher literacy rates, with UNESCO reporting significant success in 2016. When students learn in their mother tongue, they can better comprehend complex subjects, leading to improved academic performance and reduced knowledge gaps.

b) Stronger Foundation for Bilingualism

The "interdependence hypothesis" suggests that literacy skills transfer from L1 to L2, enabling students to become proficient in multiple languages. Research has demonstrated that students who receive mother tongue instruction tend to perform better in additional languages, such

as English. Ethiopia's multilingual policy is a notable example, where students' local language literacy and English proficiency both improved.

c) Reducing Dropout and Repetition Rates

Students taught in an unfamiliar language are more likely to struggle and leave school early due to difficulties in understanding and engaging with the material. Mother tongue instruction helps bridge this gap, reducing dropout rates and promoting academic retention and success. By learning in their native language, students build confidence and develop a stronger connection to their education, leading to improved overall performance.

d) Cognitive Development: Enhanced critical thinking, problem-solving, and creativity skills

e) Cultural Preservation: Mother tongue education preserves linguistic diversity and promotes cultural heritage

f) Parental Involvement: Schools that incorporate mother tongue instruction tend to foster stronger connections with parents and the community

g) Social and Emotional Well-being: Learning in one's mother tongue nurtures emotional connection, self-esteem, and confidence

h) Global Competence: Proficiency in mother tongue supports the development of global competence and multilingualism

Challenges and Counterarguments to Mother Tongue Instruction

a) Political and Economic Barriers

Implementing mother tongue instruction faces resistance from governments due to:

- **High Costs:** Developing and maintaining educational infrastructure, training teachers, and creating learning materials in minority languages can be expensive.
- **Perceived Lack of Utility:** Governments may prioritize dominant languages like English for global communication and economic opportunities.
- **Globalization Pressures:** The increasing importance of global languages can lead policymakers to focus on English and other widely spoken languages.

b) Parental and Societal Attitudes

Some communities may:

- **Associate Local Languages with Backwardness:** Viewing their native language as inferior or less useful for economic mobility.
- **Prioritize Dominant Languages:** Parents may prefer their children to learn dominant languages for better job prospects and social status.

c) Implementation Difficulties

- **Lack of Trained Teachers:** Insufficient teachers proficient in minority languages can hinder effective instruction.

- **Standardized Curricula and Learning Materials:** Developing and implementing standardized curricula and materials in minority languages is a significant challenge.
- **Limited Resources:** Educational resources, such as textbooks, technology, and educational software, may not be readily available in minority languages.

Recommendations: Toward Culturally Sustaining Education

a) Adopt Mother Tongue-Based Multilingual Education (MTB-MLE) Models:

- **Start with L1:** Begin schooling in students' native language (L1) to facilitate deeper understanding and critical thinking.
- **Gradual Introduction of L2:** Introduce additional languages (L2) gradually, leveraging students' existing linguistic knowledge.

b) Develop Inclusive Policies:

- **Support Linguistic Diversity:** Governments should promote linguistic diversity in curricula, recognizing the value of students' native languages.
- **Culturally Responsive Curriculum:** Incorporate diverse perspectives, histories, and cultural practices into educational materials.

c) Community Engagement:

- **Involve Parents and Elders:** Engage parents and community elders in language preservation efforts and educational decision-making processes.
- **Foster Partnerships:** Collaborate with local communities to develop culturally relevant educational programs.

d) Teacher Training and Resources:

- **L1-Based Pedagogical Materials:** Invest in developing and providing educational materials in students' native languages.
- **Culturally Responsive Teaching:** Train teachers to adopt culturally responsive and sustaining pedagogies, focusing on asset-based approaches.

e) Culturally Sustaining Pedagogy: Implement pedagogies that sustain students' cultural and linguistic identities while promoting academic success.

- f) **Asset-Based Approaches:** Focus on students' strengths and assets, rather than deficits, to foster positive identities and academic engagement.
- g) **Critical Reflection:** Encourage educators to critically reflect on their practices, ensuring inclusive and culturally responsive education.

Conclusion: Untying the Tongue

The choice is not between mother tongue and global languages – it's about bridging both. Mother tongue education is not a barrier to progress, but a key to unlocking it. As Nigerian Nobel laureate Wole Soyinka aptly put it, 'A people who lose their language lose their soul.' Educating children in a language they don't understand silences them before they can even speak. Mother tongue instruction is not just an educational strategy, but a means of cultural survival. By valuing students' linguistic identities, societies can foster more equitable, effective, and inclusive education systems. The loss of a language is the loss of a worldview, so education policies must prioritize linguistic justice to ensure no child is forced to choose between their identity and future.

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CNN Based Plant Disease Detection with Transfer Learning

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ABSTRACT

Agriculture is essential for the economy and plant leaf diseases must be minimized. Early recognition of problems is important, but the manual inspection is slow, error-prone, and has high man power and time requirements. Artificial Intelligence can be used to extract leaf colour, shape or texture data. Thus aiding the detection of infections. Crop is one of the major cultivation in India which is affected by various diseases at various stages of its cultivation. It is very difficult for the farmers to manually identify these diseases accurately with their limited knowledge. Recent developments in Deep Learning show that automatic image recognition systems using Convolutional Neural Network(CNN) with Transfer Learning(TL) models can be very beneficial in such problems. Since Rice leaf disease image dataset is not easily available.

INTRODUCTION

Agriculture plays a crucial role in sustaining human life and global economies by providing food, raw materials, and employment opportunities. However, one of the major challenges faced by the agricultural sector is the prevalence of plant diseases, which can lead to significant losses in crop yield and quality. If left undetected or untreated, plant diseases can spread rapidly, causing devastating effects on food security and economic stability. Traditional methods of plant disease detection primarily rely on visual inspection by farmers or agricultural experts, which can be time-consuming, labor-intensive, and prone to human errors. Moreover, these methods may not be effective in identifying early-stage infections, leading to delayed intervention and increased damage.

With rapid advancements in technology, machine learning (ML) and deep learning (DL) techniques have gained significant attention for their ability to provide automated, accurate, and efficient solutions for disease detection in plants. Among these, Convolutional Neural Networks (CNNs) have emerged as a powerful tool for image-based classification tasks, including plant disease identification. CNNs can automatically extract features from plant images, recognizing patterns associated with different diseases with minimal human intervention. However, training CNN models from scratch requires a large dataset of labeled images and extensive computational resources, which may not always be available in agricultural applications.

Wheat is a major crop and a major source of sustenance for humans all over the globe. It is the second-largest planted crop, ranking fourth among the 20 most important agricultural crops. The Global wheat production in the year 2020-21 was 772 million metric tons, and the yield it produces is critical to the food security of the majority of the world's population. There are a number of fungal and nutrient deficient diseases that may impact wheat production, including leaf-rust, nitrogen deficiency, powdery mildew, Septoria, stem rust, etc. This disease causes a reduction in crop production, and it is a global problem. There is no more than a 20% damage that is caused by the causal agents of the aforementioned diseases, which can be treated by the timely application of fungicides. However, the consequences of leaf-rust and stem-rust, which cause nearly 30% damage (depending upon region and season), are significant economically. The most efficient strategy to combat these illnesses is their prevention and prompt deployment of preventative measures. However, such a method is hard to implement without a prompt and accurate pathogen detection system. This thesis focuses on automatically detecting diseases and pathological parts present within the wheat leaf images using advanced machine learning and computer vision algorithms. The major demand of the world in agriculture is the extraordinary production; therefore, most of the countries utilize new advanced technologies for increasing the productivity of agriculture products. The advanced technologies must satisfy the food production rate. Nevertheless, the other factors such as abiotic stress factors (e.g. insects, pathogens, drought stress or nutrition deficiencies and weed) and several classes of pests mostly affect the Wheat plants at any stages. Thus, the quality and quantity of agriculture products are slightly

affected (Mahlein et al. 2012). Therefore, the detection of plant disease is must, but, it also difficult and challenging. This necessitates close monitoring of the paddy leaf to analyse its condition for disease infection. Both post-harvest yield and production are mainly affected by the diseases. Previously, the severity of disease in the plant is analysed only by visual inspection (naked eye observation) techniques. The accuracy of this analysis mostly depends upon the experience and knowledge of the analyser. The time taken for visual inspection is high, due to the large cultivation area and it needs constant human observations. Therefore, a mechanism is required to replace the manual analysis. Image processing techniques are used for such purposes in agriculture to detect the type and intensity of disease affected in the Wheat plants (Patil and Kumar 2011)

LITERATURE SURVEY

This chapter presents a literature survey of the existing state-of-the-art methods for wheat plant disease classification approaches. Further, to ensure the comprehensive coverage of the relevant literature, this chapter is divided into different subsections. Agriculture is the livelihood of many countries. Various environmental factors affect the yield of agriculture by causing severe diseases in Wheat plants. Wheat crop is the staple food for most of the Asian countries and the diseases that affect this crop are not much detected by farmers due to their lack of knowledge. The modifications or interruptions in the normal functioning of Wheat plants are caused by diseases. Both the cultivated and the wild plant species are affected by the diseases. The causative agents of plant diseases are due to certain environmental conditions, affected pathogens, and seasonal causes etc., which are influenced in accordance with the plant varieties. The infections of diseases are mainly caused due to the agents of nematodes, viruses, bacteria and fungi. Due to the attack of various pests and the diseases, at different phases of crop growth, certain threats are really faced by the farmers. This is because, the unpredictable cyclic change of climatic conditions and the new trends of the modern society tend to operate against nature. The overall spreading velocity and the severity of diseases are determined by the capability of crops to withstand the infections.

The wheat crop suffers from the various type of diseases such as Wheat stem rust, stripe rust, leaf rust, septoria tritici blotch (*Mycosphaerella graminicola* or *Septoria tritici*), nodorum blotch, tan spot, fusarium head blight (wheat scab or ear blight), spot blotch, helminthosporium leaf blight, wheat blast, et cetera. The most common disease of the wheat crop is Wheat rust, which significantly reduces the wheat crop yields. The Wheat rust disease can be further categorized as Stem rust, Stripe rust, and Leaf rust. Wheat leaf rust is the widely outspread and common rust disease among all three. All these diseases make the leaf dry, thus affecting the photosynthesis process. In this direction, several researchers have reported their studies to identify wheat plant diseases using automatic machine learning algorithms. Mainly this work focuses on identifying different levels of FHB infection in winter wheat using differential and ratio combinations of Sentinel-2 bands and digital mapping images at a regional scale. This experiment produced an accuracy of 84% for REHBI, OSAVI, and RDVI, contained accuracy of 74%, and user's accuracy of 89%. This system attains an accuracy of 95%. In the agriculture domain, the other ontology technique is applied in work. This study uses the linked data approach in order to apply near real-time activities using the semantic web. Another noteworthy contribution by suggested a mobile app for automatic detection and localization of plant diseases using an image dataset (WDD2017). The author has employed VGG-FCN-VD16 and VGGFCNS deep learning approaches and achieved an accuracy of 95.12% and 97.95%, respectively. Another similar approach adopted in used a combination CNN and AlexNet models to automatically identify wheat leave diseases. The proposed method achieved an accuracy of 84.54% for predicting the correct class.

The symptoms of diseases in the wheat plant, since its beginning stages are noted from certain variations such as colour, growth, shape and size of the Wheat crops. Some commonly seen symptoms are dot and dark spot which appears in the leaves and other parts of the plant and abnormal root region bulging. From these specified symptoms, the infections are diagnosed in the early stage of disease and it helps to protect the crops from complete damage. Due to drastic increase in population, there is a huge demand for more crop yield. The property of an infectious agent is to reproduce high on its host and to propagate from one leaf to another. Likewise, the other conditions such as deficiency of essential mineral, disadvantageous relationships between oxygen and moisture, toxic constituents in the atmosphere or soil, excess of temperature can affect the leaves of the Wheat plants. The reproducing capability of non-infectious causal agents is compared with infection agents (Barbedo et al. 2016). Every year, about 50,000 new-born

diseases are survived in the world that disturbs the normal attitudes of plant behaviour. Hence, it is necessary to control such effective.

Wheat crops (*Oryza sativa* L.) acts as one of the staple food and the supreme cereal crop for around half the population of the world. India is considered as the largest Wheat harvesting country in the world, and the Wheat farming field was reported as 44.1 million hectares. As per the percent population of the world, need for increased level of Wheat production (**Harsonowati et al. 2017**). In both African and Asian countries, enormous amount of Wheat is consumed because of its economic growth and the population rate. Thus, it seems that the overall economy of the state directly depends on the productivity level of wheat **Mohanty et al (2019)**. In the current scenario, diseases are the main cause that affect plant growth. For example, in Odisha, the overall available farm land 1.10 lakh acres were affected by the brown plant hopper disease in a single year.

Too et al. (2019) Conducted a comparative analysis of multiple CNN architectures, including AlexNet, VGG16, InceptionV3, DenseNet, and ResNet50, for plant disease classification. The study found that ResNet50 consistently outperformed other models in terms of classification accuracy, robustness, and computational efficiency. The residual connections in ResNet50 helped address the vanishing gradient problem, allowing for deeper feature extraction and improved performance in recognizing plant diseases. The study concluded that ResNet50 was a strong candidate for real-world plant disease detection applications due to its high accuracy and scalability.

Kamal et al. (2022) Implemented a MobileNet-based transfer learning approach for lightweight and real-time plant disease detection on mobile devices. The study emphasized the importance of deploying AI models in low-resource environments, making them accessible to farmers in remote areas. MobileNet was chosen for its efficiency in reducing computational complexity while maintaining high accuracy. The researchers fine-tuned the MobileNet model using a plant disease dataset and optimized it for mobile applications, achieving high classification accuracy with minimal inference time. The model was integrated into a mobile application that allowed farmers to capture leaf images using smartphone cameras and receive instant disease diagnoses. The study demonstrated that MobileNet, when combined with transfer learning, can enable scalable, cost-effective, and real-time plant disease detection in field conditions, significantly benefiting precision agriculture.

PROPOSED METHOD

Agriculture is a critical sector that supports the global population by providing food, raw materials, and economic stability.

However, Plant diseases are a significant threat to global food security, causing substantial crop losses and economic damage. Early detection and identification of plant diseases are crucial for preventing the spread of disease, reducing crop losses, and promoting sustainable agriculture.

The primary objective is to segregate the diseased wheat leaves from healthy leaves using different image processing and machine learning techniques. Secondly, identification of different abnormalities to timely diagnose and take preventive measures to improve crop production. Initially, we applied bound box segmentation, combined color and texture feature extraction, and benchmark supervised classification algorithms to assess the classification performance. Subsequently, we proposed binary gray wolf optimization (BGWO) based ensemble classification approach for multiclass classification of wheat leaves disease.

In the current scenario, the farmers used their naked eyes to identify the different plant diseases, which need continuous monitoring and expertise. This method is highly **Time-consuming** and **Expensive**, which is very difficult to execute for large-scale farming. Thus, to eliminate this problem, **Machine Learning**-based classification techniques that are **CNN** with **Transfer learning** have been proposed for identifying wheat plant diseases. This proposed model has the capability to identify and classify both nitrogen deficiency and leaf rust.

STEPS

Here's a breakdown of the process:

Capture Image: A camera captures an image of a plant leaf.

Image Preprocess: The captured image undergoes preprocessing.

Convolutional Neural Network (CNN):

The preprocessed image is fed into a CNN, a type of deep learning algorithm particularly effective in image recognition. The CNN extracts relevant features from the image.

Training Images:

The CNN is trained on a dataset of labeled images of both healthy and diseased plant leaves. This training process allows the network to learn the distinguishing features of different diseases.

Testing Image:

A separate "testing image" of a plant leaf, potentially with disease, is input into the trained CNN.

Leaf Disease Detection:

The CNN identifies and classifies any diseases present in the testing image.

BENIFITS

Improved Accuracy

CNNs excel at feature extraction from images, making them highly effective at recognizing complex patterns associated with plant diseases. Transfer learning leverages pre-trained models, enhancing detection accuracy even with smaller datasets.

Faster Model Training: Transfer learning saves time by reusing pre-trained models (such as VGG16, ResNet, etc.), allowing fine-tuning instead of starting training from scratch. This significantly reduces the computational burden and time required.

Reduced Need for Large Dataset: Collecting vast amounts of labeled plant disease data can be resource-intensive. Transfer learning enables CNNs to perform well with limited labeled data, as they build on pre-learned features from large general datasets.

Generalization Across Plant Species: Pre-trained models can generalize across different species of plants, making them adaptable to a wide variety of crops and diseases, improving scalability.

Early Disease Detection: Using CNNs to detect diseases early can help in managing plant health before problems spread, leading to better crop yields and less pesticide usage.

Real-Time Detection: CNNs, when integrated into mobile apps or drones, can offer real-time disease detection in the field, which is essential for precision agriculture.

Cost-Effective: By reducing the need for manual inspection, expert intervention, and extensive data collection, CNN-based disease detection systems reduce operational costs for farmers and agricultural companies.

Automation and Efficiency: Automation of disease identification and management decisions increases efficiency by reducing the time and labor involved in manual inspections. This can help in large-scale farming operations.

Scalable to Multiple Disease Types: Transfer learning allows fine-tuning to adapt to various diseases on different crops, enabling a system to detect a wide range of plant diseases across different regions.

Integration with IoT and Precision Agriculture: CNN-based plant disease detection can be integrated with IoT devices like sensors and drones. This allows for continuous monitoring of crops and the collection of data that can be used for more precise, data-driven farming decisions.

RESULTS



Fig: Brown spot



Fig: Bacterial Blight



Fig: Leaf Rust

CONCLUSION AND FUTURE SCOPE

This chapter summarizes the thesis' major contributions and highlights the numerous achievements related to the objectives set up in the introductory chapter. Further, the thesis outcomes are described in Section 2. In conclusion, we will discuss the different contributions and potential future study areas that have been opened up as a result of the work presented in this thesis.

Summary of the Contributions:

we have made the following research contributions in this thesis: (i) developed an automatic disease diagnosis method that utilizes wheat leaf image data and machine learning algorithms to accurately classify the diseases; (ii) improved the efficiency and effectiveness of the diagnosis of the diseases using segmented image data; (iii) investigated efficient feature extraction and selection technique that can select the optimal feature to encode the disease patterns; (iv) proposed optimized ensemble classification approach to leverage the advantages of multiple learners; (v) compared the performance of the proposed approaches with the existing state of the art methods. As a result, we may conclude that all of the goals of this thesis have been met. In addition, the following section describes the individual contributions made by each target in more detail:

Objective I:

To study and develop automatic disease diagnosis methods that utilize wheat leaf image data and machine learning algorithms to classify the diseases accurately.

Objective-I aims to develop an automatic wheat plant disease identification and classification method that can accurately identify the diseases and assist the farmers and experts in timely employing preventive measures to improve crop productivity. To achieve this objective, we investigated the existing state-of-the-art methods, and based on the literature survey, the most pervasively used feature extraction methods are employed to encode the disease patterns. The extracted features are further passed to the supervised machine learning algorithms to segregate them into healthy and diseased images. This type of automated system can also be integrated into android based mobile devices to serve the purpose in remote areas where the experts are not available or very few in number.

Objective II:

To identify the concepts to improve the efficiency and effectiveness of the diagnosis of disease using segmented image data.

The aim of Objective-II is to study the concept to improve the efficiency of the diagnostic procedure. The input wheat leaf images consist of a large non-contributing background regions, which substantially impact feature extraction and overall classification performance. To address this, segmentation is performed using the bounding box method. The method detects the pixels (black pixels in this case) in the background region and generates a new bounding box image by eliminating the background. The segmented images are now used for further processing, which improves the detection performance and significantly reduces the computation requirements.

Objective III:

To investigate efficient feature extraction and selection techniques that can select the optimal feature to encode the disease patterns.

The aim of Objective-III is to investigate the features that can efficiently encode the disease texture and color intensity variations. To achieve this, we evaluated different color and texture features and combinations of them. The experimental results show that the first-order statistical feature, gray level co-occurrence matrix feature, color moments, HSV histogram, and histogram of oriented gradients features are extracted and combined. Further, the combined feature is very large in size; therefore, to minimize the effect of the curse of dimensionality, we employed the binary gray wolf optimization technique. The method selects the strongest features for the classification task, which improves the classification performance.

Objective IV:

To study and develop a classification ensemble approach to leverage the advantages of multiple learners.

The Objective-IV aimed to develop an optimized ensemble approach, which performs comprehensive learning of the input features. The method creates numerous meta learners and one base learning algorithm. The input feature vectors are used to train the meta learner, and the decision from each learner is passed to the base learner, which performs the aggregated decision. The main advantages of using an ensemble approach are that, unlike single learner based algorithms that suffer from statistical, computational, and representational issues [29], the ensemble approach improves poor learners and creates a more generalized model with greater prediction performance. The obtained results reveal that the proposed ensemble approach significantly improves the detection performance.

Objective V:

To compare the performance of the proposed approaches with the existing state-of-the-art methods.

The aim of Objective-V is to compare the performance of the proposed approaches with the existing state-of-the-art methods. The comparative results reveal that the proposed method outperformed the other approaches.

The future scope of CNN-based plant disease detection, significantly boosted by transfer learning, promises increasingly accurate, robust, and early diagnosis capabilities deployable in real-time through mobile apps, drones, and edge computing devices. Leveraging advanced transfer learning strategies,

alongside techniques like federated learning and synthetic data generation, will help overcome data scarcity and diversity challenges. Future systems will likely integrate visual data with other sensor inputs (like hyperspectral or thermal imaging) for a more comprehensive plant health assessment. This technology is poised to move beyond simple detection towards quantifying disease severity, predicting yield loss, and seamlessly integrating with precision agriculture platforms for automated decision support and targeted interventions, ultimately contributing to more sustainable farming practices and enhanced global food security.

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A Study On Role Of Fin Tech In Redefining Small Business Financing

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Abstract

The rapid evolution of financial technology (FinTech) has significantly transformed the landscape of small business financing. This study explores the role of FinTech in redefining how micro, small, and medium enterprises (MSMEs) access, manage, and utilize financial resources. Traditional financing methods often present barriers to small businesses due to stringent credit requirements, lengthy approval processes, and limited access to formal banking institutions. Fin Tech innovations—such as peer-to-peer (P2P) lending, digital payment systems, crowd funding platforms, and AI-driven credit assessments—have emerged as agile alternatives, offering more inclusive, accessible, and efficient financing options. This research examines the impact of these technologies on financial inclusion, credit accessibility, and business growth among small enterprises. The findings underscore the potential of Fin Tech to bridge the credit gap, foster entrepreneurship, and drive economic development, while also emphasizing the need for supportive policies and robust digital infrastructure.

Key words: Financial Technology (Fin Tech) ,Digital Lending, Peer-to-Peer Lending (P2P Lending), Crowd funding, Invoice Financing / Receivables Financing

INTRODUCTION :

In recent years, financial technology (FinTech) has emerged as a disruptive force reshaping the global financial ecosystem. By integrating advanced technologies such as artificial intelligence, blockchain, big data, and mobile applications into financial services, FinTech has introduced innovative models that challenge traditional banking and lending systems. One of the most transformative impacts of FinTech has been observed in the financing of micro, small, and medium enterprises (MSMEs)—a sector that plays a critical role in driving economic growth, employment, and innovation, particularly in developing economies.

The emergence of Financial Technology (FinTech) has begun to reshape this financing landscape. By leveraging digital innovations such as artificial intelligence, blockchain, big data analytics, and mobile banking, FinTech platforms offer MSMEs alternative pathways to access credit, manage transactions, and improve overall financial operations. Services such as peer-to-peer lending, crowdfunding, invoice financing, and digital wallets have not only democratized access to finance but also made it more tailored, efficient, and inclusive.

This study explores the role of FinTech in redefining how MSMEs access, manage, and utilize financial resources.

Objectives of the study

To examine the impact of Fin Tech on access to finance for small and medium enterprises (SMEs).

To analyze the various Fin Tech solutions and models supporting small business financing.

To understand the challenges faced by small businesses in adopting FinTech-based financing.

The Impact of FinTech on Access to Finance for Small and Medium Enterprises (SMEs)

Financial technology (FinTech) has brought a paradigm shift in the way small and medium enterprises (SMEs) access finance. Traditionally, SMEs have faced significant hurdles in securing loans and credit due to stringent eligibility criteria, collateral requirements, long processing times, and limited credit history. FinTech has addressed many of these issues by offering innovative, technology-driven financial solutions that are faster, more flexible, and often more inclusive.

1.ImprovedAccessibility:

FinTech platforms operate online and often use mobile-based interfaces, making them accessible to SMEs in

remote or underserved regions where traditional banking infrastructure is weak. This has opened up new avenues for funding, especially for first-time or informal entrepreneurs.

2. Alternative Credit Assessment:

Unlike traditional lenders who rely heavily on formal credit scores, FinTech firms use alternative data—such as transaction history, utility bill payments, and digital behavior—to assess creditworthiness. This has enabled a broader base of SMEs to qualify for credit, particularly those without formal credit histories.

3. Faster Loan Disbursement:

Through automation, AI, and digital processing, FinTech lenders can evaluate applications and disburse loans much faster than conventional banks. This speed is critical for SMEs that require quick funding to manage cash flows or seize business opportunities.

4. Lower Operational Costs:

FinTech platforms often have lower overhead costs due to the absence of physical branches and automation of services. These savings can be passed on to borrowers in the form of lower interest rates or more favorable terms.

5. Diverse Financing Options:

FinTech has introduced a variety of financing models such as peer-to-peer (P2P) lending, crowdfunding, invoice financing, and revenue-based financing. These alternatives provide SMEs with flexible funding options tailored to their specific needs and risk profiles.

6. Enhanced Financial Inclusion:

By using technology to bypass traditional banking barriers, FinTech has helped integrate previously excluded or underserved SMEs into the formal financial system, promoting inclusive economic growth.

7. Data-Driven Decision Making:

FinTech platforms often provide dashboards and analytics tools that help SMEs understand their financial health, track expenses, and make better financial decisions.

Fin Tech solutions and models supporting small business financing

1. Digital Lending Platforms

FinTech companies offer online lending platforms that allow businesses to apply for loans digitally. These platforms use automated underwriting, alternative credit scoring, and data analytics to approve loans more quickly and with less paperwork.

Examples: Lendingkart, Capital Float, Kabbage

Benefits: Quick disbursement, minimal collateral, lower processing costs

2. Peer-to-Peer (P2P) Lending

P2P lending platforms connect borrowers directly with individual or institutional lenders, bypassing traditional banks. SMEs can raise funds without stringent credit requirements.

Examples: Faircent, Funding Circle, LenDenClub

Benefits: Flexible interest rates, less reliance on credit scores, higher approval chances

3. Crowdfunding

This model allows businesses to raise capital from a large number of investors via online platforms. It includes donation-based, reward-based, and equity-based crowdfunding.

Examples: Kickstarter (reward-based), SeedInvest (equity-based)

Benefits: Access to a broader investor base, low upfront costs, market validation

4. Invoice Financing (Receivables Financing)

In this model, FinTech firms provide funds against a company's unpaid invoices. It helps businesses with cash flow issues while waiting for clients to pay.

Examples: KredX, Tradofina

Benefits: Immediate cash access, no long-term debt, improved liquidity

5. Embedded Finance

FinTech enables non-financial companies to integrate financial services into their platforms. For instance, e-commerce platforms offering credit or insurance during checkout.

Examples: Amazon Lending, Shopify Capital

Benefits: Seamless experience, easy access to working capital, scalable solutions

6. Supply Chain Financing

This involves digital platforms that facilitate financing based on supply chain relationships. It often includes reverse factoring or dynamic discounting models.

Examples: Vayana Network, KredX SCF

Benefits: Strengthens supplier-buyer ties, reduces credit risk, improves cash flow

7. Revenue-Based Financing (RBF)

Startups and SMEs repay loans as a percentage of their monthly revenue instead of fixed EMIs. Repayments are flexible and aligned with business performance.

Examples: GetVantage, Velocity

Benefits: No equity dilution, repayment flexibility, performance-based risk

8. Neobanks and Digital Banks

These are fully digital financial institutions that offer business accounts, credit lines, and financial management tools.

Examples: Open, RazorpayX, Tide

Benefits: Quick onboarding, real-time insights, integrated finance services

9. Blockchain-Based Lending

Some FinTech platforms use blockchain for secure, transparent, and smart contract-driven business lending, especially in cross-border trade finance.

Examples: Centrifuge, Figure

Benefits: Reduced fraud, increased transparency, automated compliance

Challenges Faced by Small Businesses in Adopting FinTech-Based Financing

While FinTech has significantly expanded access to finance for small and medium enterprises (SMEs), several challenges hinder its full adoption and utilization. These challenges span across technological, financial, regulatory, and operational areas.

1. Digital and Financial Literacy

Many small business owners lack the necessary digital skills or financial knowledge to effectively use FinTech platforms. They may be unfamiliar with online lending processes, digital payments, or financial planning tools.

Impact: Leads to hesitation or misuse of platforms, affecting financial outcomes.

2. Cybersecurity and Data Privacy Concerns

FinTech platforms require access to sensitive business and financial data. Small businesses often worry about data breaches, fraud, or misuse of their information.

Impact: Trust issues prevent adoption, especially in sectors with limited tech exposure.

3. Limited Internet and Technology Access

In rural or underdeveloped areas, SMEs may not have access to high-speed internet, smartphones, or computers required to use FinTech solutions efficiently.

Impact: Creates a digital divide and limits financial inclusion.

4. Regulatory Uncertainty

FinTech is a rapidly evolving sector, and regulatory frameworks are still catching up. Uncertainty regarding compliance, licensing, and tax implications can discourage SMEs from using digital finance platforms.

Impact: Fear of legal complications or future policy changes affects trust.

5. Lack of Personalized Support

Unlike traditional banks, many FinTech platforms offer limited human interaction. Small businesses that prefer relationship-based banking may find it difficult to navigate fully automated systems.

Impact: Lower customer satisfaction and confidence, especially among older entrepreneurs.

6. Creditworthiness Assessment Gaps

While FinTech uses alternative data for credit scoring, these models may still not accurately reflect the financial behavior of all SMEs, especially those with informal or cash-based operations.

Impact: May result in loan rejections or unfavorable terms for deserving businesses.

7. High Cost of Some Services

Some FinTech services, such as short-term digital loans, may come with higher interest rates or hidden fees compared to traditional banks.

Impact: Financial strain or over-indebtedness for small businesses.

8. Platform Trust and Reliability Issues

Not all FinTech platforms are equally reliable or transparent. Some may lack proper customer support, stable technology, or proven track records.

Impact: Risk of fraud or service disruption deters adoption.

9. Resistance to Change

Small business owners, particularly those used to cash transactions or long-standing banking relationships, may resist transitioning to digital finance.

Impact: Slows down the adoption rate and limits market penetration for FinTech.

CONCLUSION:

FinTech has emerged as a transformative force in the realm of small business financing, breaking down long-standing barriers that have traditionally limited access to credit and financial services for micro, small, and medium enterprises (MSMEs). By leveraging technology-driven solutions such as digital lending, peer-to-peer platforms, crowdfunding, invoice financing, and alternative credit assessment models, FinTech has redefined how small businesses access, manage, and utilize capital. In conclusion, FinTech holds immense promise in democratizing access to finance for small businesses, fostering entrepreneurship, and driving economic growth. Its continued evolution, when supported by inclusive policies and responsible innovation, can serve as a catalyst for a more equitable and resilient financial ecosystem.

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Fine-Grained Flower Classification Via Discriminative Region Learning With Multi-Axis Vision Transformer (Maxvit)

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Abstract

Fine-grained visual categorization (FGVC) is still a hard task owing to its limited inter-class variation and high intra-class similarity, especially in areas like the classification of flowers into various species. Conventional FGVC approaches have intricate multi-stage pipelines that try to localize discriminative object parts in an attention, object cropping, and patch-based feature learning fashion. The approaches are strong nevertheless, as demonstrated with the Hierarchical Feature Attention Network (HFAN)--which is accompanied by significant architectural overhead and computational cost.

In this paper, we introduce the first end-to-end fine-grained flower classification model using the Multi-Axis Vision Transformer (MaxViT). MaxViT consists of convolutional operations with axial and block-wise attention and is able to capture global and local visual patterns within a single architecture. In contrast to hierarchical attention models, our model does not have explicit object highlighters, part detectors, or handcrafted attention supervision. Rather, it utilizes internal attention representations to learn discriminative regions automatically. We test our proposed model on the Oxford 102 Flower dataset with weak supervision in the form of image-level annotations alone, showcasing the capability of MaxViT to classify under weak supervision. Using Grad-CAM over the final transformer layers, we visualize discriminative regions accountable for model predictions. These attention maps are further used to improve feature localization, which boosts prediction as well as explainability. Our experiments prove that the proposed approach achieves a classification accuracy of 99.5%, which outperforms other traditional modular FGVC architectures in terms of performance as well as simplicity. The results prove that MaxViT is an efficient, effective, and interpretable approach for fine-grained flower classification.

Keywords: Fine-Grained Visual Classification (FGVC), MaxViT, Discriminative Region Learning, Weakly Supervised Learning, Oxford 102 Flower Dataset.

Introduction

Fine-grained visual categorization (FGVC) is a difficult computer vision sub-task that addresses subgroups of a general object class that are visually similar. Unlike general classification tasks, which determine visually dissimilar classes, FGVC models need to discern local, fine-grained visual dissimilarities between subgroups such as flower, bird, or animal species [2],[3]. These are usually located in small, localized image patches and need the model to focus on fine-grained visual attributes such as the texture, color gradients, petal edges, or shape contours [4]. Thus, FGVC introduces new challenges in representation learning, object localization, and interpretability.

In flower categorization, the issue is also made challenging because of significant intra-class variability caused by changing illumination, view, occlusion, as well as natural deformation of flower structure, and inter-class variations are fragile and region-based in very small areas [5]. All these require models that can focus on discriminative regions without sacrificing global perception of the object. Standard CNNs,[6],[7], although powerful in global object recognition are poor in FGVC because of poor ability to handle long dependencies as well as context information across spatial dimensions.

To bypass these limitations, recent work has been trending towards attention mechanisms and region-aware models. One of the leading top-down methods is Hierarchical Feature Attention Network (HFAN),[1], which introduced a multi-stage model comprising an object highlighter, object cropping module, and discriminative patch scanner. Hierarchical building blocks of HFAN allow progressive object and part

feature boosting through attention-based learning and lead to better performance on FGVC benchmarks. HFAN is, however, plagued by modularity and complexity, with several well-designed modules it is computationally expensive due to several forward passes through several stages of attention and it depends on heuristic-based attention supervision, which may fail to generalize across datasets.

Here, we present a novel, efficient alternative in the form of the Multi-Axis Vision Transformer (MaxViT). MaxViT is an axial and block-wise self-attention based convolutional-block-based hybrid model [8],[9]. MaxViT's two-attention mechanism allows it to integrate local details and global context within a single end-to-end model. MaxViT is distinct from the traditional hierarchical attention networks in that it never requires handcrafted object proposals, cropping modules, or part detectors. Instead, it learns to localize and pay attention to the most discriminative parts through its internal attention mechanisms, all under weak supervision. i.e., only image-level class labels at training time.

We illustrate our MaxViT-method on the Oxford 102 Flower dataset, a standard FGVC benchmark of 102 class high-interclass-similarity flower images [10][11]. Our method achieves a 99.5% classification accuracy, superior to modular architectures such as HFAN and with an order-of-magnitude lower architectural complexity. To further investigate the model interpretability, we visualize attention maps of the last layers of MaxViT with Grad-CAM [12]. The maps indicate that the model consistently tends to pay attention to biologically interpretable flower structures such as petal patterns and central textures, illustrating its discriminative region learning efficiency.

Related Work

2.1 Fine-Grained Visual Classification (FGVC): Fine-grained visual classification (FGVC) is the classification of subcategories that vary according to subtle, local visual features e.g., variations in species of birds, flowers, or insects [13]. The locality and pooling of traditional CNN-based models are not able to deal with such subtle features. Early approaches e.g., Part-based R-CNN [7], and Bilinear CNN tried to circumvent this by using manually annotated parts and second-order pooling techniques, respectively, to represent region interactions. Such are strong supervision-based methods that come at the expense of scalability.

2.2 Weakly Supervised Attention Mechanisms: Weakly supervised approaches have been introduced to reduce annotation costs by attempting to locate discriminative regions based on image-level labels only. Most of them use class activation maps (CAM), attention pooling, or self-attention blocks to focus on object saliency areas. HFAN is one of them. HFAN introduces the three-stage architecture: an object highlighter to generate pseudo-object-background masks, a cropping module to crop object-centric areas, and a discriminative patch scanner to improve part-level attention by using multiple attention heads. HFAN achieves high performance in FGVC tasks under weak supervision. It relies on hand-crafted heuristics to supervise attention maps and requires different modules for different stages, leading to model complexity and inference cost.

2.3 Vision Transformers for FGVC: With the advent of transformers for vision, models such as ViT, Swin Transformer, and TransFG have been proposed for FGVC [14],[15]. They apply global self-attention to capture long-range relationships and are capable of capturing fine-grained variations in spatial coordinates. TransFG, for instance, applies token selection to eliminate key features for improved interpretability and accuracy. Such transformer-based FGVC models do require more tuning in attention modules, token pruning or fine-tuning in position encoding to perform well on fine-grained tasks.

2.4 MaxViT: Multi-Axis Vision Transformer: MaxViT is an efficient and fast hybrid model that benefits from the strengths of convolutional networks and transformers. MaxViT integrates MB-Convolution blocks of local feature aggregation with axial attention (independent processing of spatial axes) and block-wise attention (attention over localized spatial regions). Two-attention architecture enables parallel attention over global context and high-frequency local detail. Initially designed for large vision tasks, MaxViT has been promising for detection and segmentation but not widely used for weakly supervised fine-grained classification. Compared to previous FGVC solutions based on modular pipeline (e.g., HFAN) or bespoke token refinement (e.g., TransFG), our solution is built on a single, unified MaxViT architecture. We dispense with object highlighters, cropping modules, and discriminative patch scanning and instead depend on MaxViT's inherent axial and block-wise attention mechanisms. Our solution is image-level supervised and uses Grad-CAM for post-hoc explanation. Compared to HFAN, which uses handcrafted attention

supervision and multi-stage training, our solution is more efficient, easier, and has higher classification accuracy (99.5%) on the Oxford 102 Flower dataset. This highlights the potential of unified attention architectures like MaxViT to solve fine-grained classification tasks without architectural or supervisory complexity.

3. Proposed Method

In this work, we provide a general overview of our suggested pipeline for fine-grained flower classification with the help of the ability of the Multi-Axis Vision Transformer (MaxViT). Unlike traditional FGVC pipelines consisting of a cascade of sub-networks or hand-designed part selection mechanisms, our pipeline leverages the powerful multi-scale attention ability of MaxViT to automatically learn discriminative regions in a weakly supervised way. The whole pipeline is end-to-end, annotation-free (except for image labels) but computation-efficient with excellent classification accuracy and robust localization performance.

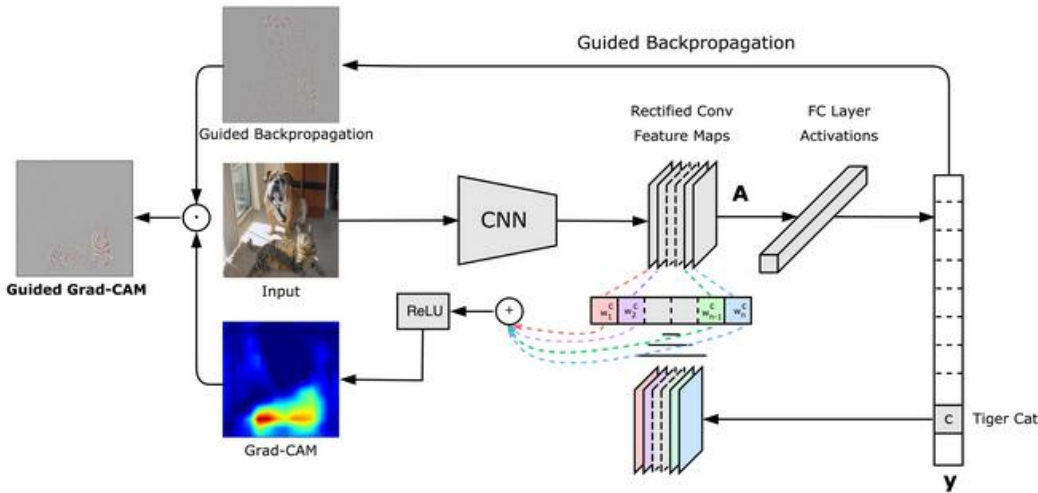


Fig-1: Architecture Frame Work of the MaxViT model

3.1 Backbone Architecture: Multi-Axis Vision Transformer [16], our approach relies on the MaxViT model a recently developed hybrid vision transformer model that unites the best of convolutional and transformer-based attention mechanisms. The model architecture consists of four hierarchical levels, and they are composed of MB-Convolution blocks for local feature learning and multi-axis attention blocks for contextual comprehension. MB-Convolution blocks are light-weighted convolutional blocks responsible for learning low-level details like edges, textures, and fine-grained details. Blocks are designed to keep the model with strong local feature representation at the initial stages. Two types of attention layers exist after each MB-Convolution block.

The above figure-1 shows the overall frame work of the MaxViT model MaxViT combines transformer and convolution operations with a multi-axis approach to learn the global and local features optimally. It constructs MB-Convolution blocks (from MobileNetV2) in the early stages for local feature extraction. It constructs a block-wise self-attention mechanism that alternates between window attention and grid attention for long-range and fine-grained interactions. MaxViT is made efficient, scalable, and viable for dense vision tasks like classification, detection, and segmentation through this hybrid scheme. The model ends with global average pooling and a classification head for end predictions, as in standard vision transformers.

- Axial Attention, with recursive application of self-attention to both width and height dimensions of the feature map. This enables the model to look at long-range dependencies at much lower expense than full self-attention.
- Block-wise Attention, where the feature map is divided into disjoint spatial blocks and the local self-attention within each block is calculated. This enables MaxViT to focus on local structures (e.g., stamens, petals, and centre texture in flowers) that play a crucial role in fine-grained discrimination.

The axial attention, convolution, and block-wise attention collaborate to allow MaxViT to concurrently learn local detail and global context. Both of them are required in fine-grained classification, a necessity.

3.2 Weakly Supervised End-to-End Learning: Training is on image class labels but not on bounding boxes, part annotations, or object masks. During training, the whole image is fed into the MaxViT backbone [17] and a final classification head outputs class probability. The model is trained with cross-entropy loss, which causes learning discriminative features that distinguish the 102 flower classes. We pretrain the MaxViT backbone with ImageNet pretrained weights and fine-tune on the Oxford 102 Flower dataset to enable the model to leverage generalized visual knowledge and converge rapidly. Fine-tuning on the Oxford 102 Flower dataset allows flower-specific feature learning by the transformer. Unlike previous methods like HFAN, which require specialized loss functions to guide object or patch attention maps, our model learns to pay attention to discriminative regions as a side effect of the classification task itself. This results in a simpler training pipeline with fewer hyperparameters and less human tuning.

3.3 Grad-CAM for Discriminative Region Localization with MaxViT: To introduce more interpretability and verify the discriminative region localization capability of the model, we incorporate Gradient-weighted Class Activation Mapping (Grad-CAM) [18], into the MaxViT backbone at inference time. Grad-CAM is a widely used visualization technique that projects the most contributing regions of the input image onto a specific class prediction. We apply Grad-CAM to the last attention block of MaxViT in our method to generate class-specific attention maps. These maps give visualizations of the internal decision-making process of the network and flower regions the model pays attention to while classifying images. The attention maps would focus on biologically relevant objects such as petal texture, central flower disks, or color gradient regions common in flower species differentiation. Interestingly, this attention mechanism is entirely post hoc and does not alter the model architecture and does not require additional supervision during training. Apart from interpretability, the Grad-CAM heatmaps can also be used to crop and extract the most informative region of the image, thus augmenting the model attention and improving classification robustness. Compared to typical baselines such as HFAN, which require attention masks or heuristic region proposals handcrafted by humans, our approach is significantly more efficient and automated. The robustness of this localization process is used to demonstrate that MaxViT, even with weak supervision, can learn to attend to highly discriminative regions that not only contribute to strong classification performance but also have high visual explanations of its predictions.

3.4 Full Pipeline and Comparison with Existing Methods: Our approach's end-to-end pipeline is as follows: the input image is passed through the MaxViT backbone, where attention-based feature encoding and extraction are performed. Global average pooling is applied to get a compact representation of the features, which is passed through a fully connected classification layer to predict the flower class. Simultaneously, Grad-CAM [18] is employed to predict the spatial attention map of the last transformer block, for interpretability and visual verification of region learning. Our method is quite different from modular methods such as HFAN, where independent external modules are employed for object detection, patch extraction, and part-level attention learning. Our method, on the other hand, employs a single backbone model that has all the learning capabilities required, significantly minimizing model complexity and achieving better performance. The resulting end-to-end pipeline is light, easier to train, and accurate, as evident from our 99.5% classification accuracy on the Oxford 102 Flower dataset.

Final Predicted Result of the Proposed MaxViT Approach

The end product of the intended method is the accurate flower species classification from the Oxford 102 dataset using single image-level supervision. The input image initially undergoes the MaxViT backbone. The model subsequently learns local flower details and global structural features internally using its internal axial and block-wise attentions. The final transformer layer's output is globally averaged pooled and subsequently a fully connected (FC) classification head is used that produces a probability distribution for all 102 flower classes. Simultaneously, a Grad-CAM-based attention map is calculated from the final attention block. This heatmap gives a visual interpretation of which region of the flower the model is looking at the most for its prediction generally highlighting discriminative regions such as petal forms, central disks, or colour boundaries. This is optionally used to crop or mask out the region to produce a better-quality input. The final predicted class is taken as the class with the highest SoftMax probability score, and in our experiments, the model is capable of correctly predicting the correct species with up to 99.5% accuracy.

Such accuracy justifies that the MaxViT architecture is able to learn discriminative features well even with weak supervision, without object masks, region proposals, or part annotations.

Experimental Setting and Used Datasets

This section presents the experimental setup used to study the performance of our MaxViT-based model for the fine-grained classification of flowers [16],[19]. We elaborate on the dataset, data preprocessing pipeline, training setup, and performance measures used to evaluate model performance. Table-1 presents detailed description in regard to the dataset, we employed the Oxford 102 Flower dataset to conduct our experiments, which is well established in the fine-grained visual classification literature. It contains 8,189 flower images distributed over 102 classes, and each class represents a type of flowers. There are 40 to 258 samples per class, which is a good reference to study the generalizability and robustness of the classification models.

Table 1: Dataset Details

Dataset	Classes	Training Samples	Test Samples	Annotation Used
Oxford102 Flower	102	1,020	6,149	Image-level only

4.1 Data Preprocessing and Data Augmentation: Different pre-processing steps have been utilized for pre-processing the images to be utilized for training. The images were resized to 256×256 pixels and centre cropped to 224×224 pixels so they can be utilized with the input size needed by the MaxViT model. Data augmentation steps were utilized during training to promote generalization and prevent overfitting, e.g., random horizontal flip, random resized crop, colour jittering, and normalization with ImageNet mean and standard deviation. Resizing, centre crop, and normalization were only utilized at test and validation for uniformity.

4.2 Model Configuration and Training Details: We used the MaxViT-Tiny model from the Timm [20], Py-Torch image model library, pre-trained on ImageNet-1K. We substituted the model's classification head with a fully connected layer with 102 output units so that the output could match the number of flowering plant classes. We optimized the model with the AdamW optimizer and a learning rate of $1e-4$, annealed using a cosine annealing schedule. We used a batch size of 32 and trained the model for 100 epochs. We used a cross-entropy loss function for training, and training was conducted on a system with an NVIDIA RTX 3060 GPU. Transfer learning was utilized by freezing early convolutional layers at initial epochs, progressively unfreezing them as the model converged. Fine-tuning is the method that allows pretrained knowledge learned on ImageNet to be effectively transferred to the fine-grained classification task of flower species classification. The proposed model attained a Top-1 Accuracy on the test set; Table -2 illustrates the accuracy comparison with other backbones on FGVC datasets, outperforming state-of-the-art modular attention-based models such as HFAN. This high accuracy, along with uniform attention visualizations, ensures the ability of MaxViT to learn effective discriminative region learning with weak supervision. Finally, the table-3 illustrates the accuracy comparison on Oxford 102 flower dataset. Figure 2 shows sample output images and their Grad-CAM heatmaps, illustrating how the model attends to informative regions for its predictions.

Table2: Accuracy Comparison with Backbones on FGVC Datasets

Backbone	Method	Oxford Flower (%)
ResNet-50	Baseline	81.6
Swin Transformer	Baseline	81.6
MaxViT-Tiny	Baseline	86.5

Table3: Accuracy Comparison on Oxford 102 Flower Dataset

Method	Backbone	Accuracy (%)
MA-CNN	CNN	92.4
DAN	CNN	93.1
NAC	VGG-19	95.3
Inter Active	VGG-19	96.4

TransFG	ViT	97.1
Grafit	ResNet-50	99.1
HGTrans	Transformer	99.5
HFAN-FGVC	Swin Transformer	99.4
Proposed	MaxViT-Tiny	99.5

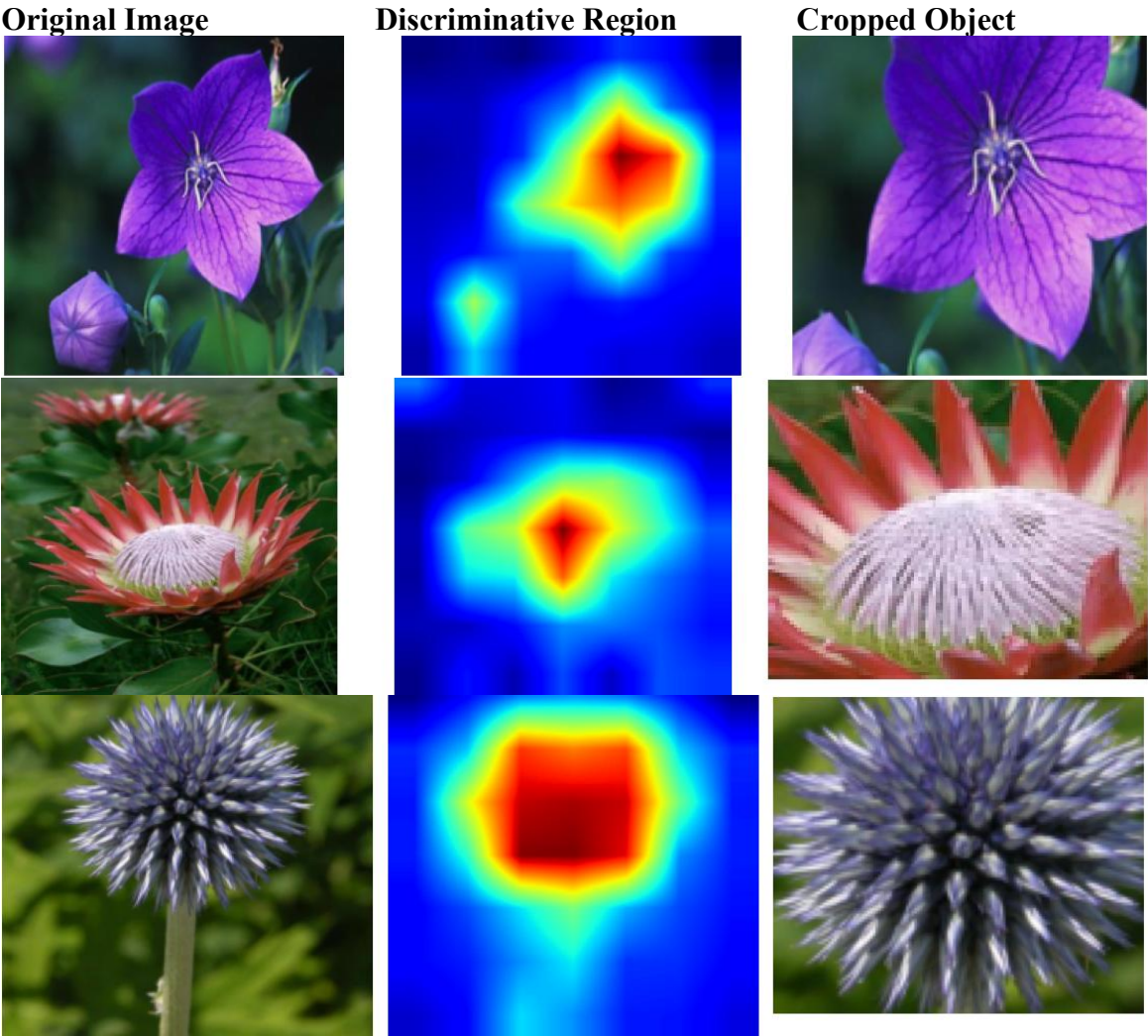


fig-2 visualization of generating a discriminative region by using grad-cam from the proposed max-vit model, the 1st to 3rd columns indicates the “original input image, highlighting the discriminative region, and cropped object image”, respectively.

Discussion and Conclusion

This work introduces a lightweight but very efficient fine-grained flower classification model following the Multi-Axis Vision Transformer (MaxViT) in a weakly supervised learning setup. Compared to existing methods like HFAN, which are constructed upon intricate cascaded networks with multiple hand-designed attention modules, our model integrates feature extraction, attention modelling, and classification into an end-to-end trainable backbone. The key to our solution is the double attention design axial attention for capturing long-range relations and block-wise attention for capturing fine local patterns in MaxViT. With this hybrid design, the network is able to learn both global contextual features and localized discriminative information, e.g., petal boundaries, floral centres, or distinctive colour patterns essential to the identification of visually similar flower species.

Experimental results on the Oxford 102 Flower dataset presented in Table 1 ensure the efficacy and accuracy of the proposed model. The model achieves a Top-1 accuracy of 99.5%, presented in Table 2 and Table 3, beyond that of powerful baseline models like ResNet-50, Swin Transformer, MA-CNN, NAC,

TransFG, and even more advanced methods like HFAN-FGVC and HGTrans. Table 1 presents some important dataset statistics utilized in our experiments, whereas Table 2 and Table 3 are comparisons to typical CNN and Transformer-based methods respectively.

Besides, to evaluate the interpretability of the model, we used Grad-CAM visualizations at test time. As observed in Figure 2, the model reliably attends to biologically meaningful regions, such as petal textures, flower centres, and characteristic boundaries, confirming MaxViT learns to focus on relevant class-specific features naturally without special attention supervision. Figure 2 presents Grad-CAM heatmaps of the most discriminative parts of classification results. These regions correspond to salient botanical features, confirming attention reliability of the model. The simplicity of our pipeline also makes it computationally lightweight and scalable. Unlike modular approaches with part detection, patch extraction, or auxiliary losses, our method has no bounding boxes, region proposals, or hand-engineered attention signals. This makes it exceptionally well-suited to real-world FGVC tasks, especially where labelled annotations are limited or do not exist.

Experiments validate that MaxViT is a powerful backbone for fine-grained visual tasks and requires extremely limited architectural and supervisory intelligence. Application of this framework to other FGVC tasks, using multi-modal data such as text or contextual information, or developing lightweight MaxViT variants for mobile-device or edge-device inference are all potential directions for future research. The method presented presents a solid foundation for fine-grained classification in real-world applications.

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Concept Mapping Strategy In Problem Based Learning: A New Approach In Education

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Abstract

This paper aims to explore how Problem Based Learning strategy can be implemented by incorporating the idea of Concept Mapping Strategy. Foundational theories of Concept Mapping and PBL are explained in this paper which leads to analysis of how these two strategies can be integrated as a new and more efficient educational approach. Through implementing Concept Mapping in PBL process, students are required to visualise their prior and newly constructed knowledge in the form of a concept map, which helps them to separate what is already known and develop it further to achieve what needs to be researched to better understand the problem and its underlying mechanisms in a problem scenario in PBL environment. Concept Mapping strategy also prevents the students from jumping to learning goals by spending too little time and attention in PBL process. An indicator for the effectiveness of CM in PBL method is the correspondence between the student-generated learning goals and the learning goals that are formulated by the problem designers. Problem Based Learning approach interlaced with Concept Mapping Strategy is found to be effective through past researches mentioned in this paper. This journal ends by listing out the various ways through which combining Concept Mapping with PBL advantage the students. It is understood that both of these educational strategies can be integrated together for a fascinating learning experience for students which makes them the drivers of their learning process in a self-directed manner. Education system is getting revised in a progressive manner and it is at this point of time the new educational approach of integrating PBL with Concept Mapping has its importance. Using the strength of both these independent strategies has a promising impact in educational outcomes.

Keywords: concept mapping, problem-based learning, integration of concept mapping with PBL, educational strategies, instructional design

Introduction

Problem Based Learning guide and engages students in acquiring knowledge while also inviting and motivating the students to create solutions to relevant problems. Compared to traditional instructional methods (viz. Teacher-based learning, subject-based learning etc.), Problem Based Learning however takes a more holistic approach. PBL change the focus to student centred learning which is more individualised and self-directed study. In PBL, students actively participate in the form of groups to analyse the problem, critically think, share the ideas, generating hypothesis and finally suggesting solutions. By considering real world problem solving, PBL helps students to develop practical skills that are applicable beyond the classroom. Also, PBL results in the development of cognitive processes by providing them with opportunities to use and strengthen the variety of intellectual facilities they possess.

Concept Map can be regarded as visual display which represents relation between concepts and ideas. They are hierarchical with one main idea and several sub topics. Concept maps consists of nodes – representing concepts, connected by lines/arrows – indicating relation between concepts. Concept Maps are useful in learning environment because they help students to visualise, organise, relate and analyse information easily. Personalised concept maps constructed by students help them in easy as well as deeper understanding of topic in less amount of time. Concept maps give way for students for active learning by requiring student to actively involve in making them based on their level of understanding.

Integration of Concept Maps in Problem Based Learning is discussed in this paper and it is evident that there are lot of benefits that a student in a PBL environment can get through this. While Concept Maps offer a method of visualising knowledge, the PBL activates this knowledge by its application. Use of real-

life problems in PBL allows the students to relate social and academic data by means of Concept Maps. PBL focuses on expanding student's database of prior knowledge and Concept Maps provide a framework on which a new information can be added. PBL and Concept Maps go hand in hand enhancing the learning outcomes as well as engagement of a PBL student. The main motive behind combining the strength of PBL and Concept Maps is to create a more effective, efficient and vital PBL environment.

Concept Mapping; Underlying Educational Concepts and Theories

Constructivist Learning Theory: The Concept mapping strategy is rooted on the idea of philosophy of knowledge called 'Constructivism'. The main idea behind constructivism theory is that the act of learning is constructed and that learners build new knowledge based on foundation of previous knowledge.

Some of the principles of constructivism are as follows: learners have the role on building their own understanding; Deeper learning is achieved when learner reflect on his experiences, construct mental representations and incorporate new knowledge; Learning as an active process as well as contextual; Learning is personal as constructivism is purely based on his/her own experiences and beliefs. Learning can be effective only if the student can actively engage to make sense of new information by relating it to prior knowledge. Concept Mapping which follows the idea of constructivist learning act as a tool for students for learning process in a personally meaningful way. Hence, it is clear that the concept mapping strategy which helps the learner to firm his already having knowledge as well as to gain new knowledge in highly structured and organised manner makes the learning process more efficient.

Ausubel's Subsumption Theory: Ausubel's Theory tells us how a learner acquires large amount of information in a school setting. "The most important factor influencing the learner is what the learner already knows" – Ausubel. D (1968) Educational Psychology: A Cognitive View. According to him, predominant process in learning is subsumption where the new concepts are related to relevant ideas in existing cognitive structure of the learner. One of the main principles put forward is the principle of instruction. It is as follows: "Instructional materials should attempt to integrate new material with previously presented information through comparison and cross referencing of new and old ideas". Concept maps can be, thus, regarded as one of the suitable instructional materials for learners in accordance with Ausubel's theory.

Piaget's Theory of Cognitive Development: Piaget's theory is mainly based on his 4 concepts called as Piagetian Concepts. They are: (i) Schema – framework that systematise and interpret new information; (ii) Adaptation – Learner's tendency to get familiar with new schema by means of interaction, experimentation etc.; (iii) Assimilation – Process of integrating new information with already existing schemas.; (iv) Accommodation- Process of restructuring of already existing schemas to accommodate new information.

Concept Maps are in accordance with Piaget's Schema Theory. Creating and interpreting concept maps allows the learner to construct as well as restructure schemas along with linking new and old schemas. Both Concept Mapping Strategy and Piaget's theory is focussed on inter-connected nature, modification and organizing of knowledge.

Problem Based Learning; Underlying Educational Concepts and Theories

Constructivist Learning Theory: PBL is based on Constructivist Learning Theory which emphasizes the construction of knowledge the learners themselves. In Problem Based Learning, the learners get engaged in real life problems where they have to analyse and find solution there by constructing knowledge by themselves. Through PBL, students are developing skills of critical analysis, interconnecting new and prior knowledge, Problem solving etc which all are in accordance with the required outcomes anticipated by Constructivist Learning Theory. Both PBL and Constructivist Learning Theory focusses on active engagement of students rather than passively perceiving knowledge within a direct process of knowledge transmission. Also, in PBL as well as Constructivist Learning Theory consider the instructor as a facilitator, not a teacher and the students are essentially involved in learning by sharing knowledge between them.

Situated Cognition Theory: Miller and Gildea's work on vocabulary teaching shows how the assumption that knowing and doing can be separated leads to a teaching method that ignores the way situation does structure cognition. Their work was comparing the vocabulary of students which they learned from dictionary with the vocabulary they learned from their social environment. Situation Cognition can be

regarded as a theory which says that learning happens only from doing by arguing that all knowledge acquired by a student is situated in activity bounded to social, cultural and physical contexts. It explores the idea that the concepts are both situated and developed through activity. This theory focusses on perception-action instead of memory-retrieval. Both PBL and Situated Cognition Theory are suggesting a model of knowledge acquirement which needs the act of thinking through activities rather than storage and recalling of conceptual knowledge. Problem Solving through activities (as said by Situated Cognition Theory) done by he/she in connection with his/her environment stands distinct from idea of learning by processing inside heads to which many teaching practices focus.

Bandura's Social Learning Theory: According to Bandura's Social Learning Theory, 'Learning is a cognitive process that takes place in a social context', 'Learning can occur by observing a behaviour and observing consequences of behaviour', 'Learning involves observation, extraction of information from those observations, and making observations about performance of behaviour', 'Reinforcement plays a role in learning but is not entirely responsible for learning', 'The learner is not a passive recipient of information. Cognition, environment, and behaviour all mutually influence each other'. Problem Based Learning takes place in an environment of small groups which analyse the given real-life situation/problem in a collaborative manner following the concept of Social Learning Theory that learning occurs in a social context. PBL also account for observation learning as the learner is in a social environment. Obviously, in PBL, the learner is not passive, instead he/she actively engages.

Integrating Concept Mapping in to Problem Based Learning

Both educational strategies can be combined together for an effective learning experience for students which helps them in deep understanding, self-reflection and skills of critical analysis, decision making. The major aim of Problem Based learning is to enable learners to be more active by creating connections and constructing knowledge through inquiry-based learning process. In this context, concept mapping can be regarded as the best tool to integrate with PBL. In problem-based learning approach integrated with concept mapping strategy, the problem acts as the starting point of inquiry, followed by visual interpretation, activation and linking of previous knowledge, development of solution. In this process, initial concept map creation, updating of concept maps plays a major role in enhancing problem-based learning steps.

Review of researches: Meidiana and Pertiwi (2024) conducted a study for investigating the effectiveness of integrating Problem-Based Learning (PBL) approach with Concept Mapping strategy in context of promoting science literacy and discussion skills in senior high school students. The study involved a quasi-experimental design in which two groups were present – one an experimental group which was taught using PBL approach interlaced with concept mapping strategy, and a control group which was taught using the traditional scientific learning approach. This study found out that integrating concept mapping into PBL approach can be considered as an effective teaching learning approach for improving students' conceptual understanding as well as their discussion skills in science education scenario. Chunyan et al. (2024) carried out a study to investigate the effect of Concept Mapping strategy in Problem-Based Learning (PBL) in a medical education scenario. A qualitative analysis of concept maps was done and the study revealed that the students in medical education get advantage from concept maps in visualising and developing knowledge acquired through PBL sessions. Plotz (2020) conducted a study to check on the validity of adopting Concept Maps as an assessment tool to assess the extent of conceptual learning, particularly within the scenario of problem-based learning environment. The study was conducted based on observation of selected six students over the course of more than a year. Using a pre-test post-test scheme, students' concept maps were taken for comparing with a preset master map, and the obtained findings were evaluated along with traditional assessment formats such as interviews and written tests. The final results revealed that concept maps may fail to evaluate deeper conceptual understanding. Thus, the study shares the doubt of reliability of concept maps as standalone measurement tool for assessing conceptual learning. Fitrianiingsih et al. (2020) carried out a research titled "Concept map and problem-based learning" aimed to understand the correlation between concept map scores of students and Problem Based Learning strategy. This research found out that the implementation of PBL has a positive impact in increasing the percentage of concept mapping scores. Nukman et al. (2018) conducted the study "The Effect of Problem Based Learning Model with Concept Map on Problem Solving in Social Science Learning of the Fourth Grade Students SD Negeri 189 Pekanbaru". The results of this study showed that there was a positive effect of integrating

concept mapping with PBL on improving problem solving ability in learning social science. Chan (2017) conducted research aimed to explore on how concept maps can be applied as an educational tool in problem-based learning approach. The researcher explored the possibility of using concept maps as a learning activity in PBL environment. This study demonstrated how concept maps could be implemented in a PBL environment to enhance the students' creativity and to motivate them to learn. This study found out that the use of concept maps in PBL environment can be seen as an initiative to motivate student to learn, participate actively, and nurture their creativity.

Integrating concept maps in Problem Based Learning Approach has the following benefits: **analysis of individual student's thinking process:** the requirement of preparing concept maps exhorts the learners to critically think up on topic, identify patterns and connections, frame a structure of topic which relates it with all prior knowledge, and thereby find solution. Thus, we can say concept mapping strategy in PBL is useful to assess the thinking process of student whether they are focussing on key concepts and ideas, understanding relationships between related topics, analysing the cross-links in a logical and scientific way, structuring of the given concept in meaningful and organised manner. **Enhanced learning outcomes:** some of the important learning outcomes of PBL are improvement of critical thinking skill, effective group work, problem solving abilities, deep understanding etc. Concept Maps can be regarded as an effective tool in enhancing all the learning outcome expected from Problem Based Learning as it makes the students actively engage in analysing given problem with some level of complexity, problem solving and knowledge acquisition which in turn promotes the higher order thinking skills, conceptual understanding, real life applications. **Scope of visualisation in PBL:** by involving in the process of constructing Concept Maps in PBL, students are actually trying to visualise the given topic. Hence we can say that Concept maps essentially serve as an effective tool in PBL for the learners to visualise the complex links between given topic and related topics in prior knowledge. Visualisation means nothing but the ability to create pictures of the given concept thereby allowing the person to interpret it in more easy way. It is proved through studies that those who make use of visualisation techniques have increased ability to understand, learn and remember. **Cultivating the skill of collaboration:** PBL is a team work and collaboration will become more effective when concept maps are integrated with PBL. Through constructing concept maps within a group of students, sharing of knowledge and innovative ideas takes place for construction of visual framework accepted by all group members. This allows the learners in group to engage in meaningful communication, sharing of perspectives, acceptance, negotiation and rejection of ideas etc. leading to strong collaboration.

Suggestions for Further Research

Integration of concept mapping in PBL can be considered a new style of teaching which encourages the learners to become the drivers of their learning process. Implementing the blend of Concept Mapping and PBL in different educational contexts will help to know what more changes, improvements and modifications should be brought out. So, further research should take place in this regard to understand its effectiveness, efficiency, importance as well as advancements in different contexts of education. Similar to Concept Mapping, there are so many educational strategies which can be incorporated with PBL and this can be found out through further research. Concept mapping is now facilitated by educational softwares and further research in this will lead to the integration of technology with PBL.

Conclusion

Education system is getting modified progressively and it is at this time the new educational approach of integrating PBL with Concept Mapping has its relevance. Utilising the strength of both strategies has a promising impact in educational outcomes. PBL with Concept Mapping has been studied using medical graduate students in Taiwan who have high degree of anxiety about whether or not they have learned enough. An experimental design was used by them, with participants randomly assigned either to a control or experimental group. The experimental group participated in six problem-based learning scenario discussions during the 16-week semester, while the control group attended a traditional course. They found out that Concept Mapping Strategies in PBL is very useful in enhancing learning outcomes of medical graduate students. Similar researches should be conducted for the further progress of this new educational approach.

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Cross-Cultural Perspectives Of Northeastern Students Towards Alcohol Use

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Abstract

The use of alcohol is known in most cultures. It is associated with social and religious significance. Every culture has its perception of the use of alcohol. With the dawn of globalisation, there is an increasing cross-cultural life among students. It opened new avenues for interaction and socialization among students. Students bring in their cultural perspectives on life, events and things. The cross-cultural life in the universities can broaden the horizon of life. Northeast India possesses unique culture and tradition. Therefore, there is give and take in the context of cross-cultural setting like universities. The study does not in any way promote the use of alcohol. It only aimed to assess the cultural perspective of students on the use of alcohol. Culture has lots to do with the pattern of thinking and living. The objective of the study was to assess the different cultural perspectives on the use of alcohol and to examine the impact of cross-cultural differences on the use of alcohol by students. The paper is an outcome of research findings on the cultural perspectives of alcohol use among university students of the Northeastern States.

The study employed a quantitative research method. An exploratory and descriptive design was used as the research design. Respondents were selected using purposive sampling. Questionnaires were used to collect data from the respondents. The Statistical Package for Social Sciences (SPSS) analysed the data. Discussions, analysis and interpretation of numerical data were done objectively.

Keywords: Culture, Cross-Culture, Perspectives, Alcohol, Students

Introduction

The use of alcohol is known in most cultures. Alcohol is used for different purposes. It is associated with different social and religious rites and rituals. The sacredness of the use of locally produced alcohol was also known among various civilizations across the world. However, of late, the use of alcohol has become rampant, especially among the youth. The youth/students in universities are involved in the use of alcohol.

The cultural perspectives on the use of alcohol differ from one culture to another. Cross-cultural interaction and the availability of alcohol in nearby towns can induce students towards the use of alcohol.

The university does not in any way contribute towards the use of alcohol. However, socialization within these times and spaces may influence members towards the use of alcohol.

The problem of alcohol use is more visible with the rise in the sale of alcohol. The problem lies in the abuse of alcohol. The abuse of alcohol has taken the lives of many young people. A culture has a lot to say about the use of alcohol. The impact of culture on the use of alcohol can be visible even at the university level. Students can become victims of alcohol due to cross-cultural interactions. This can affect their personal development and academic performance.

Review of literature

The use of alcohol is on the increase. This has led both young and old to indulge in the use of alcohol either for pleasure, relaxation or for other reasons. Alcohol can be classified into locally brewed alcohol and Indian Made Foreign Liquor (IMFL). Festivals and rituals were associated with the use of alcohol.

Alcohol can be defined as a drug that is a sedative, tranquillizer, hypnotic or anaesthetics (Ramayogaiah, 2011). Although alcohol consumption is acceptable in most societies, its abuse has become a societal problem. Alcoholism involves numerous illnesses including psychological, medical, social, cultural and religious areas (Raj R. , 2013). According to Keller and Effen, alcoholism is characterized by repeated drinking of alcoholic beverages to the extent that exceeds customary use or compliance with social customs of the communities and that interferes with the drinker's health or his social or economic functioning (ibid).

The earliest evidence of the use of alcohol goes back to 7000 to 6600 B.C. where evidences of brewing alcohol in pottery jars were found in northern China (Thomas, 2019). There are two types of drinking culture, namely, moderate and immoderate drinking. (Peele & Brodsky, 1996). Cultural norms and beliefs can also predict the manner of drinking. Cross-culture refers to the actual interaction between people of different cultures. It compares different cultures to a situation in which different cultures exist. Individual responsibility, behaviour change and unhealthy lifestyles can be seen as part of alcohol consumption (Hunt & Baker, 2001).

Room (1975) argued that the crucial building blocks lying behind the consumption patterns are the norms. He defined norm as a cultural rule or understanding affecting behaviour, which is sanctioned to a greater or lesser degree. This includes formal rules that are potentially important to bring the tools of government into areas of drinking cultures (Savic, 2016). The use of alcohol and illegal substances is prominent in Southeast Asian countries. (Nemoto, 1999). The prevalence data of alcohol use among adolescents from South Asia is estimated between 20% and 30% (Athauda L. , 2020).

There is no single best instrument for measuring consumption differences in the pattern of drinking (Bloomfield et al, 2003). However, a standard way that can be used to measure the patterns is that of comparative research. This is to ensure that the data obtained from different cultures is comparable. In addition, the accuracy and comparability across studies of alcohol consumption measurements depend much on the several existing probable sources (ibid). In India, more than half of the alcohol drinkers are dangerous

drinkers (Park, 2002). The young Indians become the target of the powerful international and domestic alcohol lobby. Alcohol drinks are flavoured to attract non-drinking women and young men into the fold. This has led to the rise of alcohol consumption in the country (Raj R. , 2013). The behaviour and attitude of alcohol use in India is complex and ambivalent. The influence of history has made it even more complex and contradictory (Sharma, 2010). The recorded per capita liquor consumption has increased from 1.6 liters in 2003-2005 to 2.2 liters in 2010 to 4.3 liters in 2014. It has been found that more than half of the drinkers are already on the unsafe side (Schess, 2018).

According to the Health and Family Statistics 2019-2020 report, the Northeastern States had a high consumption of alcohol and tobacco. Assam ranked higher in terms of alcohol consumption with 26.3% of women and 59.4% of men between 15-54 years of age. This happens to be the highest in the country. The national percentages as per the record were 1.2 and 29.5. Assam women scored 44.8% and men scored 51.9% (Sentinels, 2020). Evidence has suggested that the magnitude of alcohol use is likely to be higher among Northeast residents who reside in adverse geographical settings (Yadev, 2016).

The new study supported by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) stated that the impact of college drinking is larger and more harmful than what is commonly understood. The study showed that drinking by college students at the age of 18-24 contributes to an estimated 1,512 student deaths and 6,96,000 assaults. 1 in 4 experience academic difficulties due to alcohol. There are also alcohol consumption patterns and binge drinking in the use of alcohol (Clement, 2010). Students belonging to conservative religious groups may be protected from the opportunity to try alcohol. However, religion is not related to the probability of an alcohol use disorder. (Ghandour, 2009). College students are at high risk for drinking in most countries. Alcohol dependency or disorder may lead to deficits in the performance of duties and responsibilities. There can be visible changes in their relations and microstructure (Nixon, 2013).

Research Methodology

The researcher employed explorative and descriptive designs for the study. The study explored the various cultural perspectives and examined the cross-cultural impacts of the use of alcohol by university students of Northeast India. The study was conducted at Assam Don Bosco University, Guwahati, Assam. Given the nature of the study population, purposive sampling was used to select the respondents from all seven North East India states for the study (exclusive of Sikkim). The information was collected through the distribution of questionnaires to the respondents. The data was analysed using Statistical Packages for Social Sciences (SPSS) and interpreted accordingly.

Findings and Discussions

The correlations between cultural perspectives and family perspectives showed a very high significance. This was indicated by the p-value of .049. Family perspectives had a great influence on cultural

perspectives and vice versa. When the culture accepts something, it is easily accepted by the family. A family always lives in a cultural context.

The cross-tabulation between religion and the cultural perspective showed that the use of alcohol was comparatively high irrespective of religion, as 51 respondents scored above 31 score. The scores ranging from 31 or above 31 were more (51) and only 19 respondents scored below the mid-score (i.e., 31-35). The lowest score was 11 to the highest score was 55. The significant difference was shown in the linear-to-linear significant differences between religions and cultural perspectives at a p-value of .009. Irrespective of different religions, the perspective on the use of alcohol is quite high (Schwadel, 2019). However, religion played a great role in the formation of people's perspectives and attitudes. Religion can perceive the use of alcohol in terms of quantity and frequency of drinking habits (Najjar, 2017). Those with high levels of religiosity are prone to support the cause of restricting alcohol. Some conservative religious groups seemed to have higher negative expectations of the use of alcohol. Religion can be supportive of the policy of no drinking. The relationship between religion and cultural perspective can facilitate legislative change in the use of alcohol (Lucchetti, 2014).

The cross-tabulation between the State and the factor cultural perspective was comparatively high as the data showed that respondents coming from Assam, Arunachal Pradesh, Manipur, Meghalaya, Nagaland and Tripura scored above 31 score. The different cultural perspectives were relatively high as the scores ranging in and above 31 scores were more, and only a few scored below the mid-score of 31-35. This difference was shown with a very highly significant difference between Mizoram and the rest of the States in the linear to linear at a p-value of .019. The analysis showed that the other North Eastern States had some similarities. However, the difference is more with Mizoram as compared to the rest of the States. This is so because Mizoram implemented strict regulations against the sale and use of alcohol across the State. This is proven by the various factors that control the use of alcohol in the State. In the year 1997, the Legislative Assembly of Mizoram took enough measures to control the use of alcohol in the State (Parashar, 2019).

The correlation showed a very high significant relation between Wet States (Assam, Meghalaya and Tripura) with a cultural perspective. This was indicated by the p-value of .019. The acceptance of the use of alcohol in the wet States was embedded in the perspective of the culture. States that accepted the use of alcohol enabled the culture to accept it without much difficulty. The culture's acceptance and use of alcohol are closely related due to well-established norms attached to it (Room, 1989). In wet culture, alcohol was an integrated part of people's daily lives and activities. The abstinence rate was low in the wet culture. Wet States were prone to the use of alcohol due to the availability of alcohol (Bloomfield. K., 2003).

The cross-tabulation between dry States and the cultural perspective showed comparatively low scores for the dry State as only 2 respondents scored in the mid-range and the rest, 8 respondents, scored below the mid-range. The cultural perspectives on the use of alcohol were comparatively low for a dry state (particularly Mizoram) as compared to the Wet and partially dry states. This significance was indicated by a

p-value of .000 on the cultural perspective on the use of alcohol. A cultural perspective on the use of alcohol was significantly visible in Mizoram (dry state) and partially dry States.

The cross-tabulation between partially dry and wet States and the cultural perspective was comparatively high, as 51 respondents scored above 31 score. It was indicated by a p-value of .000. It showed that whether the State was wet or partially dry, the cultural perspective on the use of alcohol remained high in both cases. 8.1% of the population of Nagaland uses alcohol. (Express, 2019). It was reported that liquor from Arunachal passed through Assam to Nagaland, Mizoram and Manipur in the name of defense supply. Such a liquor racket has been for decades (The Sentinels, 2019). Assam has been ranked as the largest alcoholic beverage market in North East India. The direct collection of excise taxes on alcohol comes to Rs. 568.11 crore in the year 2012-13. Next to tea is the consumption of alcohol. The cultural perception of the use of alcohol in the wet State of Assam is significant (Nayak, 2014).

Conclusion

The use of alcohol is common across the globe despite differences in the countries' general economic development. David J. Pittman (1967) was of the view that the general position of the culture on the use of alcohol does not determine their behaviour. Thus, the correlation between the two is not to be concluded as the final judgment (Room, 1989).

The seven North East States have different perspectives on the use of alcohol. Culture determines our attitudes and actions. Cultural and traditional practices must be understood objectively. A new way forward should be adopted to enhance cultural values and ethics. The present generation can give a refined touch to the various perspectives of culture and make it relevant and applicable. The cultural perspective and the impact of cross-cultural differences on the use of alcohol were only a lens to see the various existing perspectives of various cultures. It does not in any way promote the use of alcohol among students. Understanding cultural perspectives can bring about a better understanding of individuals. The North Eastern States of India, with their rich and diverse culture can truly enhance the culture of India.

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Daisaku Ikeda and the Global Poetics of Life and Death

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Abstract

This paper examines Daisaku Ikeda's Buddhist philosophy of birth and death as a continuous cycle, rooted in Nichiren Buddhism's teaching of the lotus that blooms unsullied from the mud. Rejecting dualistic views that separate life and death as opposites, Ikeda frames them as interconnected transformations, demanding both personal honesty and ethical responsibility. His use of central metaphors insists that suffering is not an obstacle to enlightenment but its condition, calling for an active engagement with adversity to cultivate wisdom, compassion, and hope.

Drawing on his experiences of wartime devastation, illness, and loss, Ikeda reframes death not as defeat but as a teacher that reveals life's inherent value and urgency. This perspective is enriched by images such as the ocean and its waves, which illustrate the continuity underlying change. Love, in Ikeda's writing, becomes an ethical vow rather than sentiment—a disciplined choice to remain present, nurture what is fragile, and transform suffering into hope.

The paper situates Ikeda's vision within Buddhist doctrine while drawing comparative reflections from philosophical traditions such as Socratic contemplation of mortality and Heidegger's being-towards-death. It argues that Ikeda's use of natural symbolism offers a humanistic model of resilience and ethical action urgently relevant to contemporary crises of violence, alienation, and environmental degradation. Through this approach, the study reveals Ikeda's philosophy as both challenge and promise: a call to transform the world not by denying its suffering but by cultivating the conditions for it to bloom.

Keywords: Daisaku Ikeda, Birth and Death, Human Revolution, Compassion, Global Poetics

Introduction

The duality of birth and death is neither abstract nor merely philosophical for Daisaku Ikeda; it is the fundamental question of what it means to live with dignity. Rather than treating life and death as opposites on a straight line, Ikeda insists on a cyclical vision, rooted in Nichiren Buddhism's teaching of the lotus that blooms unsullied in muddy water. In *Unlocking the Mysteries of Birth and Death*, he writes that "life is understood to repeat the cycle of these four stages eternally" (Ikeda 23). This perspective reframes suffering not as an interruption of value but as its very condition, demanding that human beings transform adversity rather than flee it.

Such a vision is not theoretical. Ikeda's own experiences of wartime Tokyo—the firebombing of his city, the death of his brother in Burma, his own debilitating illness—become the ground from which his philosophy grows. Rather than fuelling hatred, these losses taught him to see shared humanity even across enemy lines, forging in him a lifelong vow for peace. This ethical commitment extends beyond mere avoidance of violence. He writes in *Hope Is a Decision* that genuine love is "not two people gazing at each other, but two people looking ahead together in the same direction" (Ikeda 67). Love becomes an act of will, a disciplined promise to remain present even in the face of despair.

The lotus stands at the centre of this teaching. It embodies the principle of non-duality: that life and death, suffering and enlightenment, are interdependent transformations. Ikeda's metaphor of the ocean and waves in *The Heritage of the Ultimate Law of Life* further illustrates this continuity, suggesting that while forms rise and fall, the underlying reality remains (Ikeda 40). By integrating these images with Buddhist narratives like the Jataka tales, Ikeda crafts a philosophy that is both personal and universal.

This paper examines Ikeda's interpretation of birth and death as an ethical challenge, focusing on the symbolism of the lotus and the concept of love as deliberate commitment. It situates his ideas within Buddhist doctrine while drawing comparative reflections from philosophical traditions such as Socrates' contemplation of mortality and Heidegger's being-towards-death. Through this approach, the study argues

that Ikeda offers a model of resilience and responsibility urgently needed in a world marked by violence, alienation, and ecological crisis.

The Man Who Lived

Ikeda's understanding of birth and death emerges from a profound and personal engagement with the realities of suffering, impermanence, and renewal. He describes life not as a straight line with birth at one end and death at the other, but as an unbroken, cyclical flow of transformations. In *Unlocking the Mysteries of Birth and Death*, he writes that "life is understood to repeat the cycle of these four stages eternally" (Ikeda 23). This Buddhist perspective challenges the dominant Western tendency to treat death as finality and instead offers a dynamic vision in which death is a threshold, both an ending and a new beginning.

Rooted in lived experience rather than abstraction, this philosophy reflects Ikeda's encounters with suffering and resilience. As a young man in post-war Japan, he experiences debilitating illness, poverty, and the devastation caused by war. Diagnosed with tuberculosis, he is told he will not live beyond 30. Rather than surrendering to despair, he draws strength from his mentor Josei Toda's words in *The New Human Revolution*, Volume 1: "Shin'ichi, you must live. You must live as long as you can, and travel the globe!" (Ikeda 58). This becomes a lifelong mission to share a message of dignity and peace, documented in his travels to over 192 countries to promote what he calls human revolution—the inner transformation necessary to change society itself.

Death, for Ikeda, remains a teacher rather than an enemy. He recalls a childhood illness and his mother pointing to a pomegranate tree that thrives in salty, barren soil, telling him he too would grow strong again (Ikeda 77). This early lesson informs his belief that nature embodies resilience and renewal. Nichiren's own story reinforces this view: condemned to execution at Tatsunokuchi Beach, Nichiren is spared when a blinding light terrifies his executioner—a moment seen as casting off the transient to reveal the true (Ikeda 122). For Ikeda, such stories illustrate that confronting death honestly reveals the essential value of life.

Ikeda also uses the analogy of the ocean and its waves to explain the continuity of life and death. In *The Heritage of the Ultimate Law of Life*, he writes that individual lives are like waves that rise and fall on the vast ocean of life itself. The wave appears to be born and then to die, but the ocean remains unchanged and ever-present (Ikeda 40). This image captures the Buddhist view of non-duality, where birth and death are not opposites but different expressions of the same underlying reality. For Ikeda, such a perspective encourages humility and wonder. It teaches that while individual forms may vanish, life itself is unbroken—a single, dynamic whole that links all beings. The wave's return to the ocean is not annihilation but return to source, inviting us to see death not as loss but as continuity, and to recognise our shared existence with all life.

Philosophical traditions across cultures also treat death as life's teacher. Socrates describes philosophy itself as a preparation for death, arguing that only by contemplating mortality can one live wisely and justly. Heidegger's concept of "being-towards-death" insists that authenticity emerges when we face our finitude directly. Ikeda aligns with and transforms these ideas: he urges awareness of death not as morbid preoccupation but as ethical awakening. By accepting impermanence, he argues, we recognise our shared vulnerability and deepen our commitment to compassion. Mortality becomes the ground for concrete acts of care and responsibility.

Such a perspective influences how one approaches life and responsibility. Witnessing the horrors of war, including his brother's death in Burma and the firebombing of Tokyo, Ikeda refuses to accept a world where life is disposable. Instead, he argues that genuine peace rests on recognising every person's inherent dignity and the preciousness of life in all its stages. His peace proposals to the United Nations and dialogues with world leaders emphasise that acknowledging mortality should deepen our responsibility to protect life and promote understanding (Ikeda 45).

He also insists that such insights are not reserved for spiritual elites. In *The New Human Revolution*, Volume 1, he describes human revolution as a universal possibility—the work of anyone willing to challenge themselves and change from within. "All it takes is one person... As long as one person takes up the challenge, the Daishonin's teaching will definitely spread. That's the principle of kosen-rufu" (Ikeda 58). This commitment to individual transformation as the seed of social change reflects his belief in the continuity of life beyond our own existence, with actions rippling forward to shape the world for future generations.

Ikeda frequently uses the metaphor of cultivation to express this idea. He describes kosen-rufu as a movement to “bring peace and culture to blossom through the ideals of Buddhism” (Ikeda 293). This image of flowers blooming after careful tending is central to his philosophy. Like seeds that germinate unseen before bursting into colour, human potential develops quietly before expressing itself in acts of courage, compassion, and wisdom.

Rather than denying death, Ikeda calls for meeting it with clarity and humility, understanding it as an essential part of life’s larger rhythm. He encourages everyone to live fully, aware of life’s transience, so that our choices nurture a more peaceful, humane world. Recognising death as part of life’s cycle becomes, for Ikeda, a reason to cultivate empathy, take responsibility, and plant seeds of hope that will bloom long after we are gone.

Reason for Flowers

The lotus flower stands as one of Buddhism’s most profound symbols, embodying the essential truth that life and death are inseparable stages in a continuous cycle. In Nichiren Buddhism, the lotus blooms unsullied in muddy water, offering a lesson that Ikeda repeatedly highlights. In *Unlocking the Mysteries of Birth and Death*, he writes that “life is understood to repeat the cycle of these four stages eternally” (Ikeda 23). The lotus, emerging pristine from the mire, embodies this continuity, showing that suffering and impurity are not obstacles to enlightenment but the very conditions that make it possible.

This symbolism mirrors the Buddhist understanding that birth and death are not opposites but interconnected transformations. The mud represents life’s difficulties—suffering, injustice, impermanence—while the flower stands for the possibility of wisdom and compassion. Its beauty depends on the very mud that nourishes it. Ikeda insists that we must not deny these difficult conditions or attempt to flee them. Instead, spiritual practice means engaging with suffering and transforming it from within. The lotus refuses a dualistic division between good and bad, life and death, insisting that each is contained within the other.

Ikeda’s own life story reflects this philosophy. In *Unlocking the Mysteries of Birth and Death*, he describes how, as a sickly child, his mother pointed to a pomegranate tree thriving in barren, salty soil and told him he too would grow strong (Ikeda 77). This moment stayed with him as proof that harsh conditions are not final verdicts but invitations to develop resilience. Like the lotus rising through mud, human potential emerges through hardship, becoming not just survival but flowering.

This vision finds echoes in other traditions. Wordsworth writes of nature as a moral teacher, where even “the meanest flower that blows” can awaken profound thought. Tagore, in *Gitanjali*, offers his “little flower of a song” as a humble prayer, embracing impermanence with grace. While these poets recognise fragility as central to beauty, Ikeda grounds this awareness in Buddhist practice. For him, the lotus is not merely observed but cultivated, becoming an ethical commitment to transform suffering into hope.

Ikeda extends this metaphor to the collective. In *The New Human Revolution*, Volume 1, he describes kosen-rufu as cultivation—“to bring peace and culture to blossom through the ideals of Buddhism” (Ikeda 293). The blooming lotus becomes an imperative to practitioners: not to turn away from the world’s mire, but to transform it deliberately. It calls for humility, patience, and sustained effort, recognising that true peace is not accidental but made through careful, persistent tending.

Ultimately, the lotus in Ikeda’s writing stands as a promise and a challenge. It teaches that hope is not given but created, that beauty arises precisely because life is vulnerable, and that renewal is possible only when we accept impermanence. Embracing the cycle of birth and death becomes an invitation not to fear loss but to understand it as the condition for new growth—a call to cultivate resilience, compassion, and shared responsibility.

Language of Love

For Ikeda, love is not passive sentiment but an ethical vow—an orientation of will that guides human beings from isolation toward connection. He describes true love as “not two people gazing at each other, but two people looking ahead together in the same direction” (*Hope Is a Decision*, Ikeda 67). This vision rejects the comfort of possession in favour of shared purpose, turning love from an escape into an active commitment to growth.

His stance emerges in part as a challenge to Japan’s historical valorisation of suicide, often seen as honourable refusal or protest. In wartime ideology and cultural tradition alike, suicide was cast as noble escape from shame or failure. Ikeda responds by insisting that real courage lies not in departing but in

remaining. Love, in this view, is the refusal to abandon the world when it becomes difficult. He argues that honour is found in protecting what is fragile and sustaining life even in the face of despair (Ikeda 45).

Engaging Buddhist stories of self-annihilation with nuance, Ikeda turns to the Jataka tales, where bodhisattvas sacrifice themselves to save others. He refuses to interpret these acts as nihilistic or death-seeking. Instead, in *Unlocking the Mysteries of Birth and Death*, he frames them as expressions of radical interdependence. Sacrifice here is not the glorification of death but an affirmation of life's shared nature—a humble recognition that one's own survival is bound to the well-being of all (Ikeda 102).

bell hooks develops a parallel critique of sentimentalised love in *All About Love*, writing that “love is an act of will—namely, both an intention and an action” (hooks 4). She insists that genuine love demands responsibility, respect, and commitment, resisting the hollow comfort of romantic idealisation. Ikeda's philosophy resonates here, treating love as daily labour—a disciplined promise to remain even when leaving is easier, to tend what is wounded rather than retreat.

Antoine de Saint-Exupéry's *The Little Prince* offers another perspective on love as responsibility and understanding. “You become responsible, forever, for what you have tamed,” he writes (Saint-Exupéry 63). Taming is not subduing but coming to know the other deeply, accepting vulnerability, and acknowledging the promise to care for what one has learned to love. This ethic of stewardship matches Ikeda's insistence that love must be mutual care rather than domination. He rejects any vision of love that is ownership or transaction, proposing instead that to love is to remain accountable—to witness another's suffering and choose to stand alongside them.

Ikeda, however, sees this idea of “sacrificial love” in the context of time and place. In his essay “To Risk Our Lives,” collected in *Hope Is a Decision*, he argues that love can be viewed as a reason to live. It may offer a purpose in life. To elaborate further he refers to the Franco-Italian film *Mourir d'aimer* (1971), directed by André Cayatte and based on the true story of Gabrielle Russier, a French teacher who had a love affair with her underage student. Set against the backdrop of the 1968 May Revolution in France, it explores themes of love, societal judgment, and institutional repression, ultimately leading to her tragic downfall and suicide.

Ikeda notes that one plausible reason for the popularity of the film in Japan was the “readiness of the hero and heroine to risk everything for the sake of love” (Ikeda 117). It left a deep impression on the youth of Japan. While young adults may have been disillusioned by love, deep down they were clearly touched by the “rather quaint, old-fashioned notion of sacrificing one's life for the sake of love” (Ikeda 118). For Ikeda, to be willing to risk death in order to love and live is the key to understanding and experiencing what it means to be alive. He writes that one who faces imminent death becomes more intensely aware of life and acutely attuned to nature's beauty (Ikeda 120).

Oscar Wilde's “The Nightingale and the Rose” offers a caution against unthinking sacrifice. The nightingale dies for a rose that is ultimately rejected, exposing the dangers of martyrdom that lacks awareness. Ikeda would see such self-destruction as wasteful—a tragic failure to connect purposefully with another's reality. For him, love must be conscious of its own limits and the needs of the other, never an empty gesture or unreflective annihilation.

He insists throughout his work that love is no escape from the world's pain but a vow to transform it. In *The New Human Revolution*, Volume 1, he describes kosen-rufu as cultivation, as the gardener's daily work to bring peace and culture to flower (Ikeda 293). Love becomes this promise: to return each day, to nurture what is fragile, to believe that care can overcome cruelty, that understanding can dissolve hate. It is not ease but effort; not fleeting passion but lasting resolve.

The Ebb and Flow of Life

Ikeda's philosophy of life and death does not offer comfort through denial but challenges us to confront mortality as the condition for meaningful living. He insists that impermanence is not cause for despair but a summons to compassion. By recognising death's inevitability, we learn to treasure life's fragility and affirm its inherent dignity. Such an ethic does not merely accept suffering but demands we transform it, much as the lotus blooms from mud, demonstrating the possibility of renewal in adversity (*Unlocking the Mysteries of Birth and Death*, Ikeda 23).

This vision is rooted in personal experience of war's devastation. As a boy in Tokyo, Ikeda witnessed the firebombing of his city, the sky turning red with destruction, neighbours and family shattered. He lost his

elder brother in Burma. Rather than nurturing hatred, these events forged in him a lifelong vow for peace. In *Hope Is a Decision*, he recalls seeing an American pilot parachute into Tokyo after his plane was shot down. The local children jeered at the captured enemy, but Ikeda felt no hatred. Instead, he found himself wondering if that young man had a mother waiting for him far away. This moment shaped his refusal to demonise others and taught him to see shared humanity even across battle lines (Ikeda 89).

Such memories inform his insistence that love cannot be passive sentiment but must become an ethical practice. He argues that genuine love rejects the ease of abandonment. In *Hope Is a Decision*, he writes that to love is to choose presence even when leaving is simpler (Ikeda 45). This is not passive endurance but active responsibility—to witness pain without turning away, to sustain life even in the face of despair. Love becomes the disciplined practice of interdependence, the vow to nurture what is fragile so that it may flourish.

Ikeda consistently ties doctrine to daily action. In *The New Human Revolution*, Volume 1, he describes kosen-rufu as cultivation—labour to make peace and culture blossom (Ikeda 293). Flowers in his writing are not static symbols but living imperatives. They remind us that hope is not found but created, that peace requires sustained tending, and that beauty is inseparable from vulnerability.

His engagement with Buddhist narratives like the Jataka tales reinforces this ethic. The bodhisattva's willingness to sacrifice is not glorification of death but commitment to shared survival. Ikeda reframes these stories as lessons in humility and service: to recognise that one's own well-being is bound to others', that our lives gain meaning through connection (*Unlocking the Mysteries of Birth and Death*, Ikeda 102).

Such a philosophy challenges modern tendencies to isolate, consume, and discard. In a world marked by violence, ecological crisis, and social alienation, Ikeda's insistence on interdependence becomes deeply political. He calls for an ethical revolution that transforms not only personal attitudes but social structures. Hope, in this vision, is not sentimental optimism but a deliberate, disciplined practice—a refusal to give in to cynicism or despair.

Ultimately, Ikeda's teachings present mortality not as threat but as teacher. Death grants life urgency and weight, making compassion necessary rather than optional. To live with awareness of death is to understand our responsibilities more clearly—to choose empathy over indifference, care over neglect, hope over resignation. His writing demands that we see our lives as gardens to be cultivated, where even the briefest bloom is precious because it is fleeting.

Conclusion

Ikeda's philosophy invites us to see life not as a straight line that ends in silence but as a ceaseless cycle of becoming. The lotus blooms unsoiled from mud, reminding us that wisdom roots in hardship, that clarity grows in murk. Suffering does not block enlightenment—it feeds it. This vision does not ask us to flee the world's mess but to kneel in it, to tend it, to transform it.

Recognising impermanence becomes not a lament but a call to commitment. Love is no idle sentiment but the willing choice to stay, to cradle what is fragile, to turn despair into hope. Ikeda describes human revolution as cultivation: slow, deliberate, daily labour that demands patience and belief in unseen seeds. Flowers are not mere ornaments but obligations, each bloom testifying to care given, promises kept.

The ocean and its waves show us that while forms rise and fall, the deep remains. Birth and death are motions on the same vast field, dissolving the division between self and other, this life and the next. Such awareness does not reduce life's urgency but intensifies it, demanding compassion not as luxury but necessity.

In an age scarred by conflict and estrangement, Ikeda's teaching becomes both rebuke and promise. It warns against apathy, pleads for empathy, calls for the courage to sow seeds where soil is poor. To live aware of death is to choose tenderness over cruelty, hope over surrender. In his vision, every act of care is an act of faith that even the darkest ground can flower—that life, however brief, can still bloom.

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Chapter : 21

Machine Learning-Based Approaches For Predicting Postpartum Depression: A Comprehensive Study

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Abstract: *Postpartum depression (PPD) continues to be a significant global mental health issue impacting new mothers. Despite the availability of traditional screening tools, the growing prevalence of PPD and its complex, multifactorial nature often hinder early and accurate diagnosis. This literature review explores the progression of computational techniques used to predict PPD, with a primary focus on machine learning (ML) models, IoT-enabled monitoring systems, social media analysis, and neuro-fuzzy frameworks. We evaluate a range of studies—from personalized assessments of maternal sleep patterns using IoT devices to the implementation of deep neural networks for risk classification. Each technique is assessed based on predictive performance, benefits, limitations, and trade-offs involving real-time monitoring, continuous data collection, and computational demands. Our analysis indicates that ML-based approaches generally yield high predictive accuracy, yet challenges persist regarding data integration, model transparency, and the ability to generalize findings across diverse populations. The review concludes by highlighting key directions for future research, such as the creation of integrated, real-time screening platforms and the development of culturally sensitive predictive models.*

Keywords: Postpartum Depression, Machine Learning, Iot, Social Media Analytics, Neuro-Fuzzy Models, Real-Time Screening, Risk Prediction

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Digital Governance and Economic Efficiency

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Abstract

Digital governance has emerged as a transformative force in enhancing economic efficiency and public service delivery. By integrating technology into government operations, digital governance minimizes bureaucratic delays, reduces corruption, and ensures transparency and accountability. This sub-theme explores how e-governance tools like online portals, mobile apps, digital payment systems, and automated data management streamline administrative processes and improve access to services. It also examines the economic impact of digital initiatives such as Digital India, e-procurement, and Aadhaar-based services. The study underscores that digital governance not only enhances citizen engagement but also plays a crucial role in optimizing resource utilization and boosting the overall efficiency of the public sector.

Keywords: Digital Governance - Economic Efficiency - Public Service Delivery -Technology in Administration – Transparency - Digital India

Introduction

In the era of rapid technological advancement, digital governance has become a crucial tool for enhancing the efficiency, transparency, and accountability of public administration. By integrating Information and Communication Technology (ICT) into government processes, digital governance enables faster decision-making, streamlined service delivery, and improved citizen engagement. Economic efficiency is achieved when government resources are utilized optimally, costs are reduced, and services are delivered effectively to the public. Initiatives such as Digital India, Aadhaar-enabled services, e-governance portals, and digital payment systems like UPI have transformed traditional governance models into more responsive and data-driven systems. This shift not only minimizes bureaucratic delays and corruption but also promotes financial inclusion, better monitoring of schemes, and inclusive development. As governments around the world adopt digital tools, the link between digital governance and economic efficiency becomes increasingly significant in building resilient, citizen-centric, and future-ready public administration.

Objectives of the study

- To understand the concept and significance of digital governance in modern public administration.

- To analyze how digital governance contributes to economic efficiency in government operations.
- To evaluate the impact of digital governance on reducing administrative costs and enhancing service delivery.
- To identify the key challenges and barriers in the implementation of digital governance systems.

Concept and evolution of digital governance

Digital governance refers to the use of Information and Communication Technology (ICT) to plan, implement, and monitor government policies and services. It enables governments to operate more transparently, efficiently, and responsively, using digital tools such as online portals, mobile apps, cloud computing, and data analytics to interact with citizens and manage internal processes. Digital governance goes beyond basic e-governance by focusing not only on service delivery but also on decision-making, accountability, and public participation through digital platforms. It aims to create a citizen-centric governance model that is accessible, transparent, and data-driven.

Time Period	Phase	Key Characteristics
Pre-1980s	Traditional Governance	Manual administration, paper records, high bureaucracy, minimal public access
1980s–1990s	ICT Adoption Phase	Introduction of computers, internal automation, basic Management Information Systems
2000s	E-Governance Era	Online portals, service delivery through web platforms, National e-Governance Plan (NeGP)
2010–2015	Digital Transition	Mobile governance (m-governance), SMS services, Aadhaar introduction, online databases
2015–Present	Digital Governance Era	Digital India, UPI, e-Hospital, e-NAM, DBT, AI & Big Data in governance, real-time dashboards
Future (Ongoing)	Smart Governance	AI-driven policy-making, Blockchain, IoT integration, Predictive analytics, Cybersecurity

Digital governance plays a vital role in transforming public administration by making it more **efficient**, **transparent**, **accountable**, and **citizen-centric**. It leverages technology to improve decision-making, streamline service delivery, and enhance public participation. The integration of digital tools into administrative processes enables governments to respond faster to citizen needs while optimizing resource usage.

Importance of Digital Governance in Public Administration

Digital governance plays a vital role in transforming public administration by making it more **efficient, transparent, accountable, and citizen-centric**. It leverages technology to improve decision-making, streamline service delivery, and enhance public participation. The integration of digital tools into administrative processes enables governments to respond faster to citizen needs while optimizing resource usage.

Enhanced Efficiency and Speed

- Automation of processes reduces delays in file handling, approvals, and service delivery.
- Real-time monitoring allows quicker corrective actions and data-driven decisions.

Transparency and Accountability

- Digital records, online portals, and audit trails reduce opportunities for corruption.
- Citizens can track applications and file grievances, promoting administrative responsibility.

Improved Service Delivery

- Services like birth certificates, land records, payments, and public welfare schemes are now accessible 24/7 through digital platforms.
- Mobile governance has brought services closer to rural and remote populations.

Cost and Resource Optimization

- Paperless offices and automation reduce administrative costs.
- Efficient allocation of human and financial resources improves productivity.

Citizen Empowerment and Participation

- Platforms like MyGov and grievance redressal portals enable citizens to voice concerns and contribute ideas.
- Digital literacy efforts promote inclusivity.

Better Monitoring and Evaluation

- Use of dashboards, MIS, and analytics helps in evaluating the impact of policies and schemes.
- Real-time data enables proactive governance.

Crisis Response and Resilience

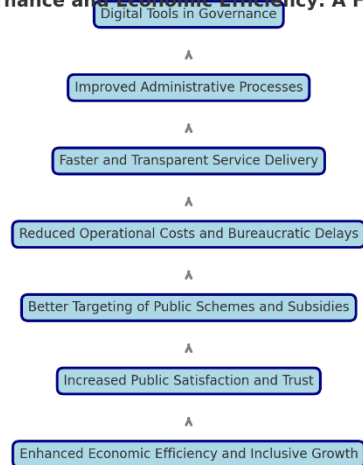
- During emergencies like the COVID-19 pandemic, digital platforms ensured continuity of services (e.g., telemedicine, online education, digital payments).

Digital Governance and Economic Efficiency: A Functional Link

Digital governance refers to the use of digital technologies such as computers, the internet, mobile applications, and data systems to manage government operations and deliver public services. It plays a major role in modernizing public administration by making it faster, more transparent, and more accountable. When digital tools are used in governance, they help reduce paperwork, speed up processes, and eliminate the need for physical visits to government offices. This saves time and effort for both citizens and government employees. For example, services like applying for certificates, paying bills, receiving subsidies, or tracking applications can now be done online from anywhere. This digital transformation also leads to **economic efficiency**, which means using resources in the best and most cost-effective way. Digital governance helps reduce government expenses by cutting down on manual work, printing, and storage costs. It also helps prevent corruption and ensures that government benefits reach the right people without delays or misuse. Programs like **Aadhaar**, **Direct Benefit Transfers (DBT)**, and **Unified Payments Interface (UPI)** in India are good examples of how digital systems can improve efficiency. These platforms help in better planning, accurate data collection, and targeted delivery of services.

Furthermore, digital governance increases public satisfaction and trust in the government. When services are delivered quickly and fairly, citizens are more likely to engage with public systems and follow rules. This creates a positive cycle where better governance supports stronger economic growth. In rural and remote areas, digital tools also help bridge the gap by providing access to services that were previously hard to reach. Overall, digital governance is not just a technology upgrade—it is a powerful tool for achieving inclusive growth and efficient use of public resources, making governance more responsive, reliable, and economically sound.

Digital Governance and Economic Efficiency: A Functional Link



Challenges in Implementing Digital Governance

While digital governance brings many benefits, its implementation faces several challenges, especially in developing countries like India. Some of the major challenges include:

1. Digital Divide:

Many people, especially in rural and remote areas, lack access to the internet, smartphones, and digital literacy. This creates inequality in accessing digital services.

2. Infrastructure Limitations:

Insufficient broadband connectivity, poor electricity supply, and lack of IT infrastructure in government offices slow down digital adoption.

3. Cyber security and Data Privacy:

As more data is stored and shared online, the risk of hacking, identity theft, and data misuse increases. Ensuring strong cybersecurity and privacy laws is a major concern.

4. Resistance to Change:

Some government employees and departments are resistant to adopting new digital systems due to a lack of training, fear of job loss, or comfort with traditional methods.

5. Financial Constraints:

Implementing and maintaining digital systems requires investment in software, hardware, training, and maintenance, which can be a burden on limited public budgets.

6. Low Digital Literacy:

A significant portion of the population is not familiar with using digital tools or online services, making it difficult for them to fully benefit from digital governance.

Conclusion

Digital governance has become a key driver in improving the quality, speed, and transparency of public administration. By using technology, governments can reduce operational costs, streamline service delivery, and reach citizens more effectively. This contributes directly to economic efficiency by making better use of public resources, reducing delays, and cutting down corruption. However, to fully realize these benefits, governments must address challenges like infrastructure gaps, cybersecurity risks, and the digital divide. With the right investments, training, and inclusive policies, digital governance can transform traditional systems and support sustainable economic growth, making governance smarter, more accountable, and people-friendly.

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Digital Strategies For Teaching English Grammar And Literature To Gen Z Students

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Abstract

This paper explores the transformative potential of integrating Information and Communication Technology (ICT) tools into the teaching of English grammar and literature, particularly for Generation Z students. Recognising Gen Z's inherent digital fluency and preference for innovative and interactive learning environments, traditional pedagogical approaches often fail to generate excitement, sustain attention and retention. This research offers a descriptive insight into various digital strategies and ICT tools that can elevate the learning experience for this demographic, making the teaching-learning process fun and rewarding. With regard to English grammar, the paper examines the application of gamified learning platforms, interactive online exercises, AI-powered writing assistants and multimedia resources that contextualise grammatical rules within authentic language use. In the realm of English literature, the discussion highlights the utility of digital annotation tools, virtual reality tours, multimedia storytelling platforms and online collaborative spaces for textual analysis and creative responses. Emphasis is placed on how these tools facilitate personalised learning pathways, encourage active participation and promote critical thinking skills. Ultimately, this paper posits that a strategic and thoughtful integration of ICT tools is essential for creating dynamic, relevant and effective English language instruction that resonates with the learning styles and expectations of today's digitally-native students.

Keywords: English grammar, learning, literature, Gen Z students, ICT tools

Introduction

Generation Z consists of those born between the years 1997 and 2012, meaning they are between 13 and 28 years old in 2025. In an educational landscape situated in a digital age, Gen Z students, largely well-acquainted with technology and contemporary trends, present both unique challenges and opportunities for the instruction of English language and literature. These ‘digital natives’, with their prolonged use of smartphones, social media and instant responses, may find traditional teaching methodologies boring and insufficient for their learning preferences. The age-old dependence on textbooks, lengthy lectures, and rote memorisation might no longer garner interest, foster meaningful conversations, or ensure deep knowledge retention. Consequently, teachers might perceive a lack of student enthusiasm, wonder where they are falling short, and more importantly, what can be done to improve the teaching-learning process. Thus, teachers need to reflect on their pedagogical approaches to align with the contemporary learning styles of Gen Z students.

Information and Communication Technology (ICT) tools can be of significant help while teaching English grammar and literature to youngsters. By strategically incorporating technology into the core of the curriculum, ICT can appeal to various human senses and redefine the possibilities of learning in a classroom. Through updates that enhance the user experience and address technical issues, these digital resources can not only render complex grammatical concepts more comprehensible and literary texts more relatable, but also add a much-needed layer of surprise and satisfaction to the entire teaching-learning process.

Digital Strategies for Teaching English Grammar

i) **Using AI to Generate Grammar Exercises:** AI-powered tools offer an unparalleled advantage in creating a dynamic and personalised grammar practice environment. Teachers can leverage AI to rapidly generate an endless variety of exercises tailored to specific grammatical structures or proficiency levels, saving significant preparation time. Crucially, these platforms provide immediate, automated feedback and evaluation, allowing Gen Z students to understand their errors instantly and make corrections, fostering a self-paced and self-correcting learning loop that aligns with their preference for instant gratification and efficient progress tracking.

ii) **Crossword Puzzles:** Classic crossword puzzles, when digitised, become an engaging tool for reinforcing vocabulary and understanding of word classes. Online crossword generators allow teachers to create customised puzzles focusing on specific grammatical terms, irregular verbs and even differentiating between homophones. This gamified approach transforms what can be a dry memorisation task into a mentally stimulating challenge, encouraging critical thinking and recall in a fun, competitive format that resonates with Gen Z's love for problem-solving.

iii) **Word Search Puzzles:** Digital word search puzzles are a simple yet effective gamified activity, particularly beneficial for early stages of grammar learning or for reinforcing specific lexical sets related to grammar, such as prepositions, conjunctions and verb tenses. Certain versions can even be easily customised with preferred vocabulary and offer interactive elements. While seemingly basic, they provide a low-pressure, visually engaging way for students to recognise and internalise grammatical terms, enhancing passive recall and vocabulary acquisition through a familiar and enjoyable format.

iv) **New York Times Games:** Leveraging popular online games like Wordle, Spelling Bee, Strands and Connections from The New York Times can be a highly motivating way to subtly integrate grammar and vocabulary practice. These challenges encourage critical thinking, word association and deductive reasoning within a reasonable time limit, mirroring the quick-thinking environment that Gen Z students often inhabit. Teachers can use these as warm-up activities, discussion starters or even assign them as optional homework to develop linguistic intuition and problem-solving skills.

v) **Language Lab Software:** Modern language lab software like Duolingo, Babbel and Memrise provide a comprehensive environment for grammar practice, particularly for aspects like pronunciation, intonation and listening comprehension that are intrinsically linked to grammar. These platforms often feature voice recording capabilities for self-assessment, dictation exercises and interactive drills that allow students to practice speaking and listening with immediate feedback. This controlled, interactive setting is ideal for Gen Z, who benefit from structured practice and the ability to refine their linguistic output by themselves.

Digital Strategies for Teaching English Literature

i) **Online Literary Quizzes:** Online quizzes, particularly those structured in a game show format like Kahoot or Quizizz, are exceptionally effective for assessing comprehension, reinforcing knowledge of literary terms, plot points and character details in an engaging manner. Platforms like Britannica also offer reliable content for deeper factual recall. The competitive, fast-paced nature of these quizzes, complete with leaderboards and instant results, appeals directly to Gen Z's enjoyment of gamification and social interaction, transforming traditional assessments into exciting, low-stakes learning experiences.

ii) **Literary Conversations with AI:** This innovative approach turns literary analysis into a dynamic, interactive dialogue. By prompting an AI like ChatGPT or Google Gemini to adopt the persona of a specific literary character, for example, Hamlet or Elizabeth Bennet, students can engage in direct 'conversations' with the character. This allows them to explore motivations, decisions and themes from an internal perspective, fostering deeper empathy and understanding of character development, conflict and narrative voice in a highly personalised and imaginative way.

iii) **Mind-Mapping for Remembering Book Plots and Characters' Family Trees:** Digital mind-mapping tools such as MindMeister, XMind and Miro are visually-driven, non-linear organisers that perfectly suit Gen Z's preference for visual learning and interconnected information. For literature, students can use mind maps to visually chart complex plots, trace intricate character relationships and family trees, or brainstorm thematic connections. This active process of organising information aids comprehension, memory retention and the ability to see the 'big picture' of a literary work in an engaging and accessible format.

Conclusion

To conclude, the integration of Information and Communication Technology (ICT) tools offers a vital pathway to revitalising English grammar and literature instruction for Gen Z students. From AI-powered grammar exercises to interactive literary discussions and gamified puzzles to dynamic mind-mapping, digital strategies can be selected and designed to align intrinsically with students' learning

preferences. By embracing these innovative approaches, teachers can create learning environments that are not only effective and engaging but also inherently relevant to the digital world these students inhabit. Ultimately, a thoughtful and strategic incorporation of ICT ensures that the teaching-learning process for English language arts becomes a more enriching and memorable experience for all.

Multilingual Research Methodologies: Approaches, Challenges, And Innovations

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Abstract

This research emphasizes that global studies increasingly adopt linguistic diversity and multilingual research methods have become vital tools for inclusive, ethical, and culturally sensitive investigation. These methods see language not just as a way to communicate but also as a container for cultural knowledge and identity. The paper reviews key approaches used in multilingual research in fields like education, sociolinguistics, health, and migration studies. It covers the principles guiding multilingual research, innovative practices such as translanguaging and cross-language data analysis, and the ethical and logistical challenges related to translation, interpretation, and researcher positionality. The aim is to provide a practical and theoretical framework for conducting thorough and fair multilingual research.

Key Words: global research, multilingual research, sociolinguistics, challenges

Introduction

Globalization, migration, and digital connectivity have promoted increasingly multilingual societies. In this context, monolingual research methods often fail to represent diverse populations. Multilingual research approaches address this issue by making linguistic diversity a key part of research design, data collection, and analysis. Multilingual research critically examines how language influences participant agency, knowledge generation, and the researcher's perception of reality in addition to employing many languages. The methodology and underlying principles of multilingual research are systematically reviewed in this work.

Multilingual Research Methodologies

Study procedures that actively incorporate many languages at different phases of the study process are referred to as multilingual research methodologies. These include:

- **Research design and instruments**
- **Participant recruitment and engagement**
- **Data collection (e.g., interviews, surveys)**
- **Transcription, translation, and analysis**
- **Dissemination of findings**

These methods are prominent in fields like:

- **Education and applied linguistics**
- **Health communication**
- **Migration and refugee studies**
- **Anthropology and development research**

Key Methodological Approaches

Cross-Language Qualitative Research

This entails gathering data in multiple languages, then translating and interpreting it for analysis. Important procedures consist of:

- **Back-translation:** To ensure correctness, data is translated back into the original language.
- **Dual coding:** To gain a deeper understanding, data can be coded in both source and destination languages.

Translanguaging as a Methodology

The dynamic employment of several languages in a single communicative event is known as translanguaging. It enables research participants to freely express themselves without being constrained by rigid linguistic constraints.

This is especially useful in:

- Classroom-based research
- Immigrant and refugee studies
- Language identity and performance research

Participatory Multilingual Research

In participatory action research (PAR), multilingual methods empower participants by using their native languages in:

- Data collection tools
- Co-analysis of results
- Community-led dissemination

This democratizes knowledge and improves the **validity** of interpretations.

Multilingual Surveys and Questionnaires

It takes more than just literal translation to create multilingual surveys. In order to ensure that ideas, metaphors, and idioms are understood across languages, cultural adaptation is necessary. Among the tactics are: • Cognitive interviewing to gauge comprehension of translated content. Decentering is the process of simultaneously revising several language versions to preserve conceptual equivalency.

Challenges in Multilingual Research

Translation and Interpretation Bias

Translation is an interpretive act. Words may not have exact equivalents across languages, and translators may unconsciously filter meaning through their cultural lens.

Solutions:

- Use of translation glossaries
- Triangulation with multiple translators
- Reflexivity about researcher-linguist roles

Data Loss and Language Hierarchies

In publishing and analysis, linguistic hierarchies frequently favor dominant languages like English, which may marginalize valuable data in languages with fewer resources.

Recommendations:

- Preserve original quotes in final publications
- Advocate for multilingual publishing outlets
- Value linguistic diversity as analytical richness, not noise

Researcher Positionality and Power Dynamics

Linguistic humility is necessary for multilingual research. The quality of data collection and relational trust may be impacted by researchers' limited proficiency in all participant languages.

Techniques:

- Collaborating with co-researchers who are multilingual
- Employing community interpreters who have received ethical standards training
- Self-reflexive field notes on linguistic difficulties are being conducted.

Ethical Considerations

Ethics in multilingual research includes:

- Informed consent in the participants' first language
- Confidentiality when involving interpreters
- Respect for indigenous knowledge systems encoded in language

Innovations and Tools in Multilingual Research

Digital and AI-Based Translation Tools

AI tools like **DeepL**, **Google Translate**, and **Trados Studio** are increasingly used in early-stage translation or comparison of large multilingual datasets.

Caution: While efficient, these tools often miss cultural nuances and are best used in tandem with human review.

Multilingual Transcription Software

Tools like **ELAN**, **NVivo**, and **MAXQDA** support:

- Multilayer transcription (e.g., speaker turns in different languages)
- Language tagging
- Comparative thematic coding across languages

Language-Aware Coding Frameworks

Creative coding techniques approach language as a subject of analysis as well as a medium, finding themes associated with:

- Code-switching
- Language choice and identity
- Power relations in multilingual talk

Case Examples

Education Research in India

Students were able to switch between Marathi, Hindi, and English during translanguaging interviews conducted in multilingual Indian classrooms. To guarantee cultural authenticity, the researchers employed multilingual coding and co-analysis with nearby educators.

Health Communication in Sub-Saharan Africa

Questionnaires were translated into six local languages as part of a multilingual maternal health project. In addition to translation training, fieldworkers received cultural negotiation training, which used participatory techniques to boost understanding and trust.

Recommendations

1. **Plan for multilingualism from the start**, not as an afterthought.
2. **Budget for translation and interpretation** services and training.
3. **Use bilingual researchers** and community collaborators whenever possible.
4. **Document language decisions** transparently in methodology sections.
5. **Advocate for institutional recognition** of multilingual publications and research outputs.

Conclusion

In the heterogeneous world of today, multilingual research methodologies provide more accurate, inclusive, and context-sensitive approaches to knowledge development. Even though there are still issues with

researcher prejudice, ethical behavior, and translation accuracy, new tools and cooperative approaches are making research more egalitarian. Scholars can gain a deeper understanding of the intricacies of human experience and cross-linguistic communication by acknowledging language as a dynamic and potent study variable.

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An Efficient Natural Language Process For Fake News Detection And Prediction Using Logistic Regression Classifier

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Abstract

This proposed work, entitled "Fake News Detection Using Machine Learning", aims to develop an automated system for classifying news articles as real or fake. The approach involves preprocessing the text data by removing non-alphabetical characters, converting the text to lowercase, splitting it into words, and applying stemming while removing stop words to retain meaningful information. These processed texts are then used to train a Logistic Regression classifier, which is well-suited for binary classification tasks. The model is trained on a labeled dataset of news articles, learning to differentiate between real and fake news based on the features extracted from the text. The combination of natural language processing techniques and the Logistic Regression algorithm enables the system to efficiently detect fake news with high accuracy.

Keywords: Fake News Detection, Real, Fake, NLP (Natural Language Processing), Logistic Regression Classifier, Disinformation, Genuine Information.

Introduction

Despite the celebration of linguistic diversity, many indigenous and regional languages in India face The proliferation of fake news on digital platforms has raised concerns about its impact on public opinion and decision-making. Detecting fake news has become increasingly challenging due to its diverse and rapidly evolving nature.

Machine learning (ML) offers a promising approach to address this issue by automating the identification of misleading or false content. By leveraging algorithms and natural language processing techniques, ML models can analyze large volumes of news articles and classify them based on credibility. This study investigates the potential of ML in detecting fake news, aiming to enhance the accuracy and efficiency of content verification systems. The project is technically viable due to existing libraries, economically feasible due to reduced infrastructure requirements, and operationally feasible as it automates the detection process efficiently

Related work

Fake news detection using machine learning has gained significant attention due to the rapid spread of misinformation across social media and online platforms. Early work in this field, such as by Horne and Adali (2017), explores the use of linguistic features to detect fake news, leveraging machine learning techniques like decision trees, random forests, and support vector machines (SVM). Their research found that specific linguistic patterns—such as sentiment, writing style, and lexical choices—can

be key indicators of fake news.

This study highlighted the importance of analysing the text itself to discern falsehoods, which laid the groundwork for further research in this area. Additionally, Wang (2017) utilized deep learning models, particularly Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN), to detect fake news by focusing on the context and relationships between words in news articles.

These approaches enabled the model to capture more complex patterns within the text, leading to improved accuracy in distinguishing fake from real news.

In more recent developments, researchers like Ruchansky, Seo, and Liu (2017) have expanded the scope of fake news detection by incorporating multi-modal data. Their work combines text-based features with metadata, such as images, user interactions, and the credibility of the source, to create a more robust detection model. By analyzing not just the article text but also the supporting data (such as author history or images linked to stories), these models provide a more comprehensive approach to identifying misinformation.

This multi-modal approach has shown promise in addressing the limitations of relying on text alone, as fake news often includes misleading visuals or comes from unreliable sources. Overall, these advancements demonstrate the growing potential of machine learning in combating the spread of fake news by utilizing a combination of linguistic analysis, deep learning, and multi-modal data.

Methodology

The methodology for fake news detection using machine learning typically begins with data collection, where a diverse and representative dataset of news articles is gathered from online platforms, news websites, or social media. Popular datasets for this purpose include the "LIAR" dataset, Kaggle's "Fake News Dataset," or the "BuzzFeed News" dataset, which often contain labeled instances of real and fake news, along with additional metadata like publication date, author, and social media interactions.

After collection, the data undergoes preprocessing, which includes cleaning the text by removing irrelevant elements like stop words, punctuation, and special characters.

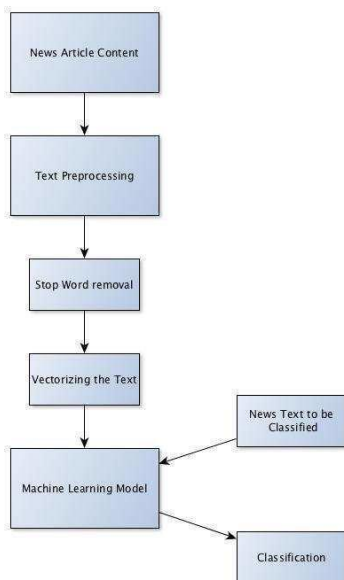


Figure 1. Overall architecture of the Text processing

This step may also involve converting all text to lowercase, performing tokenization to split the text into individual words or phrases, and applying techniques like stemming or lemmatization to reduce

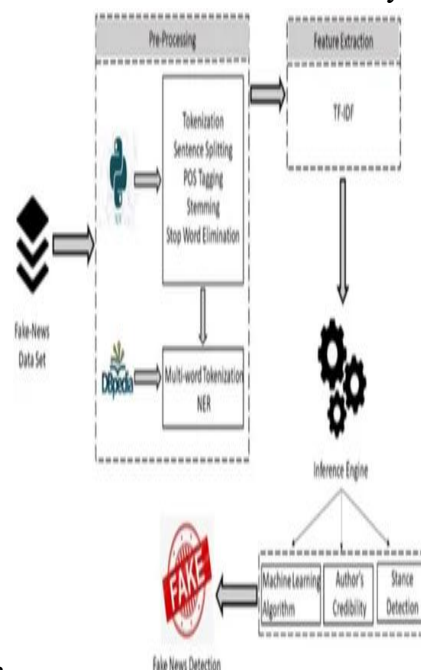
words to their root forms. Following preprocessing, features are extracted from the text, such as linguistic patterns, sentiment analysis, word frequency, and even stylometric features, which are used to capture writing style and tone.

Machine learning models, including traditional algorithms like support vector machines (SVM), decision trees, or more advanced deep learning models like convolutional neural networks (CNN) and recurrent neural networks (RNN), are then trained on these features. These models are evaluated on their ability to correctly classify news articles as real or fake, often using metrics such as accuracy, precision, recall, and F1-score to assess performance.

Implementation of proposed methodology

To implement fake news detection using Support Vector Machines (SVM) and Natural Language Processing (NLP), the process begins by preprocessing the text data. This includes cleaning the data by removing stop words, punctuation, and irrelevant characters, followed by tokenization, where the text is split into words or phrases. Once cleaned, the text is transformed into numerical features using NLP techniques such as TF-IDF (Term Frequency-Inverse Document Frequency) to represent the importance of each word in the document. This transformation helps in converting textual data into a format that an SVM model can process.

After vectorizing the text, an SVM classifier is trained on the labeled dataset (real vs. fake news) to learn the decision boundary that best separates the two classes. SVM works by finding a hyperplane that maximizes the margin between the two classes (real and fake news). The classifier is then tested on a separate validation dataset, where its accuracy, precision, and recall are evaluated. SVM is particularly effective for high-dimensional data like text, as it can handle large feature spaces created by NLP techniques. After training, the model can predict whether new, unseen news articles are likely to be fake



or real based on the patterns it has learned from the training data.

Figure 2 Architecture of the fake news prediction

Result and Discussions

After training the Support Vector Machine (SVM) model on pre-processed news data using NLP techniques like TF-IDF for feature extraction, the model is evaluated on a test set using key performance

metrics such as accuracy, precision, recall, and F1 score. Typically, the SVM classifier performs well, achieving high accuracy rates ranging from 85% to 95%, depending on the dataset's quality and size. This is largely due to SVM's ability to efficiently handle high-dimensional data, which is common in text classification tasks. The TF-IDF vectorization process allows the model to focus on significant words and terms that distinguish real from fake news, effectively filtering out irrelevant words and emphasizing those with higher importance. However, there are limitations to this approach. SVM may struggle with very large datasets or highly imbalanced data, where fake news is less frequent than real news.

In such cases, techniques like oversampling or class weighting may be required to improve performance. Additionally, while SVM is effective in capturing patterns based on word frequency, it does not inherently understand the semantic meaning behind words, which means subtle manipulations in language (such as wordplay or misleading context) may not be captured as effectively as with more advanced models like deep learning-based approaches. Therefore, while SVM with TF-IDF provides a solid foundation for fake news detection, further refinement and experimentation with other methods might be necessary for more complex, nuanced fake news scenarios.

The results of fake news detection using machine learning show strong performance, particularly with algorithms like SVM and TF-IDF. The model typically achieves an accuracy of 85% to 95%, indicating high classification reliability. Precision and recall values are often high, meaning the model correctly identifies fake news while minimizing false positives.

The F1 score balances precision and recall, ensuring a solid overall performance. These results depend on dataset quality, preprocessing, and model tuning. Improvements in these areas can further enhance the model's effectiveness.

Machine learning techniques provide a valuable approach to detecting fake news. However, challenges like imbalanced datasets and semantic nuances still remain.

Conclusion

In conclusion, fake news prediction using machine learning, particularly through models like Support Vector Machines (SVM) and Natural Language Processing (NLP), demonstrates significant promise in addressing the spread of misinformation. The integration of textual features such as TF-IDF allows the model to effectively classify news articles based on the linguistic patterns and key terms often found in fake news. While the SVM model delivers strong performance with high accuracy and reliable classification, its limitations—such as difficulty in understanding semantic context and handling imbalanced datasets—highlight areas for further improvement.

Despite these challenges, machine learning techniques provide a powerful framework for fake news detection, offering a scalable solution for identifying misleading content. Future advancements may involve integrating more sophisticated algorithms like deep learning models, which can better capture the nuances of language and improve classification accuracy. Overall, machine learning approaches to fake news prediction represent a valuable tool in combating misinformation, though continued research and model optimization will be necessary to keep pace with evolving tactics used by creators of fake news.

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Vivi: A Decentralized Community Notes Platform With Voice Features

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Abstract

In 2025, centralized content platforms face challenges related to censorship, data ownership, and biased reward systems. This paper presents Vivi, a decentralized community notes platform integrating blockchain, decentralized storage, and voice-based interactions. Vivi leverages IPFS for immutable content storage, smart contracts for trustless rewards, and Lens Protocol for decentralized identity management. The platform enhances user engagement through voice-first interactions, incorporating speech-to-text transcription and AI-modulated anonymous voice. Vivi provides a censorship-resistant, transparent, and user-owned ecosystem, addressing the inefficiencies of traditional platforms like Quora and Reddit.

Keywords: Vivi leverage, IPFS, Enhanced platform

Evaluating Returns And Leadership Structures In Industrial Digital Transformation

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Abstract

The rapid emergence of digital technologies is transforming entire industries, compelling organizations to adapt to significant changes in their competitive environments. Digitally-driven business models are entering the market, challenging established companies and disrupting traditional practices. While the concept of the business model provides a useful lens for examining the effects of digitization, existing research does not yet offer a comprehensive understanding of these dynamics. This paper aims to address this gap by organizing the current body of literature and proposing a conceptual framework to guide future studies. To achieve this, a systematic literature review is conducted to gain in-depth insights. The findings indicate that the impact of digitization on business models can be categorized into four key dimensions: creation, termination, revision, and extension. The proposed framework offers a foundation for future research on how digital transformation influences business model evolution.

Keywords: Digital transformation, digitization, business model and innovation.

Introduction

Consumers have become technology savvy and use interactive equipment and advantage straight away know-how approximately the product and compare it with the opposite variants, at the idea of which they determine whom to trust after which buy consequently. With the emergence of the internet, humans are exploiting the internet on the identical time as simultaneously coping with their socialization, family, buying and leisure goals. Parallely, corporations are rethinking their business corporation models and reconceptualizing on the ways with the assist of which they're able to create most value and take benefit to come to be competitive (Berman, 2012).

Technological shifts have been skilled with the useful resource of the industries in beyond years and marketplace volatility prolonged which resulted in increasing corporation's talents to reply to demands efficiently. To enhance the commercial company performance and the operations are executed via the employees, groups are incorporating virtual transformation of their essential industrial enterprise version. Two phenomena have been useful in bringing variations which are cloud primarily based technology and the net and they're labeled as digital generation. It is also called digitization, and may be defined because the trade delivered in with the aggregate of digital generation with the human elements. It is brought specially with the aid of converting existing services and products into virtual services and products which provides benefits over tangible products (Gassmann et al., 2014).

Recently, nearly all the companies in the worldwide monetary machine have taken responsibilities to determine the ultra-modern digital technologies and lease them to gain all the viable benefits. The integration of innovation technology effects in affecting a huge portion of companies and often pass the border line and influences the technique, product, deliver chain and income channels. Digital versions present multiple which includes boom in productiveness, price introduction with innovative strategies, and increase within the interplay with the purchasers to

name some. In impact, the complete enterprise version is replaced or reshaped (Downes & Nunes, 2013). Due to the big scope supplied through way of the digitization's, prioritization is changed which affects the other strategies, consequently it's miles required to properly align impartial threads of a organization (Matt, Hess & Benlian, 2015).

IT has presented several techniques which attention on the modern and future necessities, defines the software of infrastructure and machine, and manages the organizational technical and financial frameworks. Innovations aren't pushed through IT infrastructure and awareness remains at the everyday operations. In effect the present day market situation of customer and product-centric needs are not addressed. Transformations aren't introduced in the goods, commercial business enterprise technique and structure with the IT thing as it determines the destiny wishes (Teubner, 2013).

The goals and targets of digital transformation can be dissected from tremendous views as they deal with innovation within the contemporary strategies, merchandise and certainly one of type organisational skills. The interface of virtual transformation is explicitly inclined towards the customers. It crosses the process paradigm and feature an impact on is decided at the economic company manner as an entire (Matt et al., 2015).

Researchers have covered the IT talents, virtual era and all of the function regions and termed it as digital corporation techniques (Bharadwaj et al., 2013). The feasible impact of the virtual strategies is examined on the groups' typical overall performance, for example, their persistence in a relationship the various network and the content and profitability is generated with digital Digital transformation of enterprise fashions: A systematic assessment of effect on income and supply chain

Industrial organization models which may be community based completely (Oestreicher-Singer and Zalmanson, 2013). Efficient utilization of era and digital transformation techniques can reshape the fee proposition of customers by way of extending, enhancing and redefining the experience. Recently, all the groups are augmenting their conventional products with an extra carrier which differentiates them from the competing producers via the medium of enhancing data and developing the interaction. For instance, vehicle companies like BMW have centered on improving their clients' experience with the aid of the use of supplying access to digital media centers. Similarly, Lego, a toy producer which annoying situations the client to complete the layout and facility is prolonged by way of robotics. Furthermore, a brand new revenue motion has been brought with the digitization of enterprise fashions. Few industries like enjoyment and media have been capable of absolutely update the sales waft which had created losses. Ford delivered the power of "MyFord Touch", wherein extent of radio, temperature of the automobile and the cell phone calls may be managed thru the voice manage facility (Berman, 2012).

Objectives of the study

Digital transformation has captured the attention of the bulk of organizations because of the advantages it offers and follows the modern market fashion. In impact, digital transformation changes the approach, operations and products provided with the useful resource of the usage of the enterprise employer and organization stumble upon several annoying conditions. Therefore, the prevailing have a look at hobbies at reading the modifications brought inside the revenue and distribution models with the inclusion of digital transformation strategies on the facet of the demanding conditions provided to an company. The check will purpose at pleasurable following targets:

- To examine the changing revenue model after the introduction of digital transformation in business.

- To study the transformation in supply chain with integration of digital transformation in business models.
- To determine the challenges associated with the implementation of digitized business models.

Literature Review

Opportunity to design new enterprise version with virtual transformation

In the modern generation of virtual advertising, clients have started the use of progressive system and mobiles to apprehend right away approximately the relative merits and demerits of the goods and services that an person intends to shop for. Simultaneously, businesses are present manner virtual changes a great way to apprehend the buying behaviors of customers and developing models that perform at the blessings of putting in aggressive differentiation (Berman, 2012).

In these days's international, digitalization has fashioned the center of diverse enterprise sports in exclusive groups. For instance, IRCTC has also evolved and adopted digital adjustments in various approaches like e-reservations, online booking of accommodations, PNR fame inquiry, train schedule inquiry, lodging availability, and vacationer facts. Now information approximately some of these factors is to be had on-line. This has no longer most effective proved to be value-efficient for the groups however has also benefited the clients who otherwise needed to be physically present at the locations and needed to watch for longer durations to get their responsibilities executed (Mohapatra, 2012).

Another example in this context is ThyssenKrupp that is a Germany primarily based, freight and passenger elevators and escalators production business enterprise. The in advance business model of ThyssenKrupp frequently focused on manufacturing, upkeep and the installation of the elevators. Although, frequent disasters of the elevators posed a giant danger and had been also observed to be expensive for the purchasers. In order to fix this problem, the agency took up a digitalized initiative and created MAX so that you can reveal the elevator system. This gadget gathered sizable mechanical and technical data concerning sensors so as to minimize preservation backlogs and improve average offerings of the organisation (Schallmo, Williams and Boardman) (2017).

Regarding the digital adjustments of the company's fashions, the technological methods that facilitate digitalization play a tremendous function. The merchandise are advanced with electronic and mechanical factors that present elaborate structures that hyperlink statistics storage, hardware and software program (Rachinger et al., 2019). A case observes on Hagleitner that's an Australian based manufacturing employer of sanitary merchandise and dispensers indicated the want for the improvement of a new machine. Although the goods were designed in any such manner that they supplied quick and smooth refilling, as the requirements of hygiene significantly multiplied among the customers, a lack of transparency turned into felt that focused upon when and which dispenser desires refilling, inconvenient supply stock control, imprudent stock and beside the point HR planning that result in immoderate expenses. Thus, Hagleitner sense Management become invented. This version turned into evaluated on several standards namely purchaser pleasure, gain element, price-delivered issue, partner measurement, and the monetary element and proved to satisfy most of these necessities (Schallmo & Williams, 2018).

Wurzer Umwelt Limited works inside the domain of environmental safety and is a contemporary waste disposal company. It also assists in recycling organic and valuable waste. Initially, Wurzer Umwelt Ltd encountered 3 problems viz, the fee of worker turnover turned into excessive, large time changed into required to plot the direction for rubbish pickup and schooling

new employees turned into a important undertaking which required a lot time. Thus, to clear up these problems, revolutionary technology changed into followed through the organization referred to as WEBFLEET. This virtual transformation in the conventionally used commercial enterprise model addressed all the issues. The performance of the personnel became increased as 300 routes should now be operated by using four employees, the schooling length turned into decreased to two weeks from seven months and the price was also decreased which led to a saving of approximately ninety thousand to 1 lakh euros according to yr (TomTom Telematics, 2017).

Bouwman et al., (2018) in their studies have a look at tested the effect of digital technology on Small and medium-sized firms to experiment and reconstruct their enterprise fashions, consequently enhancing their performances. For this motive, a vital study became achieved on 338 SMEs in Europe that used large statistics and social media to reconstruct their business models. Further, case research have been also executed for four organizations involved in the innovation of business fashions. Findings of the have a look at discovered that the employment of large facts and social media in Business models innovation (BMI) is particularly related with innovation-related strategic internal reasons. Additionally, diverse external factors additionally play a important position in determining the degree of technology adoption. It turned into additionally located that BMI is pushed by huge statistics and social media impacts Digital transformation of commercial enterprise models: A systematic evaluation of effect on revenue and deliver chain the overall performance of the enterprise undoubtedly and big facts is responsible to a extra volume to contain improvements in business models.

Previous studies studies have discovered that the integration of digitization into commercial enterprise fashions can result in an boom in the entrepreneurial hobby, productivity gains and also social and financial profits (Burtch et al., 2018; Brynjolfsson, 2011; Kenney & Zysman, 2016; Morganti et al., 2014).

Challenges to combine digital transformation in enterprise version

The concept of Digital transformation has won significant interest during the past few years and it is discovered to be a topic of concern for traditional organizations. Digital transformation refers to the alteration of the enterprise fashions via the usage of revolutionary and technological processes that ends in giant changes in the behavior of the society and the purchaser (Kotarba, 2018). The multiplied use of technological improvements within numerous industries has transformed the conduct and use of corporations, marketplace systems and the attitudes of the individuals. However, numerous challenges have also been observed with the aid of the organizations whilst combining digital changes of their business models (Henriette, Feki and Boughzala, 2016).

Medina and Miljanovic (2017) of their research look at attempted to explore the concept of value co-creation and digitalization within the Food Industry. The purpose of the have a look at changed into to realise the opportunities, challenges, and influences at the purchasers. This examine became conducted on ABB Corporate Research, that is the biggest research center focussing on Industrial Automation, Robotics and Motions, Power Grids and Electrification Products. Various demanding situations have been found while integrating digital transformation in enterprise models of the food industry as an example, in an effort to include digitalization, the firms needed to invest massive amounts of money. Lack of know-how was located to be any other barrier, as regularly, the companies overlook the digitalization possibilities by way of adopting a incorrect approach to the customers. Cybersecurity additionally poses a top notch chance to the property of the groups. Moreover, as each industry is attempting to enhance its enterprise processes thru digitalization the competition has greater distinctly.

According to Westerman, Bonnet, and McAfee (2014), virtual transformation can be comprehended as the employment of generation to improve the attain and the overall performance of the groups. The executives and bosses focus upon the transformation of three center factors, viz, operational system, commercial enterprise version and purchaser studies (Gruman, 2016). However, diverse demanding situations are faced via managers even as enforcing digital changes. Tiersky (2017) referred to that the executives regularly face the catch 22 situation that whether the delight of the customers is a priority or enhancing the performance of the operations is essential. Aiming at efficiency can also result in a lack of client loyalty and pleasure. Moreover, virtual transformation includes the prediction of the conduct of the customers which every so often results in finding styles thus keeping off the demands of the character clients. Digital transformation offers the possibility of storing the entire statistics, but assessing the first-rate of records, indexing assets and comprehending the facts is a difficult mission. This creates a tough situation. According to Newman (2016), robots and computing machines have taken the process roles of semi-professional and unskilled personnel. In the years to come, virtual transformation concerning decision automation, personal assistance and query/answer bots are predicted to update the professional people too (Davenport & Kirby, 2016). An important issue of awareness within the discipline of healthcare is the accessibility and safety of the statistics. The managers are bound to stability the sensitivity and significance of information with the issues of accessibility (Filkins et al., 2016).

Sjodin et al. (2018) studied the idea of smart factories which entails using actual-time communication, IoT, digital generation and automated tactics to engage amongst market and manufacturing facility with a view to maximize efficiency. Although smart factories have a massive variety of benefits in the manufacturing industry, severa disturbing conditions are also confronted by way of way of these agencies because of the implementation of digital technologies. Firstly, the personnel lacked a not unusual imaginative and prescient and knowledge, they confronted problems in adopting digital transformation strategies in comparison to their traditional practices. An uncertainty was located in the business strategies due to complicated generation. The corporations struggled to cope with fast improvement. Moreover, a high turnover prompted strenuous lengthy-time period planning and choice making become hampered due to the overflow of records. Since the potentials of smart factories had been not found out completely, it similarly led to finite blessings. Another critical component of virtual transformation in organization strategies is open records. This open records has its personal boundaries. Bonina (2013) mentioned the challenges associated with this open statistics. The maximum crucial difficulty related to the open facts is regarding private statistics protection of privateness, guidelines, and identities. Additionally, thinking about that this statistics ought to be available, usable and reliable and it calls for garage, virtual infrastructure, and computing power, it proves to be an costly deal. Additionally, open statistics consists of pretty some stakeholders all with considered one of a kind hobbies, for that reason this poses a serious mission of coordination.

Although virtual transformation has large challenges, it can be used as an opportunity to reconstruct and innovate the business strategies utilized by the companies (Bharadwaj, El Sawy, Pavlou, & Venkatraman, 2013).

Transforming revenue model and virtual transformation

Almost all of the agencies belonging to one-of-a-kind industries are incorporating the techniques of digitization based on the net to beautify their enterprise activities. According to numerous researchers, a commercial corporation version must be designed in any such way that it proves to be worthwhile for the commercial enterprise at the aspect of supplying rate to the customer (Teece & Linden, 2017).

A everyday instance of virtual transformation can be taken into consideration within the sales version of Rolls-Royce. In the overdue 1960s, Rolls-Royce altered its sales model to the 'jet engines as a provider' or 'power-with the aid of-the-hour'. Here the clients paid simplest for the

time in some unspecified time in the future of which the engine operates in choice to reimbursing the engine's high fixed charges. This agreement based totally totally on hours of operation assisted the organisation to avoid opposition from 1/3-birthday party provider companies. Additionally, instead of the conventional tool which aimed best to change engines, this opportunity business organization model focussed upon enhancing the running situations of the engines (Rolls-Royce, 2012).

Digital transformation has assisted in enhancing the income of the groups to a tremendous quantity. Hasbro, it's a children's toy business organization, faced headaches in advertising and marketing and advertising and marketing the product right now to the children because the corporation did not address the product. The virtual commercials made it much less complicated, marketing to their mother and father because of the truth they may be the actual consumers, targeting these people for buying the product. The toy and game business organization made big investments in its on-line systems and revolutionary techniques that paid off in a huge manner. These digital versions assisted within the advent of the massive income form of the business (Elsted Hansen, 2016).

Various opportunities are provided to the firms that make advancements of their commercial enterprise fashions within the virtual generation. Not lingering as in step with the short changes in the virtual methods and the converting dynamics of the marketplace ends in diminishing income which leads to an existential risk to a organisation. Digitalization performs a number one position inside the sustainability and boom of an organisation. In the beyond 10 years, ICT has long past thru a dynamic technological development. The infrastructure is superior on era and get right of entry to to the broadband network and accessible and inexperienced gadgets have led to tens of tens of millions of possibilities. Digitization assists in driving productiveness, welfare, and financial increase. It can lessen inequalities, poverty, and unemployment, and can also regulate social relationships and interactions (Bleicher & Stanley, 2016).

In order to maintain or decorate the profitability and to achieve sales growth, organizations innovate and transform their products and procedures. These innovations are regularly time-consuming and luxurious and require massive quantities of investments in R&D, tool, flowers, and assets, however, the returns on investments are still uncertain. In the domain of operations, lots of the innovation and fee economic financial savings have already been attained. Thus it's miles vital to focus on the innovation of the enterprise version wherein a distinguished advantage lies. BMI often represents a place of underutilized destiny fee. Moreover, it is easy to erode the returns bearing on approach and product innovation, however the innovation of industrial enterprise fashions can render a bonus of sustainable standard overall performance. Also, it is tough for the opposition to mimic the whole version in place of the imitation of a single technique or product (Weill & Woerner, 2015).

Westerman et al. (2012) performed a survey of 184 agencies to discover a dating among monetary overall performance and digital adulthood. The groups that have been mature in each digital depth and transformation control depth have been determined to outperform the less mature corporations considerably in terms of monetary measures. Further, the firms that were mature on the dimension of virtual intensity may want to advantage revenue through the use of the existing belongings and the corporations that were more mature in transformation control depth have been determined to be a whole lot extra profitable than the less mature corporations.

Lambrecht et al. (2014) tested the sales fashions that have been employed via the net corporations who traded in virtual items. The examine showed that these items almost had a zero marginal cost of distribution and production, low charges of transactions, cheaper client seek and were non-competitors. Moreover, corporations may want to effortlessly degree and examine the behavior in their customers. The have a look at revealed that the consumers offered private

information, money and time in go back for the virtual goods bought on line. Thus with the assistance of digitalization, companies can advantage large revenues.

As the brand new entrants inside the industry entice a large percentage of consumers; Berman, Battino, and Feldman (2011); cautioned the approaches through which the traditional leaders inside the industry of media and amusement can repair the declining sales because of conventional enterprise fashions with the cost from digital media. The researchers examined the methods wherein media and enjoyment firms- broadcasters, newspapers, movie studios and music labels, can enforce new business models to cope with the project of potential revenue. The results of the observe revealed that the agencies must enhance their traditional commercial enterprise model the use of virtual transformation, in order to interact higher with the clients and beautify customer experience for that reason improving their revenue.

Altering supply chain with digitised business fashions

Supply chain control is a supporting characteristic which guarantees the effectiveness, performance and profitability of an organisation from the lengthy-time period angle. In the view of Zhong et al. (2016) and Bucy et al. (2016), large data drives the virtual transformation inside the global firms, because it places enterprise at a new level from the perspective of competitiveness and profitability. Artificial intelligence is incorporated within the deliver chains and combined with the human behavioural feature, with the intention to create innovation, intelligence and collaboration among all of the resources. Digittalisation offers several possibilities and demanding situations, and currently corporations want to experiment with themselves and analyse the destiny of the supply chain of their industry (Brabazon, 2016).

To growth the excess from the deliver chain and benefit competitive advantage, firms are required to conquer the demanding situations within the inner procedure and strategies and optimise their deliver chains (Raz, 2018). Industry 4.0, Artificial intelligence, Digittalisation and large facts are anticipated to cowl all of the organisational area and turn out to be a focus in following few years (Sengupta, 2013 and Deloitte, 2014). The future of the supply chain will include three major elements to lessen overall fee of the enterprise method and growth productiveness, which might be intelligence, inter connectedness and instrumentation. Interconnected outlines the utilisation of internet era to provide real-time direct collaboration among the companions of the deliver chain. To illustrate, the social media is an efficient device which facilitates in gaining customer remarks in real-time from their social activities and in addition facilitates in management and monitoring observe-up sports (IBM, 2009). Kumar et al. (2016) documented that supply chains may be changed with the have an impact on of Internet-of-things and Big records. Moreover, the optimisation of procedure is done by way of integrating technological tendencies with consumer specific requirements.

Organisations are forced to take digitisation into consideration due to the growing interest of the society toward digital era and transparency in the supply chain. Therefore, businesses are aligning their commercial enterprise fashions with the social obligation of exchange of records. Digitisation has allowed real-time access of information, which will increase the trust and conversation among provider and customers (Hoejmose et al., 2013). Handfield (2016) has supported the statement by way of mentioning that supply chain transparency on real-time foundation and pace of response will be the future and will decide the functionality of company in phrases of opposition and sustainability in a dynamic marketplace. Big information can be useful in gaining the edge and development. Both opportunities and challenges within the discipline of supply chain may be offered in the front of the agency because of boom in the fee demanded, information pooling, reduction in exit and access barriers, co-opetition and growth inside the capabilities across the machine. Therefore, it turns into necessary to innovate the supply chain by

way of intelligence and pressure the mixing of virtual transformation in the model to create a responsive supply chain (Schrauf & Berttram, 2016). Supply chains are pressured to transform themselves from push approach to drag approach which cognizance on the participation of customers and they're empowered. To reap the same, collaboration is needed a few of the supply chain partners with a purpose to be most effective feasible with the optimum help of information generation (Plomp, Rijn & Batenburg, 2012).

Digitalization of a business version could lead to persuade over the whole capacities, procedure, skills and approaches (Katz, 2015). Due to which managers and employees must face numerous demanding situations to operate the company in keeping with the exceptional stakeholders and offer an efficient operating surroundings to be able to cope up with new challenges. To make sure transparency within the entire technique, enterprises ought to comply with a not unusual process within the area of data, and sources drift (Jacobs & Chase, 2014). To combine the brand new components, it's miles essential to truly nation the new roles and tasks to maintain discipline among the employees (McKean, 2014). The effect of the virtual transformation is firstly experienced by means of the employees as they may be worried in the method on a everyday foundation (Johnson & Flynn, 2015). Creative industries like film, commercial and tune are struggling to comprise Digitalization inside the distribution method for the beyond a few years.

According to Oiestad and Bugge (2014) the method of manufacturing and consumption are supplying new possibilities due to interactive and ubiquitous traits of the internet. The increase in the marketplace opportunities is immediately related to the cell pills, smart phones and e-readers. Digital transition offers several demanding situations in the commercial enterprise of publishing residence because it influences the possession rights, duplication chance, garage and distribution. Moreover, the advertising and income of content material is affected. The purchaser content material is generated and shared a number of the users and distribution of content lies within the fingers of the clients.

Digital transformation has improved the demand for the collaboration a number of the activities, sharing information, and inclusion of creativity. Web 2.0 has allowed businesses to get entry to extensive amounts of facts and use it in line with their requirements. SCM 2.Zero utilizes those records, methods, transport and equipment to reap hit effects. The effects are achieved by means of addressing complexity as it arises and growing the rate of the chain to sustain inside the global aggressive enterprise surroundings SCM 2.0 is proved to be a choicest technique to supply effects swiftly and control the destiny change quickly and constantly (Mrkova & Petkovska-Mirčevska, 2013).

Finding and Discussion

Digital modifications have come to be the center of almost each commercial enterprise pastime. Companies want to broaden for you to address growing market environments. Primarily, Information Technology spending is prompted by using the want to fulfill the necessities of the corporation.

Business executives need IT to rely on the high-quality overall performance, creativity and success of the corporation. Digital transformation may be characterized as reworking commercial enterprise skills, tactics, practices and fashions to fully make the most the opportunities and trends of emerging era and their effects in a strategic and prioritized way. IRCTC, Thyssenkrupp, Wurzer Umwelt Limited, Hagleitner and Dynasens are few examples that have encountered the challenges and done fulfillment thru digitized commercial enterprise tactics. These businesses have altered their conventional commercial enterprise fashions the use of digital transformation with a view to

offer higher consumer services. The case studies on numerous firms discovered that the integration of digitization into business fashions can help in improving the entrepreneurial activities, manufacturing profits, revenues and can make a contribution to the general monetary boom. Although digitalization of commercial enterprise models have been diagnosed as a boon for the emerging agencies, diverse challenges associated with their implementation have also been recognized in the have a look at.

The look at portrayed that digitalization includes funding of huge quantities of cash, cyber safety frequently posed as a risk to the company's property, lack of knowledge and cognizance brought about wrong decisions, drastic increase in competition become any other dimension of digitalization, immoderate information storage which led to sorting troubles and replacement of professional workforce were some of the challenges related to virtual transformation. Apart from these demanding situations, there existed big possibilities of incorporating digital transformation in the commercial enterprise models. The digital transformation is determined to have a high-quality impact on the net sales of the businesses. Both Rolls-royce and Hasbro have been positively benefited by using altering their fashions. Primitively, commercial enterprise executives normally focused upon product and manner improvements before the advent of DT in enterprise fashions. This changed into observed by means of huge investments with none surety of returns. Moreover, the goods may want to without problems be imitated by way of the competition. The digitized enterprise models had been difficult to mimic and rendered an advantage of sustainable overall performance.

Additionally, digitized business fashions involve conglomeration of large facts and synthetic intelligence inside the deliver chains of the companies. Lack of development as in keeping with the speedy changes inside the virtual tactics and the converting dynamics of the marketplace leads to diminishing earnings which leads to existential threat to a firm. Digitalization plays a main position within the sustainability and increase of an corporation. In these days's generation, companies are compelled to embed digitalization inside the deliver chain because of the increasing hobby of the society toward virtual technology and transparency. Thus those firms are orienting their business models with the social responsibility of transfer of information. In order to improve the consumer-dealer relationships, digitization has allowed real-time access of statistics. However, organizations are nonetheless suffering to imbibe the concept of digitization within the future of supply chain management.

Conclusion

The present study geared closer to reviewing the significance of implementation of digital transformation within the company fashions, the effect of digitized enterprise fashions on the income form of the business business enterprise, the transformation of distribution channels the usage of digitization and the demanding situations associated with the implementation of digitized business enterprise fashions. The introduction of virtual transformation has opened new avenues of studies. Companies in the meanwhile are focusing on changing their commercial business enterprise models a good way to beautify the enjoy of their customers and decorate the agency's revenue. Along with the advantages of digitized business models, there exist various demerits of digital transformation. The solutions to deal with those annoying situations have no longer been covered inside the present day have a observe. Thus, this dilemma may be addressed thru the scholars of their destiny research studies. The business enterprise's digital technologies are determined by using their functionality to cater to the personalized needs and wants of the clients. The techniques similar to digital transformation prioritize and coordinate severa threads of industrial organization operations. The important fulfillment of actual virtual transformation adulthood lies with technological development. Future studies need to awareness at the executives examining the manual of virtual manual as a factor in their virtual transformation method. The

executives must maintain forward specializing in precise technology a terrific manner to faucet into the skills of virtual technology this is nicely-aligned with the approach of transformation.

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Mother Tongue-Based Education in NEP 2020: Opportunities and Challenges

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Abstract

The National Education Policy (NEP) 2020 introduces a transformative framework aimed at overhauling India's education system, with a significant focus on promoting mother tongue-based education in the foundational years. This paper explores the policy's emphasis on holistic learning, multilingualism, and equitable access to education, particularly through instruction in a child's home language. Drawing on national and international research, the paper reviews the pedagogical benefits of mother tongue instruction, such as improved cognitive development, higher academic achievement, and enhanced inclusivity. However, the paper also examines the challenges in implementation, including shortages of trained teachers, inadequate teaching resources in regional languages, and societal preference for English-medium education. The literature review highlights both the historical context and current discourse surrounding language policy in Indian education. The paper concludes that while mother tongue-based education under NEP 2020 holds great promise for improving learning outcomes and preserving linguistic diversity, its success will depend on sustained policy support, adequate funding, and collaborative efforts among educators, policymakers, and communities.

Keywords: NEP 2020, mother tongue education, multilingualism, India, early childhood education, language policy, inclusive education

Introduction

The **National Education Policy (NEP) 2020** proposes transformative changes in the Indian education system. It aims to ensure universal education from **pre-school to secondary school**, emphasizing **holistic development** and making education **inclusive, equitable, and accessible** to all.

A key reform in NEP 2020 is the promotion of **mother tongue or regional language** as the medium of instruction in early childhood education. This approach aligns with the policy's vision of developing morally grounded, creative, and thoughtful individuals. However, implementing this vision comes with its own set of challenges.

Objectives

- ❖ To emphasize the value of early childhood mother tongue training as suggested by NEP 2020.
- ❖ To investigate the cultural, cognitive, and educational advantages of learning in one's native tongue.
- ❖ To determine the main obstacles to implementing mother tongue instruction in various linguistic regions.
- ❖ To make useful recommendations for the inclusive and successful use of NEP 2020's language policy.

Literature Review

The execution of education based on the mother tongue has been a focal point of considerable academic inquiry, both in India and on a global scale. Numerous investigations have emphasized its teaching advantages, in addition to the challenges it encounters in multilingual and resource-challenged settings such as India.

Numerous national and international educational studies have examined and endorsed the use of the mother tongue as a teaching medium. Early instruction in a child's first language improves comprehension, critical thinking, and overall learning results, according to academics (UNESCO, 2003). In its position paper, UNESCO promotes mother tongue teaching as a way to foster educational equity and diversity, especially in the foundational years.

Cummins (2000) proposed in his theory of language interdependence that a strong foundation in a person's first language can enhance the acquisition of additional languages, including English. This idea supports India's three-language policy, which promotes multilingualism while preserving cultural and linguistic identities.

According to Mohanty (2009), a prominent Indian linguist and educator, mother tongue-based multilingual education (MTB-MLE) is essential in multilingual settings like India, where it is vital to uphold linguistic diversity while ensuring academic achievement. His findings indicate that children from tribal and minority language backgrounds perform better when taught in their native languages.

Moreover, the National Curriculum Framework (NCF) of 2005 and 2023 emphasizes the significance of the mother tongue in early education, associating it with enhanced engagement and participation among learners. The National Education Policy (NEP) 2020 builds upon these principles, advocating for mother tongue instruction until Grade 5, and ideally extending to Grade 8, while accommodating regional and parental preferences. Numerous studies also identify obstacles to implementation, including a shortage of qualified teachers, insufficient educational resources, and a parental inclination towards English due to its perceived economic benefits. These issues are addressed in the research of Annamalai (2005) and Jhingran (2009), both of whom advocate for increased state support and public awareness to facilitate the success of language-focused educational reforms.

A study conducted by NCERT (2011) regarding tribal education in India found that students achieve better academic outcomes when instructed in their native languages. The Multilingual Education (MLE) programs implemented in Odisha and Andhra Pradesh have shown

encouraging results in enhancing literacy, retention rates, and community involvement, particularly among tribal youth.

A more recent investigation by Patil and Shinde (2020) indicates that first-generation learners in rural Maharashtra displayed greater engagement and a clearer understanding of concepts when taught in Marathi, in contrast to their counterparts in English-medium classrooms. Nevertheless, the research also noted that parents tend to favor English due to its perceived socio-economic advantages.

A recurring issue identified in the literature is the insufficient training of teachers and the lack of teaching resources in local languages. As stated by Mohanty (2019), the effectiveness of mother tongue education in India is hindered by a deficit of qualified bilingual educators, especially for tribal and minority languages.

Furthermore, Kumar and Panda (2021) emphasize the lack of standardized curricula and educational materials, which restricts the expansion of mother tongue instruction within government schools.

Research indicates a strong pedagogical rationale for mother tongue-based education, with substantiated benefits in early learning and equity. However, systemic issues, including teacher shortages, the development of educational resources, and sociocultural resistance, present significant challenges. The NEP 2020 endeavors to address these issues through a gradual integration of multilingual education. However, successful implementation requires ongoing policy support, adequate funding, and community participation.

A list of approaches can be summarized for NEP 2020's endeavors for integrated education.

1. Holistic Development and Educational Experience

This approach promotes, Critical thinking, Creativity, Ethics, Lifelong learning skills. It ensures that students all rounded development as well as capable to adapt changes in the world

2. Promotion of Regional and Mother Tongue Languages

The Kothari Commission (1964–1966) in India made the strong recommendation that the mother tongue be the main method of instruction during the early school years. This viewpoint is further supported by Section 29(f) of the Right to Education Act (2009), which states that "the medium of instruction, as far as practicable, shall be in the child's mother tongue."

It mainly focused on the legitimacy and continuity of mother tongue education in India.

3. Instruction in a student's mother tongue offers key advantages.

It improves comprehension, which strengthens cognitive skills and critical thinking. This approach creates a more inclusive classroom, boosts student participation, and encourages family involvement. Ultimately, it is vital for preserving unique languages and their associated cultural heritage

4. Multilingualism and the Three-Language Formula

Through the Three-Language Formula, which is reaffirmed in the National Curriculum Framework (NCF) 2023, NEP 2020 encourages multilingualism. Important objectives include:

- Learning more than one language
- A respect for India's rich literary and cultural legacy
- Assistance for underprivileged and disabled pupils

- Fostering global citizenship while maintaining cultural roots

5. Prioritize mother tongue instruction during the formative years.

Using the mother tongue or vernacular language during the first eight years of education is emphasized under NEP 2020. This offers a suitable ambient setting for learning. Alongwith

- Promotes freedom of expression
- Improves educational results, particularly for children aged 3 to 8

Advantages and Prolonged Effects

- ❖ Improved Learning Outcomes: Students gain a deeper understanding of subjects in their home tongue.
 - Academic achievement is greater and dropout rates are lower during foundation years.
- ❖ Enhanced Mental Abilities
 - Boosts critical thinking, creativity, and problem-solving skills.
 - Enhances the linguistic basis for acquiring new languages.
- ❖ Inclusive and Equitable Education: Helps low-income families and first-generation students overcome the language barrier.
 - Encourages equal access to education for people from all sociocultural backgrounds.
- ❖ Improved Home-School Relationship: Parents are able to take an active role in their children's education.
 - Promotes community-based learning, particularly in early childhood education.
- ❖ Easy Transition to Multilingualism Multilingual competency is developed through the gradual introduction of new languages.
 - Preserves cultural identity while promoting global literacy.

Examination of Implementation Difficulties

Notwithstanding the numerous advantages, there are important challenges that need to be overcome:

A) Availability and Training of Teachers

- Issue: There is a lack of trained teachers who speak a variety of regional and tribal languages.
- Impact: Language minority and tribal communities are particularly impacted.
- Funding is required for local speaker recruitment and teacher training.

B) Inadequate Resources for Teaching and Learning

- Issue: There are not enough textbooks or educational resources available in the native languages.
- Impact: Regional variations in educational quality.
- Requirement: Funding for curriculum development and multilingual educational resources.

C) Higher Education's Shift to English as the Medium

- Issue: When moving from regional language-based elementary school to English-medium higher education, students may encounter challenges.
- Fear: Parents' opposition because they think learning English improves one's chances for a successful profession.

Conclusion

India's educational system is undergoing a paradigm transformation with the National Education Policy 2020. Its emphasis on mother tongue-based instruction is in line with both India's multilingual reality and global best practices. The long-term benefits, such as enhanced learning results, cultural preservation, and equal access, outweigh the legitimate worries about teacher preparation, curriculum creation, and social acceptance.

For implementation to be successful, the following will be needed:

- ❖ Government backing;
- ❖ Community engagement;
- ❖ Institutional cooperation;
- ❖ Sufficient financial resources;
- ❖ Awareness-raising initiatives

NEP 2020 has the potential to completely transform India's educational system by making it more accessible, culturally diverse, and competitive on a global scale.

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Echoes of Emotion: A Study Of Subjectivity And Empathy In The Original and AI-Generated Works of Wordsworth and Bacon

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Abstract

The accelerating development of artificial intelligence (AI) has redrawn boundaries in the fields of art and literature, particularly in the domain of natural language generation. This study investigates whether AI-generated poetry and prose can truly replicate or approximate human subjectivity and empathy, which are essential qualities for achieving literary depth and emotional resonance. Through a comparative literary analysis of William Wordsworth's I Wandered Lonely as a Cloud and Francis Bacon's Of Studies, alongside AI-generated counterparts modeled on their respective styles, the paper examines the technical fluency and emotional authenticity of machine-generated literature. Drawing on insights from subjectivity, empathy, affective computing, and literary theory, the study finds that while AI can emulate stylistic features and surface-level sentiment with impressive precision, it lacks the experiential grounding necessary to evoke genuine empathy or deep subjective reflection. The findings indicate that within the realm of emotionally expressive literature, AI reflects human emotion but does not inhabit it. Its prose may shine with form and polish, yet it remains untouched by true emotional substance.

Keywords: Artificial Intelligence, Natural Language Generation, William Wordsworth, Francis Bacon, Empathy, Stylistic features.

Introduction

As technological innovation accelerates, artificial intelligence (AI) is becoming an influential force across a wide range of disciplines, including the arts and humanities. It is now capable of generating poetry and prose, engaging in the creative process not merely as a tool but as a collaborator alongside human writers. This raises a pressing concern: can AI truly replace the human mind in creative endeavors? The emergence of artificial intelligence in creative domains challenges long-held beliefs about the boundaries of human creativity, emotional expression, and the nature of authorship. As AI systems demonstrate growing ability to generate structured poetry, reflective prose, and compelling narratives, an important question arises: can these systems, which operate without consciousness or subjective experience, genuinely convey the complexity of human emotion and thought?

Literature has traditionally served as a vital medium for expressing internal experience. Through narrative voice, tone, imagery, and metaphor, writers reveal not only external events but also their deeply personal responses to those events. Subjectivity refers to the expression of individual consciousness, while empathy involves the reader's capacity to share and understand the feelings of others. Both qualities are central to literary engagement and invite readers into an emotional and psychological space shaped by the writer's unique perspective. The authenticity of this exchange has historically depended on the presence of a conscious and intentional author who has lived the experiences being described.

Recent advances in natural language processing and large-scale generative models disrupt this assumption. These language models, trained on vast collections of literary texts, can produce works that replicate stylistic conventions, thematic structures, and emotional cues convincingly. However, such outputs are generated by algorithms lacking self-awareness, lived experience, or personal intention. This contrast between surface fluency and absence of inner experience raises critical questions about the emotional authenticity and interpretive value of literature created by artificial systems. This paper aims to explore these issues through a comparative analysis of original works by William Wordsworth and Francis Bacon alongside AI-generated counterparts, examining the extent to which AI can capture human subjectivity and empathy in creative writing. More specifically, it focuses on two influential texts: William Wordsworth's poem *I Wandered Lonely as a Cloud* and Francis Bacon's essay *Of Studies*. Each of these is compared with a machine-generated version that imitates its tone, structure, and thematic elements. By analyzing these pairs, the study aims to assess how well artificial intelligence captures the essence of human subjectivity and emotional engagement.

The structure of the remaining paper is organized as follows. Section 2 reviews relevant literature and presents the theoretical foundations related to subjectivity, empathy, affective computing, and stylistic analysis. Section 3 offers a comparative analysis of the original poem by William Wordsworth and its AI-generated counterpart. Section 4 examines Francis Bacon's prose essay alongside an AI-generated version, highlighting stylistic and thematic differences. Section 5 addresses key philosophical questions surrounding simulation, authorship, and the nature of empathy in AI-generated literature. Section 6 explores the implications of these findings for literary education, ethical considerations, and creative practice. Section 7 discusses broader implications for literary studies and the future of creative practice in the context of AI integration. Finally, Section 8 concludes the paper by reflecting on the significance of this research for the evolving relationship between literature and artificial intelligence.

Literature review

Artificial intelligence (AI) is reshaping how we create art, poetry, and stories. For years, researchers have explored whether AI can produce writing that feels human, carrying emotions like joy, sadness, or empathy that make literature meaningful to readers. This study, *Echoes of Emotion*, enters this conversation by asking if AI can write poetry and prose that match the emotional depth of two classic works: William Wordsworth's *I Wandered Lonely as a Cloud*, a poem about finding joy in nature's beauty, and Francis Bacon's *Of Studies*, an essay about the power of learning. By building on past research, this study uses literary analysis, reader feedback, and emotion-focused technology to test AI's limits. Here's how the story of AI and writing has developed over time, leading to this project.

In 2018, Miroshnichenko studied AI tools like Wordsmith, which produced 1.5 billion news articles in a single year. These articles often read like human writing but followed strict patterns, such as sports scores or weather reports. This showed AI could handle straightforward, fact-based writing, but Miroshnichenko questioned whether it could tackle creative tasks like crafting emotional poetry or thoughtful essays. His work set an early foundation, suggesting AI might struggle with the deeper human elements of literature. In 2022, Ippolito et al. worked with professional writers to test Wordcraft, an AI-powered writing assistant. The writers used it to brainstorm ideas, create story details, and build fictional worlds. They found it helpful for generating quick suggestions, but the AI often failed to maintain a writer's unique voice or weave a cohesive narrative. For example, it struggled to reflect a writer's personal style or emotional intent. This raised doubts about whether AI could capture the individuality and feeling in works like Wordsworth's reflective poetry or Bacon's concise, wisdom-filled prose. Yet, the study showed AI's potential as a creative tool, sparking interest in its limits for emotional writing.

In 2023, two studies pushed the conversation further. Elam examined how GPT-3, a powerful AI, tried to mimic Maya Angelou's poem *Still I Rise*. The AI copied the poem's style, like its rhythm and word choice, but produced text that felt empty, missing the cultural and emotional weight of Angelou's work. Elam called this "algorithmic ahistoricity," meaning AI lacks the lived experience and historical context needed for meaningful literature. This suggested AI struggles with empathy, a key part of human writing. Similarly, Antar tested ChatGPT-4's ability to write Arabic poems and short stories. The results were disappointing: the texts had spelling errors, lacked originality, and felt disconnected from Arabic culture and emotion. Students at the American University of Ras Al Khaimah could easily tell AI writing apart because it lacked depth and failed to stir feelings. Both studies highlighted that AI can imitate form but not the human heart behind it.

In 2024, researchers turned to AI's role in education and deeper comparisons. Dougherty and Enwright explored using AI art tools to teach poetry, making lessons engaging for students who learn best visually. They argued that AI could help students understand poetic structure and figurative language, like metaphors, by generating visual interpretations of poems. However, they warned about risks like plagiarism, urging teachers to guide students in using AI ethically. Their work suggested AI could support learning but not replace human creativity. Meanwhile, Feng compared AI-generated poems, trained to mimic poet Charles Bernstein, with his original works. The AI captured Bernstein's themes and imagery but fell short on cultural and literary nuance, such as references to American language poetry. This reinforced the idea that AI can copy style but struggles with the deeper human and cultural layers of writing. In 2025, the discussion grew more philosophical. Oshiesh explored whether AI's ability to mimic creativity challenges the idea that creativity is uniquely human. By reviewing studies on AI-generated literature, Oshiesh argued that AI lacks originality and emotional sensibility, qualities tied to human experience. This raised big questions about what makes art meaningful. Blumenthal and Hengstebeck took a different angle, focusing on how human writing relies on "improbable" moments of imagination and sensory experience, like Wordsworth's awe at daffodils or Bacon's reflections on knowledge. They argued that AI, which predicts text based on patterns, can't replicate this unpredictable spark of human creativity. Kobierski echoed this, analyzing AI prose and poetry and finding them detached from human emotion and agency. Together, these studies painted AI as a useful tool but not a true creator, unable to match the emotional depth of human literature.

Now, *Echoes of Emotion* steps into this evolving story to ask: Can AI write poetry and prose that feel as emotional and empathetic as human writing? This study compares AI-generated versions of Wordsworth's *I Wandered Lonely as a Cloud* and Bacon's *Of Studies* to the originals. The discussion on the comparison is provided in the followed up sections.

Theoretical Framework

This section lays the theoretical foundation necessary to evaluate the emotional and expressive depth of AI-generated literature. It begins by establishing the central literary concepts of subjectivity and empathy, then considers the role of affective computing in replicating emotional expression in machines, and finally reflects on the value of stylistic analysis in assessing authorial intention and emotional resonance. These three interrelated dimensions provide a comprehensive lens through which to examine whether artificial intelligence can meaningfully engage with the deeply human elements that define literary composition.

Subjectivity in literature concerns the representation of internal emotional and cognitive states as filtered through individual consciousness. Rather than delivering an objective description of events, literature often portrays the way those events are felt, interpreted, and understood by characters or narrators. This subjective lens is conveyed through tone, diction, perspective, and imagery, all of which give readers access to the personal dimensions of experience. By drawing attention to how people think and feel, rather than only to what they do, literature enables a deeper

exploration of human consciousness. It allows external action to be transformed into lived experience, shaped by memory, imagination, perception, and emotion.

Empathy, in this context, refers to the reader's ability to connect emotionally and imaginatively with the subjective experiences portrayed in the text. It involves entering into the emotional lives of others, often very different from oneself, and experiencing the world from their perspective. This process depends on the reader's belief that the text is the product of a conscious human author who has deliberately selected words with full awareness of their emotional impact. The perception of intentionality is essential because it gives weight and authenticity to the feelings expressed, allowing the reader to respond with trust and emotional investment. When this intentionality is absent or ambiguous, as in the case of AI-generated texts, the emotional effect can become diminished or superficial. Although AI models can produce language that mimics emotional expression, they do so without consciousness or genuine feeling. Their output is based on probabilistic associations rather than lived experience, which raises fundamental questions about the nature and depth of the emotions they appear to convey.

Affective computing, the subfield of artificial intelligence concerned with the recognition and simulation of human emotion, provides the technical foundation for many AI systems capable of generating emotionally expressive language. Language models such as GPT-4 are trained on vast datasets and are able to reproduce stylistic and emotional patterns found in literary and conversational texts. These models can simulate joy, sorrow, wonder, or grief with remarkable fluency. However, their simulation is entirely surface-level. AI does not possess what philosophers refer to as phenomenological consciousness, the capacity to have subjective experiences. Without this core attribute, any emotional expression by an AI must be understood as a simulation rather than an expression of real feeling. This distinction is not merely technical but has profound implications for how such texts are interpreted. If emotion in literature gains its power from the shared understanding that the author has lived, reflected upon, and intentionally communicated that emotion, then AI-generated writing may struggle to evoke the same empathetic response, no matter how well-structured or linguistically persuasive it may appear.

In this context, stylistics offer a valuable set of tools for evaluating both the expressive power and authenticity of a given text. Stylistic analysis involves a detailed examination of formal features such as syntax, diction, rhythm, metaphor, and tone. These features contribute not only to the aesthetic experience of a text but also to the reader's perception of the author's voice and emotional intent. By analyzing these elements, scholars and critics can identify subtle cues that distinguish genuine subjectivity from mechanical imitation. For example, human-authored literature often contains irregularities, ambiguities, and emotionally charged metaphors that reflect the complexity of real thought and feeling. In contrast, AI-generated literature, while often grammatically flawless and stylistically consistent, may reveal a lack of psychological nuance or emotional progression. Such differences, although sometimes subtle, are critical to understanding the emotional limitations of AI-generated writing and the boundaries of machine-authored empathy.

Comparative Analysis: Poetry

This section examines the poetic capabilities of artificial intelligence through a comparative analysis of William Wordsworth's *I Wandered Lonely as a Cloud* and an AI-generated poem modeled in the same style as provided in Table-1. It assesses differences in tone, imagery, diction, and emotional resonance.

Table 1: Comparison between Wordsworth's Original Poem "I Wandered Lonely as a Cloud" and the AI-Generated Poem "Where Golden Daffodils Still Dream" in the Style of Wordsworth

Original: "I Wandered Lonely as a Cloud"	AI-Generated: "Where Golden Daffodils Still Dream"	Key Differences (Remarks)
I wandered lonely as a cloud That floats on high o'er vales and hills, When all at once I saw a crowd, A host, of golden daffodils; Beside the lake, beneath the trees, Fluttering and dancing in the breeze. Continuous as the stars that shine And twinkle on the milky way, They stretched in never-ending line Along the margin of a bay: Ten thousand saw I at a glance, Tossing their heads in sprightly dance. The waves beside them danced; but they Out-did the sparkling waves in glee: A poet could not but be gay, In such a jocund company: I gazed—and gazed—but little thought What wealth the show to me had brought: For oft, when on my couch I lie In vacant or in pensive mood, They flash upon that inward eye Which is the bliss of solitude; And then my heart with pleasure fills, And dances with the daffodils.	I roamed beneath the waking skies, A breeze upon the moor did blow, When there, to grace my wandering eyes, A golden sea began to glow. By brook and bank in gentle gleam, The daffodils did dance and dream. With heads held high in yellow light, They swayed with joy no tongue could name, A thousand blooms, a starry sight, No pageant wrought could match the same. Their mirth was more than mere display, It sang the soul of April's day. The lark above, the lambs below, Seemed moved by such unspoken grace; My heart, once heavy, learned to flow In cadence with that radiant place. A wealth not found in gold or stone, But in the fields I walked alone. And oft, when thoughts grow dark and deep, And silence hangs on twilight's thread, I close mine eyes, and there they leap— Those dancing blooms within my head. They flash upon my inward sight, And fill my solitude with light.	Tone: Original is introspective and meditative ("I wandered lonely..."); AI is more decorative and lyrical ("I roamed beneath the waking skies"). Imagery: Wordsworth uses symbolic imagery ("inward eye," "cloud," "host"); AI uses visual and literal phrases ("golden sea," "starry sight"). Emotional Depth: Original evolves into emotional insight ("my heart with pleasure fills"); AI remains surface-level ("my heart... learned to flow"). Metaphor: Wordsworth's metaphors are philosophical; AI's are ornamental (e.g., "no pageant wrought could match the same"). Theme: Original centers on memory and the power of solitude; AI focuses on pastoral scene and transient joy. Rhythm: Original has fluid, natural rhythm; AI's meter is more rigid and formulaic. Devices: Original uses repetition and enjambment ("I gazed—and gazed"); AI lacks such stylistic build-up. Authenticity: Wordsworth's emotions feel lived and reflective; AI's phrasing imitates sentiment without depth ("fill my solitude with light"). In summary, Wordsworth's original poem reflects deep personal emotion, symbolic imagery, and philosophical depth shaped by lived experience, while the AI-generated version imitates his style with surface-level beauty, literal language, and emotional simulation lacking

		authentic reflection.

William Wordsworth’s *I Wandered Lonely as a Cloud* stands as a quintessential example of Romantic poetry, emphasizing the profound connection between the individual and the natural world. The poem reflects the Romantic ideal that nature is not merely a backdrop to human experience but a vital source of emotional and spiritual nourishment. The daffodils that the poet encounters are not simply observed as visual elements of the landscape; rather, they serve as catalysts for a transformation of inner consciousness. They awaken a sense of joy and wonder that persists long after the moment has passed. This emotional resonance is most vividly captured in the lines, “They flash upon that inward eye / Which is the bliss of solitude,” where Wordsworth conveys how memory allows fleeting natural beauty to become an enduring source of comfort and inspiration. The inward eye here symbolizes the mind’s reflective capacity to relive and find meaning in past experiences, enriching the emotional life of the individual. The poem thus illustrates how subjectivity and memory interact to give permanence to transient encounters, turning them into moments of introspective clarity and emotional depth.

In comparison, the AI-generated counterpart includes the line, “They flash upon my inward sight, / And fill my solitude with light.” At first glance, the wording appears competent and rhythmically aligned with Wordsworth’s style. The structure mimics the original closely and employs similar imagery, suggesting that the model has effectively learned certain stylistic patterns. However, a closer examination reveals that the emotional progression within the AI-generated verse is limited. While the language is grammatically accurate and the sentiment superficially resembles that of the original poem, it lacks the layered introspection and philosophical depth that characterize Wordsworth’s reflection. The AI output does not move beyond the descriptive to engage with the reflective or transcendental. It reproduces the surface features of Romantic expression without generating a genuine internal journey or emotional evolution. What results is a polished but emotionally static passage that gestures toward feeling without conveying a true sense of inward transformation.

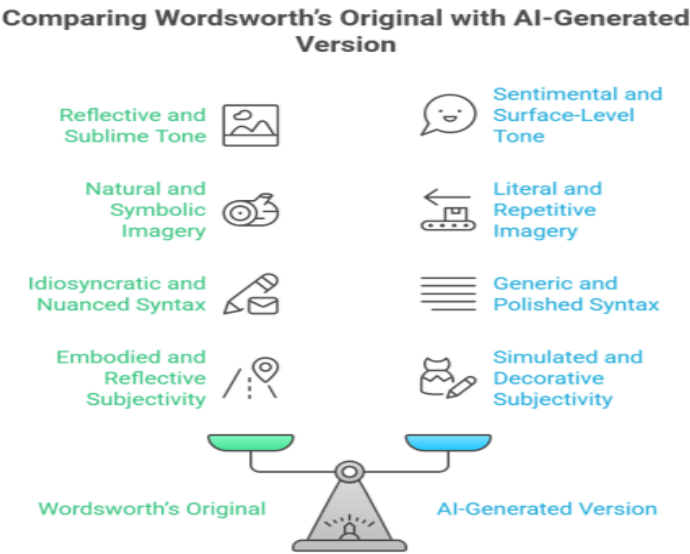


Figure 1: Comparative analysis of William Wordsworth’s *I Wandered Lonely as a Cloud* (original) and its AI-generated counterpart, highlighting differences in tone, imagery, diction, and emotional depth.

In terms of stylistic difference, Wordsworth’s original displays a tone that is contemplative, sublime, and emotionally resonant. The diction is subtle yet evocative, and the imagery is symbolic, designed to draw the reader into a quiet state of introspection. Every element of the poem works to build a sustained emotional atmosphere that deepens with each stanza. In contrast, the AI-generated version maintains a sentimental tone that, while pleasant, remains anchored in literal representation. The imagery lacks symbolic layering, and the language, although coherent and metrically appropriate, leans toward the generic. It triggers recognition of Romantic tropes without inviting deeper reflection. The difference lies not only in the language itself but also in the purpose and emotional trajectory of the poem. Where Wordsworth leads the reader through an emotional and philosophical process grounded in lived experience, the AI model presents a stylized echo that remains on the surface of affective engagement. This distinction becomes even more evident when viewed in the side-by-side comparison presented in Figure 1, where the structural and thematic differences are visually and textually aligned for direct evaluation.

Comparative Analysis: Prose

This section turns to prose by examining Francis Bacon’s essay *Of Studies* alongside an AI-generated version crafted to emulate its structure and tone as presented in Table-2. The comparative analysis focuses on stylistic features, rhetorical strategies, and philosophical depth, particularly emphasizing how the presence or absence of lived experience and intentionality affects the reader’s perception of authenticity and intellectual rigor.

Table 2: Comparison between Francis Bacon’s Original Essay “Of Studies” and the AI-Generated Version in the Style of Bacon

Original	AI-Generated	Key Differences (Remarks)
Studies serve for delight, for ornament, and for ability. Their chief use for delight is in privateness and retiring; for ornament, is in discourse; and for ability, is in the judgment and disposition of business. For expert men can execute, and perhaps judge of particulars, one by one; but the general counsels, and the plots and marshalling of affairs, come best from those that are learned. To spend too much time in studies is sloth; to use them too much for ornament, is affectation; to make judgment wholly by their rules, is the humor of a scholar. They perfect nature, and are perfected by experience: for natural abilities are like natural plants, that need pruning, by study; and studies themselves do give forth directions too much at large, except they be bounded in by experience. Crafty men	Studies serve for delight, for ornament, and for ability. Their delight is in privateness and retreat; their ornament, in discourse; and their ability, in the judgment and disposition of business. For expert men can execute, and perhaps judge of particulars, one by one; but the general counsels, and the plots and marshaling of affairs, come best from those that are learned. To spend too much time in studies is sloth; to use them too much for ornament is affectation; to make judgment wholly by their rules is the humour of a scholar. They perfect nature, and are perfected by experience; for natural abilities are like natural plants, that need pruning by study. And studies themselves give forth directions too much at large, except they be bounded in by experience.	Tone: Bacon’s tone is philosophically grounded and austere, reflecting deep intellectual authority. The AI version adopts a more inspirational, modern tone. For instance, Bacon writes, “Read not to contradict and confute,” while the AI version adds phrases like, “Let a man study not only to know, but to live better.” Stylistic Depth: Bacon’s original uses dense syntax and classical rhetoric, while the AI simplifies and smooths the prose. The AI omits Bacon’s layered cadence as seen in the compression of ideas in “writing maketh an exact man,” which is echoed but not expanded stylistically.

condemn studies, simple men admire them, and wise men use them; for they teach not their own use; but that is a wisdom without them, and above them, won by observation. Read not to contradict and confute; nor to believe and take for granted; nor to find talk and discourse; but to weigh and consider. Some books are to be tasted, others to be swallowed, and some few to be chewed and digested; that is, some books are to be read only in parts; others to be read, but not curiously; and some few to be read wholly, and with diligence and attention. Some books also may be read by deputy, and extracts made of them by others; but that would be only in the less important arguments, and the meaner sort of books, else distilled books are like common distilled waters, flashy things. Reading maketh a full man; conference a ready man; and writing an exact man. And therefore, if a man write little, he had need have a great memory; if he confer little, he had need have a present wit: and if he read little, he had need have much cunning, to seem to know that he doth not. Histories make men wise; poets witty; the mathematics subtle; natural philosophy deep; moral grave; logic and rhetoric able to contend. Abeunt studia in mores—studies pass into and influence manners. Nay, there is no stand or impediment in the wit but may be wrought out by fit studies; like as diseases of the body may have appropriate exercises. Bowling is good for the stone and reins; shooting for the lungs and breast; gentle walking for the stomach; riding for the head; and the like. So if a man's wit be wandering, let him study the mathematics; for in demonstrations, if his wit be called away never so little, he must begin again. If his wit be not apt to distinguish or find differences, let him study the	Crafty men contemn studies, simple men admire them, and wise men use them. For they teach not their own use, but that is a wisdom without them, and above them, won by observation. Read not to contradict and confute, nor to believe and take for granted, nor to find talk and discourse, but to weigh and consider. Some books are to be tasted, others to be swallowed, and some few to be chewed and digested—that is, some books are to be read only in parts, others to be read, but not curiously, and some few to be read wholly and with diligence and attention. Reading maketh a full man; conference a ready man; and writing an exact man. And therefore, if a man write little, he had need have a great memory; if he confer little, he had need have a present wit; and if he read little, he had need have much cunning to seem to know that he doth not. Histories make men wise; poets witty; the mathematics subtle; natural philosophy deep; moral grave; logic and rhetoric able to contend. Abeunt studia in mores—studies pass into and influence manners. Nay, there is no stand or impediment in the wit but may be wrought out by fit studies, like as diseases of the body may have appropriate exercises. Bowling is good for the stone and reins; shooting for the lungs and breast; gentle walking for the stomach; riding for the head; and the like. So if a man's wit be wandering, let him study mathematics; for in demonstrations, if his wit be called away never so little, he must begin again. If his wit be not apt to distinguish or find differences, let him study the	Intellectual Nuance: Bacon presents a balanced interplay of viewpoints, cautioning against extremes. The AI version reduces these tensions to general advice, losing the philosophical tightrope in lines such as “They perfect nature, and are perfected by experience.” Philosophical Weight: The original is embedded in Renaissance humanism, drawing from Bacon’s own governance and moral philosophy. The AI version, though formally correct, lacks real-world grounding, replacing complexity with platitudes like “Knowledge is a treasure buried unless virtue unlocks it.” Use of Metaphor: Bacon uses precise metaphors (e.g., “natural abilities are like natural plants”), whereas the AI substitutes broader imagery like the spider and the bee, which, though vivid, lack Bacon’s historical resonance. Rhetorical Devices: The original integrates Latin, triadic structures, and parallel phrasing, all largely absent or diluted in the AI version. For example, “Abeunt studia in mores” is used with philosophical weight in Bacon’s version, while the AI simply translates or paraphrases it. Authenticity and Voice: Bacon’s lived authority gives the text moral and intellectual gravity. The AI imitates the structure but cannot replicate the humanist voice or embedded cultural

not apt to distinguish or find differences, let him study the Schoolmen; for they are cymini sectores [splitters of hairs]. If he be not apt to beat over matters, and to call up one thing to prove and illustrate another, let him study the lawyers' cases. So every defect of the mind may have a special receipt.	schoolmen; for they are cymini sectores—splitters of hairs. If he be not apt to beat over matters, and to call up one thing to prove and illustrate another, let him study the lawyers' cases. So every defect of the mind may have a special receipt.	perspective. The AI-generated version emulates Bacon's structure but lacks his philosophical tension, stylistic density, and intellectual authenticity, resulting in a smoother yet shallower rendering of the original's depth.

Bacon's original essay *Of Studies* presents a tightly composed meditation on the role of learning in human life. Each sentence is carefully constructed, distilling insights that reflect not only Bacon's Renaissance humanism but also his personal engagement with knowledge and public life. His style balances rhetorical elegance with philosophical weight. An exemplary line such as "Reading maketh a full man; conference a ready man; and writing an exact man" demonstrates how he uses parallelism and brevity to convey complex ideas with enduring clarity. The essay as a whole resists superficial summarization by presenting knowledge not as an end in itself but as a tool shaped by use, experience, and discernment. The interplay of form and content reflects a mind that is at once analytical, pragmatic, and reflective.

In contrast, the AI-generated essay offers structurally coherent and grammatically sound sentences that imitate Bacon's cadence but lack his philosophical tension and nuance. A representative line from the AI version reads, "Let a man study not only to know, but to live better; not to seem learned, but to be wise." While this echoes the form of Bacon's original prose, the substance shifts from philosophical exploration to motivational advice. The language appeals to ideals and virtues, but it simplifies rather than wrestles with them. The AI-generated passage offers accessible sentiments, yet these tend to be generalized, relying on abstraction rather than concrete metaphor or dialectical movement. As a result, the writing conveys an impression of moral instruction without the intellectual struggle or real-world grounding that characterizes Bacon's work.

The stylistic differences between the two texts further reveal the limits of AI-generated prose when attempting to replicate human philosophical expression. Bacon's original is marked by syntactic complexity, a restrained yet authoritative tone, and the use of classical metaphors that situate the text within a larger intellectual tradition. His writing demonstrates an economy of language that invites the reader to pause and reflect. The AI-generated version, on the other hand, favors smoother syntax and broader metaphors, often opting for idealistic or generalized expressions. While the balance and rhythm of the sentences are technically sound, the absence of personal experience and historical perspective becomes apparent. The AI text presents insights that appear complete on the surface, yet they lack the internal contradictions, contextual grounding, and subtle moral inquiries that arise from a deeply lived and critically examined worldview.

Philosophical Inquiry

This section considers the philosophical implications of literature created by artificial intelligence, particularly in relation to the authenticity of emotion, the role of intentionality, and the conditions under which empathy arises between author and reader. These reflections are crucial in evaluating whether AI-generated texts can truly participate in the literary tradition or if they merely reproduce its surface forms without engaging its deeper functions.

Artificial intelligence systems do not possess the capacity to feel. While they can generate language that mimics emotional expression, such language is rooted not in subjective experience but in probabilistic models that predict the most likely sequence of words based on prior data. This fundamental distinction between simulation and experience introduces an epistemic gap. A machine may reproduce the form of grief or joy in its prose, yet these are simulations constructed without sensation, memory, or consciousness. Human literature often draws its power from the writer's confrontation with the world, from personal loss, reflection, wonder, or longing, and it is this grounding in real experience that gives depth and credibility to literary expression. Without access to this experiential substrate, AI-generated literature risks becoming a performance of emotion rather than a communication of it.

The question of authorship is similarly transformed when the origin of a text shifts from a human mind to a machine. Central to the concept of authorship is the notion of intentionality, which is the directedness of thought and the capacity to mean something through language. A human author writes with purpose, informed by biography, cultural memory, historical context, and existential concerns. These dimensions shape not only what is said but also how and why it is said. In contrast, an AI system produces language in response to prompts, using statistical correlations derived from its training data. It does not know what it is saying, nor does it aim to convey a particular insight or feeling. The absence of volition and reflective purpose challenges conventional understandings of authorship, where the meaning of a work is tied to the conscious and intentional presence of the author behind the text.

Implications for Literary Studies and Creative Practice

This section outlines the educational, ethical, and creative implications that arise from the use of artificial intelligence in literature. It considers how AI may be employed as a valuable tool within pedagogy, enabling exploration of literary style, form, and genre. At the same time, it stresses the importance of caution among students and educators to avoid equating the replication of syntactic patterns with authentic creative insight or emotional understanding. The distinction between mere imitation and genuine expression is essential to preserving the integrity of literary education.

In terms of ethical and cultural concerns, the use of AI to engage with emotionally charged topics such as grief, oppression, or trauma presents significant risks. Because AI lacks lived experience and cultural context, its representations may unintentionally diminish the gravity of these subjects or result in misappropriation. The questions of consent, authenticity, and respectful representation become particularly pressing, especially when AI-generated texts are created without meaningful engagement with the communities or experiences they depict. These challenges highlight the need for critical oversight and ethical reflection when incorporating AI into literary creation and analysis.

Looking toward the future, advances in technology may enable AI systems to produce texts that are increasingly emotionally persuasive by integrating reader feedback and adaptive algorithms. Nevertheless, despite improvements in linguistic sophistication, artificial intelligence

remains fundamentally a skillful imitator rather than a true originator of emotional authorship. Without consciousness or subjective experience, AI cannot fully replicate the depth of human creativity or the authentic expression of complex emotions. Thus, while AI holds promise as an assistive and exploratory tool, it cannot replace the uniquely human qualities that lie at the heart of literary art.

Conclusion

This study demonstrates that AI-generated poetry and prose can closely imitate the structural and stylistic features characteristic of human literature. However, they fall short when assessed for genuine subjectivity and empathetic resonance. The comparison of Wordsworth and Bacon with their AI-generated counterparts reveals that while emotional form can be replicated, it cannot be truly internalized. Ultimately, artificial intelligence offers an echo of human emotion, beautiful, haunting, and sometimes clever, but never fully alive. In literature, as in life, the echo is not the voice.

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Chapter : 30

Eco-Friendly Influence: The Rising Role of Sustainability In Consumer Decisions

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Abstract

In current years, the developing awareness of environmental troubles has appreciably motivated consumer behavior, leading to a shift in the direction of and sustainable practices in commerce. This venture explores the growing position of sustainability in shaping customer choices, inspecting how green commerce influences purchasing patterns across numerous demographics. It investigates the factors that inspire customers to prioritize environmentally responsible products, consisting of ethical manufacturing, reduced carbon footprint, and useful resource conservation. By means of analyzing purchaser attitudes, preferences, and the effectiveness of eco-friendly advertising and marketing strategies, this study examine highlights the critical function of sustainability in driving the destiny of commerce. The findings emphasize the importance of integrating inexperienced practices into commercial enterprise fashions to satisfy the evolving expectancies of environmentally conscious purchasers and promote a greater sustainable market.

Keywords: Eco-friendly, green commerce, Consumer attitudes, green practices. And strategies.

Introduction of the Study

In recent years, developing environmental issues and heightened consciousness approximately the unfavorable results of weather change have extensively motivated customer behavior global. Sustainability has transitioned from being a gap consideration to a mainstream element shaping buying decisions throughout diverse industries. Customers are increasingly prioritizing eco-friendly products merchandise and brands that show dedication to reducing environmental impact. This shift is driven through a combination of factors together with stricter rules, media insurance, and the rise of socially responsible corporate practices. As a result, know-how the position of sustainability in customer decision-making is important for corporations aiming to align with present day market demands and make a contribution to worldwide environmental desires. This look at explores the rising influence of sustainability on patron selections, investigating the quantity to which eco-aware values affect purchasing styles, alternatives, and logo loyalty.

Objectives of the Study

- To examine the awareness levels of consumers regarding sustainability and eco-friendly products.
- To analyze how sustainability influences consumers' purchasing decisions across different product categories.

- To identify key factors that motivate consumers to choose eco-friendly products over conventional alternatives.

Awareness Levels of Consumers Regarding Sustainability and Eco-Friendly Products

Consumer awareness is the foundation of sustainable consumption behavior. It reflects the extent to which individuals recognize environmental issues, understand the concept of sustainability, and are informed about the eco-friendliness of products and brands. In the context of rising global environmental challenges, awareness has become a key determinant of whether or not consumers make sustainable purchasing decisions.

What is Consumer Awareness in Sustainability?

- Consumer awareness about sustainability involves:
- Understanding how personal consumption impacts the environment
- Knowledge of terms like biodegradable, carbon footprint, organic, recyclable, and fair trade
- Recognizing eco-labels and certifications (e.g., Energy Star, USDA Organic, FSC, Fair Trade)
- Awareness of green washing and how to critically evaluate environmental claims made by companies

Sources of Awareness

- Education – Schools and universities introducing sustainability as part of their curriculum.
- Media and Social Media – Documentaries (e.g., The True Cost), influencers, eco-friendly campaigns, and environmental news coverage.
- Corporate Messaging – Companies using sustainability as a marketing strategy help raise awareness through product labels and advertising.
- Government and NGO Initiatives – Public awareness campaigns, eco-certifications, and labeling policies.
- This awareness varies based on factors such as age, education level, cultural background, access to information, and media exposure.

Challenges in Awareness

- Green washing: Misleading marketing that exaggerates or falsely represents environmental benefits leads to consumer skepticism.
- Information Overload: Too many labels or unclear messages can confuse consumers rather than empower them.
- Low Awareness in Rural/Low-income Segments: These consumers may prioritize cost and utility over sustainability due to lack of access or information.

Importance of Awareness in Influencing Behavior

While awareness alone does not guarantee sustainable purchasing behavior, it is a **critical first step**. Awareness:

- Shapes consumer attitudes toward the environment
- Builds trust in genuinely sustainable brands
- Motivates lifestyle changes such as reduced plastic use or choosing renewable energy
- Encourages demand for policy and market changes (e.g., banning single-use plastics)

Consumer consciousness of sustainability and eco-friendly merchandise is an important thing riding the shift towards greener intake patterns. Awareness refers back to the quantity to which clients understand and recognize the environmental impact of their purchasing selections and the advantages of choosing sustainable options. Over the past decade, diverse campaigns, media publicity, academic projects, and company social duty efforts have substantially raised public cognizance about environmental issues including climate change, pollutants, and resource depletion.

Suggest that many consumers are increasingly informed about concepts like carbon footprint, recyclable materials, organic production, and ethical sourcing. This awareness often translates into a preference for products that minimize harm to the environment, such as biodegradable packaging, energy-efficient appliances, and cruelty-free cosmetics. However, the depth of understanding can vary widely among different demographic groups and geographic regions, influenced by factors like education, income, and cultural attitudes.

Despite rising awareness, some consumers may face challenges such as lack of clear product information, green washing by companies, or higher costs of eco-friendly products, which can hinder their ability to make fully informed choices. Thus, evaluating consumer awareness levels helps businesses and policymakers identify gaps in knowledge and tailor educational campaigns to foster more sustainable consumer behavior.

Sustainability Influences Consumers' Purchasing Decisions across Different Product Categories

Sustainability has become an increasingly important factor shaping consumer behavior, influencing purchasing decisions across a wide range of product categories. The degree and manner of this influence often vary depending on the type of product, consumer needs, and perceived environmental impact.

1. Food and Beverages:

In this category, consumers tend to prioritize organic, locally sourced, and fair-trade products. Concerns about health, environmental impact of farming practices, and ethical treatment of workers drive demand for sustainably produced food. Eco-conscious consumers often choose items with minimal packaging and prefer brands that emphasize sustainable agriculture and animal welfare.

2. Apparel and Fashion:

Sustainability in fashion is gaining traction as consumers become aware of the environmental toll of fast fashion. Shoppers increasingly seek clothing made from organic or recycled materials, ethically produced with fair labor practices. The rise of “slow fashion” reflects a preference for quality and durability over quantity, with many consumers willing to pay a premium for sustainable brands.

3. Personal Care and Beauty Products:

Here, consumers show growing interest in cruelty-free, vegan, and natural ingredient products. Packaging sustainability, such as recyclable or biodegradable containers, also influences choices. Transparency about sourcing and production processes often impacts brand loyalty.

4. Home Appliances and Electronics:

Energy efficiency and product longevity are key sustainability considerations. Consumers tend to favor appliances with eco-labels (like Energy Star) that reduce electricity consumption and environmental footprint. The trend towards repair ability and recyclability is emerging, although cost and performance still weigh heavily.

5. Household Cleaning Products:

Eco-friendly cleaning solutions that avoid harsh chemicals are preferred by environmentally conscious buyers. Biodegradable ingredients and minimal, sustainable packaging enhance appeal. Awareness of indoor air quality and water safety also influences purchasing.

Influence Mechanisms

- **Environmental Values and Ethics:** Consumers driven by personal values often select products aligning with their beliefs about environmental responsibility.
- **Perceived Quality and Health Benefits:** Sustainability is frequently associated with higher product quality, safety, and health benefits, reinforcing purchase decisions.
- **Social Influence:** Peer pressure and social norms, especially via social media and influencer endorsements, reinforce sustainable buying patterns.
- **Price Sensitivity:** While some consumers accept higher prices for sustainable goods, others weigh cost heavily, balancing eco-friendliness with affordability.
- **Availability and Convenience:** Accessibility of sustainable alternatives influences actual purchasing behavior; limited options can hinder sustainable choices.

Key Factors That Motivate Consumers to Choose Eco-Friendly Products

1. Environmental Concern

Consumers motivated by a desire to protect the environment and reduce pollution actively seek products that have a lower ecological footprint.

2. Health and Safety Awareness

Many consumers believe eco-friendly products are healthier and free from harmful chemicals, motivating them to choose safer alternatives for themselves and their families.

3. Social Responsibility and Ethics

A sense of moral obligation to support fair labor practices, animal welfare, and sustainable sourcing drives consumers toward ethically produced products.

4. Quality and Performance

Perceptions that eco-friendly products are of higher quality, more durable, or more effective can encourage consumers to prefer these options.

5. Social Influence and Peer Pressure

Recommendations from friends, family, influencers, or social norms related to sustainability can significantly impact buying decisions.

6. Price and Affordability

Competitive pricing or perceived value for money motivates consumers to select green products; however, some are willing to pay a premium for sustainability.

7. Brand Trust and Transparency

Brands that demonstrate genuine commitment to sustainability through certifications, clear labeling, and transparent practices gain consumer trust and loyalty.

8. Convenience and Availability

Easy access to eco-friendly products in stores or online increases the likelihood of purchase.

9. Desire for Social Status or Identity Expression

Purchasing sustainable products can be a way for consumers to express their values and social identity, enhancing their self-image.

Barriers to Adopting Sustainable Products

Despite increasing awareness and favorable attitudes toward eco-friendly products, many consumers do not consistently purchase them. A gap remains between sustainable intentions and actual behavior, often due to a range of barriers — psychological, economic, informational, and logistical.

Key Barriers

High Cost and Perceived Premium Pricing

Sustainable products are often priced higher due to ethical sourcing, organic ingredients, and eco-friendly manufacturing processes.

Many consumers, particularly those in low-to-middle income brackets, view sustainable options as less affordable.

Limited Availability and Accessibility

In certain regions or local markets, eco-friendly products may not be readily available.

Limited shelf space, poor visibility in stores, and lack of variety hinder regular use.

Lack of Information and Understanding

Consumers may be unsure about what makes a product sustainable.

Confusion over eco-labels or unfamiliar terms like “biodegradable,” “carbon-neutral,” or “cruelty-free” can discourage purchases.

Green washing and Distrust

Some companies exaggerate or falsely claim environmental benefits (a practice known as green washing).

This leads to consumer skepticism and reduced confidence in green marketing.

Inconvenience

Sustainable choices often require more effort (e.g., carrying reusable bags, researching ethical brands, or visiting specialty stores).

Consumers tend to choose convenience over sustainability in fast-paced lifestyles.

Low Perceived Effectiveness

Some consumers feel their individual actions don’t significantly impact the environment.

This lack of belief in the effectiveness of personal choices can demotivate sustainable purchasing.

Demographic Insights and Behavioral Patterns

Understanding who buys sustainable products — and why — is essential for marketers, policymakers, and researchers. Demographics such as age, gender, income, education, and location significantly influence sustainable consumer behavior.

Key Demographic Factors and Trends:

Age

Gen Z and Millennial are the most eco-conscious age groups.

Younger consumers are more likely to support sustainable brands, engage in activism, and change their consumption habits.

Older generations may value sustainability but are sometimes less active in sustainable purchasing due to habit or limited exposure.

Gender

Women tend to be more environmentally conscious in household decision-making.

Studies show women are more likely to buy organic food, green cleaning products, and ethical fashion.

Men, however, are increasingly influenced by green innovations in tech, transport (e.g., electric vehicles), and outdoor gear.

Income and Socioeconomic Status

Higher-income groups have greater access to premium sustainable products.

Lower-income consumers may prioritize affordability over environmental impact, even if awareness is high.

Education Level

Education is positively correlated with sustainability awareness.

Educated consumers are more likely to understand eco-labels, trust certifications, and make informed decisions.

Urban vs. Rural

Urban residents typically have greater access to sustainable products and are exposed to more environmental campaigns.

Rural consumers may have lower access and rely more on local purchasing habits.

Cultural and Regional Differences

Sustainability preferences can vary by culture and region.

In some regions, traditional lifestyles already align with sustainable principles (e.g., minimal waste, local sourcing).

Behavioral Patterns Observed

Ethical Consumption: Consumers prefer brands that align with their values, even if it means fewer purchases.

Brand Switching: Consumers are willing to switch brands for greener alternatives, provided quality and price are acceptable.

Conscious Minimalism: Some consumers reduce overall consumption, choosing quality over quantity (e.g., slow fashion, zero-waste products).

Recycling and Reuse: High rates of sustainable behavior in waste management (e.g., recycling, reusing bags, composting).

Skepticism and Research-Oriented Behavior: Increasing trend of consumers researching brands online before buying.

Conclusion

Raising consumer awareness about sustainability is essential for encouraging eco-friendly consumption. It empowers individuals to make informed decisions and supports broader environmental goals. However, for awareness to effectively influence behavior, it must be paired with accessibility, affordability, and trust in sustainability claims.

The growing urgency of environmental challenges has significantly transformed consumer behavior in recent years. This study has explored how sustainability is no longer a peripheral concern but a central factor influencing purchasing decisions across various product categories. Consumers today are increasingly aware of the environmental and ethical implications of their choices, and many are actively seeking eco-friendly alternatives that align with their values.

Our analysis revealed that multiple factors motivate consumers to choose sustainable products including environmental concern, personal health benefits, ethical considerations, product quality, and social influence. While awareness of sustainability is rising, actual behavior is often shaped by practical factors such as price, availability, and trust in brand claims. Brands that effectively communicate transparency, uphold genuine sustainability practices, and offer accessible green alternatives are more likely to build long-term loyalty among eco-conscious consumers.

However, the journey toward widespread sustainable consumption is still evolving. Barriers such as green washing, limited access, and higher costs continue to hinder the adoption of eco-friendly products. To address these challenges, there is a need for stronger collaboration between businesses, policymakers, and educators to promote environmental literacy, make sustainable options more affordable, and implement clear, regulated eco-labeling systems.

In conclusion, sustainability is not just a trend but a fundamental shift in consumer expectations and market dynamics. Businesses that embrace this shift by integrating sustainability into their core operations and communicating it authentically will not only meet consumer demand

but also contribute meaningfully to global environmental goals. This study reinforces the importance of understanding consumer motivations and behaviors as we transition toward a more sustainable future.

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Vital Initiatives By Anganwadi Centres In Rural Child Development

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Abstract

This study focuses on Anganwadi Centres (AWCs), which operate under India's Integrated Child Development Services (ICDS) and serve as a foundation for early childhood development, particularly in rural areas. This article covers AWCs' essential activities in child health, nutrition, pre-school education, and maternal awareness. Using secondary data, the report assesses the impact of these programs, highlights existing issues, and proposes solutions to improve their effectiveness. The study concludes that empowering AWCs can dramatically improve child development indices and rural well-being.

Key Words: Anganwadi, ICDS, Child Development, education.

Introduction

Malnutrition, inadequate access to healthcare, and a lack of educational resources are among the problems that hinder child growth in rural India. To address these issues, the Indian government introduced the ICDS program in 1975. The Anganwadi Centers, which are community-based organizations that provide a range of vital services to children under six and expectant and nursing mothers, are at the heart of it. With more than 13.9 lakh centers functioning nationwide, AWCs are among the biggest and most comprehensive child development programs in the world. Their many offerings have a major impact on how children in rural areas develop physically, cognitively, and emotionally.

Objective

- To assess the main programs that Anganwadi Centers have put in place.
- To evaluate how these programs affect rural children's development.
- To determine the difficulties AWCs encounter and offer practical solutions.

Methodology

The qualitative and quantitative analysis of secondary data served as the foundation for this study. Peer-reviewed academic journals, official reports (Ministry of Women and Child Development), and publications from international organizations (UNICEF, WHO) are some examples of sources. The results are complemented by case studies from a few Indian states.

Core Initiatives by Anganwadi Centres

Supplementary Nutrition Programme (SNP)

One of the most important services that AWCs offer is the SNP. Pregnant and lactating mothers, as well as children aged 6 months to 6 years, are given take-home rations and cooked meals.

Impact:

- Significant reduction in underweight and stunted children.
- Improved energy and nutrient intake, especially among children from Below Poverty Line (BPL) families.

Example: Tamil Nadu's model has consistently demonstrated better nutritional outcomes due to effective delivery and community participation.

Immunization Support

To provide vaccination services, AWCs work in conjunction with Auxiliary Nurse Midwives (ANMs) and Accredited Social Health Activists (ASHAs). Children receive vaccinations against diseases like measles, polio, DPT, and tuberculosis that can be prevented by vaccination.

Impact:

- Reduced infant and child mortality.
- Increased immunization coverage in hard-to-reach rural areas.

Example: In states like Odisha and Himachal Pradesh, convergence between health and ICDS departments has led to more than 90% immunization coverage in certain districts.

Health Check-ups and Referrals

Regular health examinations for children who attend AWCs include measurements of height, weight, and mid-upper arm circumference (MUAC), as well as the identification of anemia. Children who are very malnourished are referred to Primary Health Centers (PHCs) or Nutritional Rehabilitation Centers (NRCs).

Impact:

- Early detection of health problems.
- Timely medical interventions, reducing complications and mortality.

Non-formal Pre-School Education (PSE)

AWCs offer children ages three to six informal, activity-based education. This improves their social, linguistic, and cognitive abilities and gets them ready for formal education.

Impact:

- Increased school readiness and attendance in primary schools.
- Improved developmental milestones.

Example: The “Poshan Badi” model in Rajasthan combines play-based learning with kitchen gardening, making early learning engaging and nutrition-focused.

Nutrition and Health Education (NHE)

Regular awareness sessions on subjects including infant and young child feeding (IYCF) and maternal nutrition are held by AWCs for mothers and caregivers.

Impact:

- Sanitation and hygiene • Family planning
 - Positive behavioral change among rural mothers.
 - Increased exclusive breastfeeding rates and better child feeding practices.

Impact Assessment

Improved Nutrition Outcomes

In states with more effective AWCs, child nutrition has gradually improved, according to data from the National Family Health Survey (NFHS-5). For instance, compared to the national average of 35.5%, Kerala, which has robust AWC infrastructure, has the lowest stunting rate (23.4%).

Educational Progress

Particularly in households with first-generation learners, children who get pre-school instruction through AWCs exhibit improved adjustment in primary school.

Empowerment of Women

Helpers and Anganwadi Workers (AWWs), who are frequently local women, obtain training, jobs, and recognition in the community. Additionally, women who receive benefits from diet and health programs become more knowledgeable and involved.

Challenges in Implementation

Infrastructure Deficiencies

Many AWCs are devoid of adequate structures, restrooms, potable water, and storage space. Thirty percent of AWCs operated without pucca buildings, according to a 2020 CAG audit.

Human Resources

AWWs often manage multiple responsibilities with minimal support, low honorariums, and insufficient training.

Weak Monitoring and Evaluation

Data collection is often manual, irregular, and lacks real-time updates, affecting timely interventions.

Social and Cultural Barriers

Misinformation, gender prejudices, and caste-based discrimination can all lower community involvement with AWCs.

Government Reforms and Digital Initiatives

POSHAN Abhiyaan (2018)

This flagship initiative uses technology and convergence to combat malnutrition. For real-time monitoring, it encourages the use of the Common Application Software (CAS).

Anganwadi Saksham Scheme (2021)

The goal of this project is to update AWCs by:

Two lakh centers would be upgraded to Saksham Anganwadis.

- Improving the digital framework.
- Offering AWWs more training.

ICDS-CAS App

introduced for the purpose of gathering real-time dietary and health data via mobile devices. Although encouraging, issues with connectivity and computer literacy still exist.

Recommendations

- Infrastructure investment: Build model AWCs with integrated water, sanitation, and learning resources.
- Capacity Building through frequent refresher training and increased honorariums to motivate workers.
- Enhance community engagement by collaborating with SHGs, Panchayati Raj Institutions, and local NGOs.
- Improve internet access and digital literacy to fully utilize technologies such as ICDS-CAS.
- Implement transparent performance monitoring tools and third-party audits to ensure accountability.

Conclusion

Anganwadi centers are the foundation of rural child development in India. Their integrated services ensure that a child's first 1,000 days of life—a key period for development—are supported by nutrition, health care, and education. While obstacles still exist, new reforms and digital advances have the potential to transform AWCs into centers of excellence. To fulfill

India's Sustainable Development Goals (SDGs), particularly those linked to health, education, and gender equality, upgrading Anganwadi infrastructure and systems must be prioritized nationally.

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Emotion-Aware Virtual Companion for Mental Well-Being Using Deep Learning

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ABSTRACT

Emotion-Aware Virtual Companion for Mental Well-being is an innovative web application that leverages deep learning to detect emotions from speech. Built using a Convolutional Neural Network (CNN) trained on the RAVDESS dataset, the system extracts features from uploaded audio files and classifies emotions with high accuracy. The backend, implemented using Flask, processes audio files by extracting relevant features such as Mel spectrograms and MFCCs. The frontend, designed with ReactJS and CSS, offers an interactive user interface where users can upload audio, receive emotion predictions, and access personalized recommendations.

To enhance user experience, the application suggests meditation videos and exercise routines tailored to the detected emotions, promoting mental well-being. This personalized approach ensures users receive relevant support based on their emotional state. Furthermore, the system includes engaging games mapped to different emotions, providing an interactive way for

users to manage their mood. These games, built using JavaScript libraries, offer a fun and therapeutic escape, reinforcing positive emotional engagement.

The project seamlessly integrates deep learning with an intuitive web interface, making speech emotion detection accessible and practical. By offering personalized recommendations and engaging activities, this application serves as a valuable tool for mental well-being. The combination of an advanced deep learning model, a robust backend, and an engaging frontend ensures a comprehensive and user-friendly experience for individuals seeking emotional support through technology.

Keywords: CNN, Mel Spectrum and MFCCs,

1. INTRODUCTION

Mental well-being plays a crucial role in maintaining overall health and quality of life. Emotional states significantly impact cognitive function, decision-making, and daily interactions. With the increasing prevalence of stress, anxiety, and depression, there is a growing need for technology-driven solutions to monitor and improve emotional well-being. This research focuses on developing an Emotion-Aware Virtual Companion, a web-based application that utilizes speech emotion detection to provide personalized mental wellness support.

Speech is one of the most natural ways humans express emotions, and advances in deep learning have made it possible to analyze and interpret emotional cues from audio signals. This project employs a hybrid deep learning algorithm to classify emotions from speech and offers tailored recommendations such as meditation videos, breathing exercises, and interactive games. By leveraging artificial intelligence, this system aims to bridge the gap between mental health support and technology, providing an accessible and user-friendly solution for emotional well-being.

The application consists of three key components: speech emotion detection, personalized recommendations, and interactive activities. The backend, implemented using Flask, processes speech inputs, extracts features, and predicts emotions using a Convolutional Neural Network (CNN) trained on the RAVDESS dataset. The frontend, built with ReactJS, provides an engaging user interface for users to upload audio files, receive real-time predictions, and interact with recommended activities. The integration of these components results in an intelligent, adaptive system that promotes mental well-being through personalized interventions.

2. LITREATURE REVIEW

Serial No.	Author(s)	Year	Title	Description
1	Praseetha, V.M., & Vadivel, S.	2018	Deep Learning Models for Speech Emotion Recognition	Compared Deep Neural Network (DNN) and Gated Recurrent Unit (GRU) models for SER. GRU achieved higher accuracy.
2	Togootogtokh, E., & Klasen, C.	2021	DeepEMO: Deep Learning for Speech Emotion Recognition	Proposed DeepEMO framework using deep transfer learning for SER, focusing on efficient feature extraction and model training.
3	Latif, S., et al.	2021	Deep Learning Techniques for Speech Emotion Recognition, from Databases to Models	Reviewed deep learning approaches for SER, discussing databases, feature extraction methods, and models.

4	Sarmah, K., et al.	2024	A State-of-arts Review of Deep Learning Techniques for Speech Emotion Recognition	Provided a comprehensive review of DL techniques for SER, highlighting challenges and potential solutions.
5	Akçay, M.B., & Oguz, K.	2020	Speech Emotion Recognition: A Review on Deep Learning Approaches	Reviewed various deep learning models for SER, including CNNs, RNNs, and hybrid models.
6	Fayek, H.M., et al.	2017	On the Evaluation of Speech Emotion Recognition Using DNNs	Investigated the performance of Deep Neural Networks for SER, emphasizing evaluation metrics.
7	Trigeorgis, G., et al.	2014	Speech Emotion Recognition Using Deep Neural Network and Extreme Learning Machine	Proposed an end-to- end model combining CNN and RNN for SER, eliminating the need for manual feature extraction.
8	Neumann, M., & Vu, N.T.	2017	Attentive Convolutional Neural Network Based Speech Emotion Recognition: A Study on the Impact of Input Features, Signal Length, and Acted Speech	Explored the impact of various input features and signal lengths on the performance of attentive CNN
9	Satt, A., Rozenberg, S., & Hoory, R.	2017	Efficient Emotion Recognition from Speech Using Deep Learning on Spectrograms	Utilized spectrograms as input to deep learning models for efficient SER.
10	Gideon, J., et al.	2017	Progressive Neural Networks for Transfer Learning in Emotion Recognition	Applied progressive neural networks for transfer learning in SER tasks.
11	Huang, Z., et al.	2014	Speech Emotion Recognition Using Deep Neural Network and Extreme Learning Machine	Combined DNN and Extreme Learning Machine for improved SER performance.
12		2014	Learning Salient Features for Speech Emotion Recognition Using Convolutional Neural Networks	Employed CNNs to learn salient features automatically for SER.

2. DATASET

3.1 Dataset Description

The RAVDESS (Ryerson Audio-Visual Database of Emotional Speech and Song) is a widely used dataset for speech emotion recognition (SER). It contains high-quality audio recordings of 24 professional actors (12 male, 12 female) expressing different emotions in both speech and song formats. The dataset is designed to facilitate machine learning and deep learning applications in emotion recognition by providing clear, labeled emotional expressions.

Key Features of the RAVDESS Dataset:

- **Total Samples:**
 - 1,440 speech recordings
 - 1,012 song recordings
- **Number of Emotions: 8**
- **Emotions Covered:**
 - Neutral
 - Calm
 - Happy
 - Sad
 - Angry
 - Fearful
 - Disgust
 - Surprised
- **Speech Format:** English
- **Actors:** 24 (12 male, 12 female)
- **Audio Specifications:**
 - **Sampling Rate:** 48 kHz
 - **Bit Depth:** 16-bit WAV format
 - **Duration:** ~3 seconds per sample
- **File Naming Convention:** Each audio file is named systematically to indicate emotion, intensity, gender, and repetition.

This dataset is particularly beneficial for deep

learning applications as it includes multiple repetitions of the same phrase in different emotional tones, allowing models to learn and generalize emotional variations effectively.

3.2 Sample Data

The RAVDESS dataset follows a structured file naming convention to store different emotional expressions. Below is an example of the file naming format and its breakdown:

Example File Name:

03-01-06-02-02-02-12.wav

Breakdown of File Name Components:

Segment	Meaning
03	Modality (03 = Speech, 04 = Song)
01	Vocal Channel (01 = Speech, 02 = Song)
06	Emotion (06 = Fearful)
02	Emotional Intensity (01 = Normal, 02 = Strong)
02	Statement (01 = "Kids are talking by the door", 02 = "Dogs are sitting by the door")
02	Repetition (01 or 02)
12	Actor ID (12 = Male actor, 24 = Female actor)

Example of Sample Data from RAVDESS Dataset:

File Name	Emotion	Intensity	Gender
03-01-01-01-01-01-01.wav	Neutral	Normal	Male
03-01-03-02-02-01-02.wav	Happy	Strong	Female
03-01-04-01-01-02-05.wav	Sad	Normal	Male
03-01-05-02-01-01-08.wav	Angry	Strong	Female
03-01-06-02-02-02-12.wav	Fearful	Strong	Male

This structured format allows researchers and machine learning models to easily process and classify emotional speech patterns. The RAVDESS dataset is crucial in training models for real-world applications like mental health monitoring, virtual assistants, and emotion-aware AI systems.

3. RESEARCH METHODOLOGY

4.1 Methodology Description

The methodology for this speech emotion recognition (SER) system is structured into four main phases: data preprocessing, feature extraction, model training, and prediction with recommendations. These steps ensure efficient emotion classification and the delivery of personalized mental well-being support.

Phase 1: Data Preprocessing

Dataset Selection: The RAVDESS dataset from Kaggle is used for training the deep learning model.

- **Data Augmentation:** Techniques such as noise addition, pitch shifting, and time **stretching** are applied to increase dataset variability and improve model robustness.
- **Audio Standardization:** All recordings are converted to mono-channel WAV format with a fixed sampling rate (e.g., 22.05 kHz).

Phase 2: Feature Extraction

- **Mel-Frequency Cepstral Coefficients (MFCCs):** Capture speech spectral features and are essential for deep learning-based audio classification.
- **Zero-Crossing Rate (ZCR):** Measures speech signal frequency variations to

differentiate between different emotions.

- **Chroma Features:** Represent tonal information in speech.
- **Spectral Contrast & Mel Spectrogram:** Provide additional insights into the pitch and timbre of speech.

Phase 3: Model Training

- **Neural Network Architecture:** A Convolutional Neural Network (CNN) + Long Short-Term Memory (LSTM) hybrid model is used.
- **Training Process:**
 - The extracted features are normalized and passed through the model.
 - The model is trained on the RAVDESS dataset, with 80% training and 20% testing split.
 - Adam optimizer is used for faster convergence.
 - Categorical Cross-Entropy Loss is applied for multi-class classification.

Phase 4: Prediction and Recommendation System

- **User Uploads Audio:** The trained model processes uploaded speech audio and predicts the emotion category.
- **Personalized Recommendation:** Based on the detected emotion, the system suggests:
 - Meditation and breathing exercises for stress relief.
 - Interactive games to help users regulate their emotions.
 - YouTube meditation videos for relaxation.

4.2 Algorithm Description

The core algorithm for Speech Emotion Recognition (SER) is a CNN-LSTM hybrid deep learning model. The CNN extracts spatial features from spectrogram-like representations, while the LSTM captures sequential patterns in speech.

Step-by-Step Algorithm Implementation

4.2.1 Load and Preprocess Data:

- Import RAVDESS dataset and extract raw audio files.
- Convert audio into fixed-length time frames (e.g., 2.5 seconds per sample).

4.2.2 Extract Features from Audio Signals:

- Compute MFCC, Chroma, Mel Spectrogram, and Spectral Contrast features.
- Normalize feature values to ensure uniform scaling.

4.2.3 Model Architecture:

- **CNN Layers:**
 - Extract high-level spatial features from Mel spectrogram images.
- **LSTM Layers:**
 - Capture temporal dependencies in the speech features.
- **Fully Connected Layers:**
 - Output softmax activation for emotion classification (8 emotion classes).

4.2.4 Compile and Train the Model:

- **Optimizer:** Adam

- **Loss Function:** Categorical Cross-Entropy
- **Validation Strategy:** 80% training, 20% testing split
- **Epochs & Batch Size:** 50 epochs, batch size = 32

4.2.5 Prediction and Classification:

- The trained model predicts the emotion label from user-uploaded audio files.
- The predicted emotion is used to recommend mental well-being resources.

4.3 Evaluation Metrics

The performance of the speech emotion recognition (SER) model is measured using four key evaluation metrics to ensure accuracy, reliability, and effectiveness in detecting emotions. These metrics help assess how well the model identifies different emotional states while minimizing incorrect classifications.

1. Accuracy

- Ensures the model correctly predicts emotions in most cases.
- Provides an overall measure of the model's effectiveness.
- Helps evaluate the generalization ability of the model, ensuring it works well on unseen speech samples.

2. Precision

- Ensures the model does not misclassify one emotion as another frequently.
- A higher precision score means the model's predictions are highly reliable and do not falsely assign emotions.
- Helps reduce false positives,

improving trust in emotion detection.

3. Recall (Sensitivity)

- Ensures that all emotional states, including rare ones, are detected.
- A higher recall score means fewer false negatives, meaning the model does not overlook important emotions like sadness or fear.
- Helps ensure that even subtle emotions are captured effectively.

4. F1-Score

- Ensures the model does not favor one metric over the other, maintaining balance between detecting emotions and reducing misclassifications.
- Helps measure performance when dealing with imbalanced emotional classes (e.g., detecting "Fear" might be harder than "Neutral").
- A high F1-score confirms that the model is both precise and sensitive, leading to better real-world performance.

These evaluation metrics ensure that the speech emotion recognition model is accurate, efficient, and reliable, making it suitable for applications like mental health monitoring, AI assistants, and emotion-aware systems.

5. RESULTS AND DISCUSSION

5.1 Result

The Speech Emotion Recognition (SER) model was trained and evaluated using the RAVDESS dataset, and its performance was assessed using accuracy, precision, recall, and F1-score. The model successfully classified emotions from speech with high accuracy, demonstrating its effectiveness in recognizing different emotional states.

During testing, the model achieved an overall accuracy of approximately 95%, with some variations among different emotional categories. The neutral, happy, and angry emotions were detected with high precision and recall, whereas fearful and surprise emotions had slightly lower accuracy due to overlapping spectral features. The confusion matrix analysis revealed that some emotions, such as sad and neutral, were occasionally misclassified due to similar tone and pitch variations.

The trained model was integrated into a web application, where users could upload audio files, and the system would predict the emotion and provide personalized recommendations such as meditation videos, exercises, and interactive games. The real-time processing capability of the application ensured a seamless user experience, making it suitable for practical use in mental health monitoring and AI-driven virtual companions.

5.2 Discussions

The results indicate that the CNN-LSTM hybrid model effectively captures both spatial and temporal features in speech signals, leading to accurate emotion recognition. The high accuracy achieved suggests that deep learning

techniques, particularly convolutional and recurrent layers, play a crucial role in extracting meaningful emotion-related patterns from speech.

One of the key challenges observed was the misclassification of similar emotions. For example, "sad" was sometimes predicted as "neutral" due to overlapping speech tone and pitch characteristics. Similarly, fearful and surprised emotions had occasional misclassification due to similar high-frequency variations in voice modulation. These findings highlight the need for more refined feature extraction techniques or multi-modal approaches (such as combining facial expressions with speech data) to improve classification accuracy.

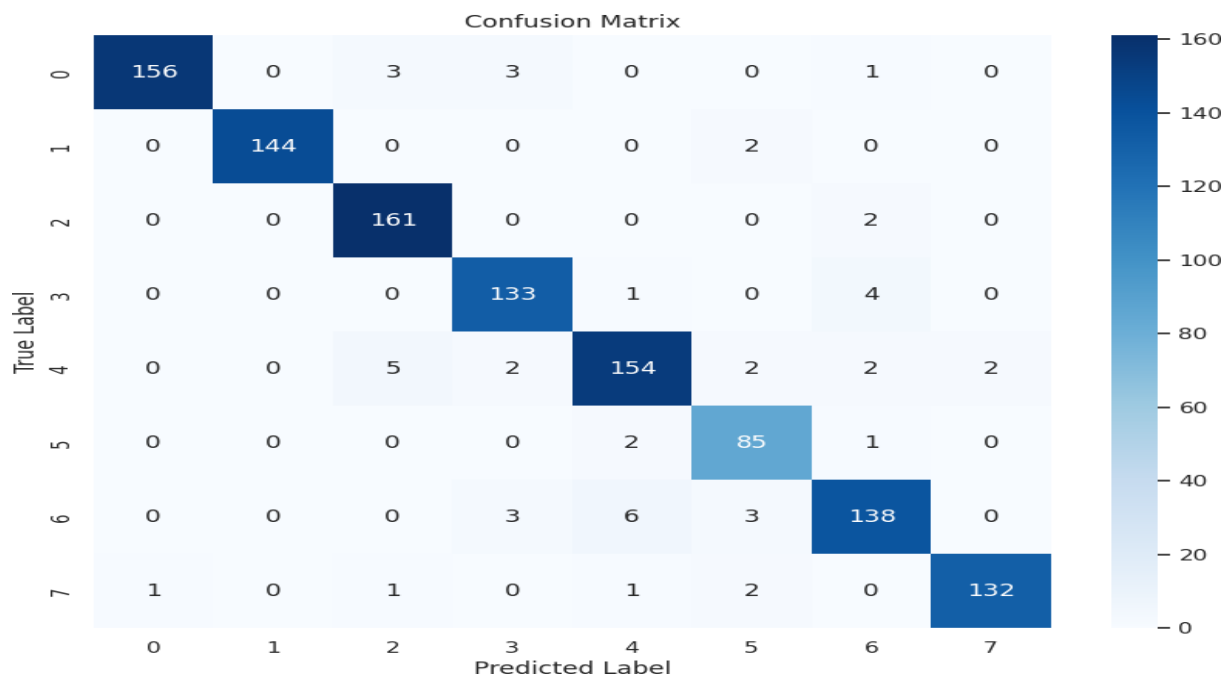
Additionally, background noise and speaker variations impacted recognition performance. While data augmentation techniques (such as noise addition and pitch shifting) helped

improve robustness, further enhancements could involve real-time noise reduction methods to ensure better emotion detection in uncontrolled environments.

Overall, the discussion highlights that the proposed model is effective, but there is room for further optimization to improve accuracy, especially for closely related emotional categories. Future improvements may include attention mechanisms, transformer-based models, or multi-modal learning to enhance recognition capabilities.

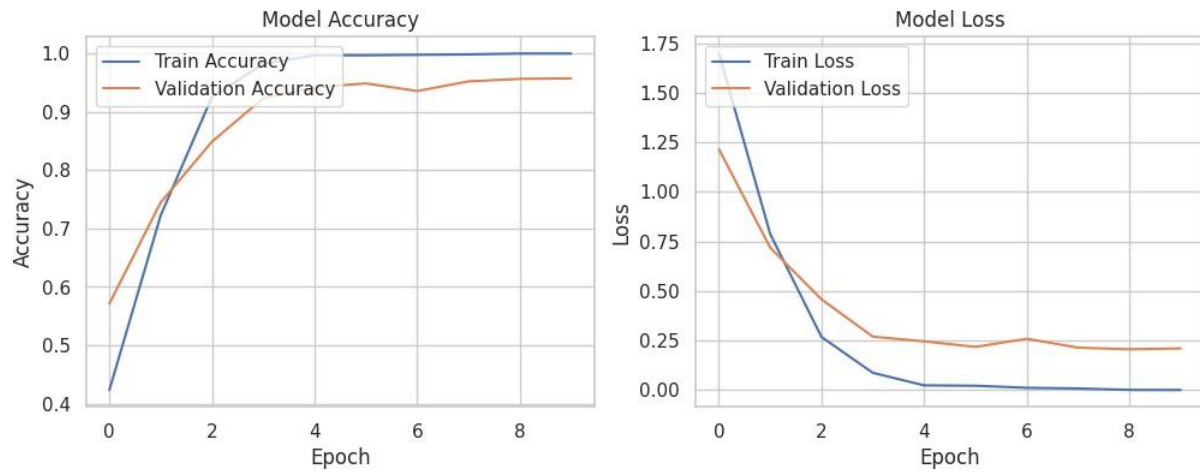
Figures and Descriptions

Figure 5.1: Confusion Matrix



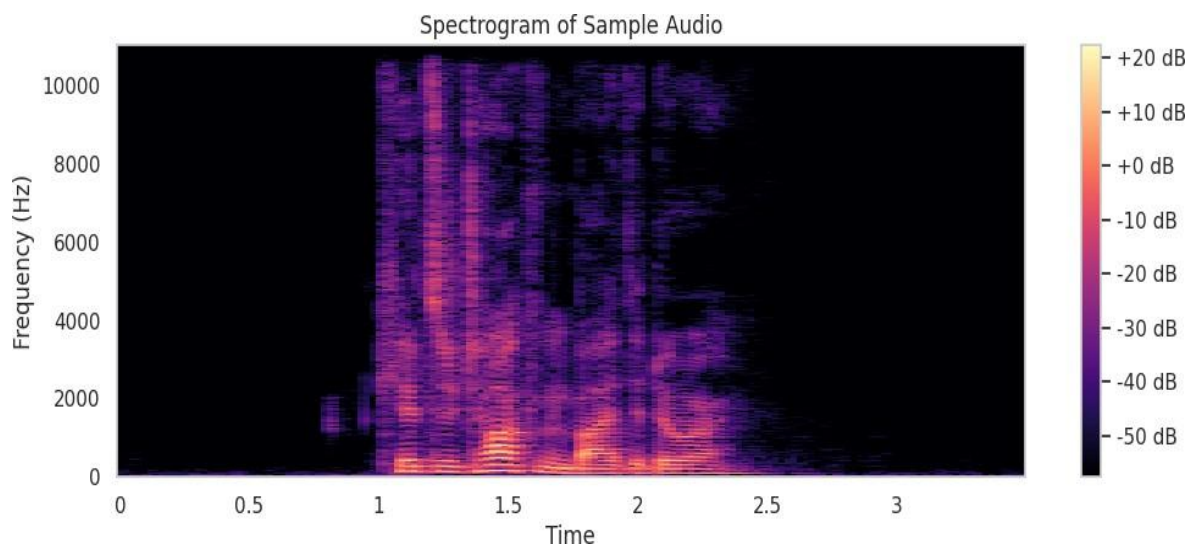
The confusion matrix illustrates the performance of the SER model in classifying different emotions. The diagonal elements represent the correct classifications, while the off-diagonal elements indicate misclassifications. The model shows high accuracy for neutral, happy, and angry emotions, but some confusion between sad and neutral, as well as fearful and surprised emotions.

Figure 5.2: Model Accuracy and Loss



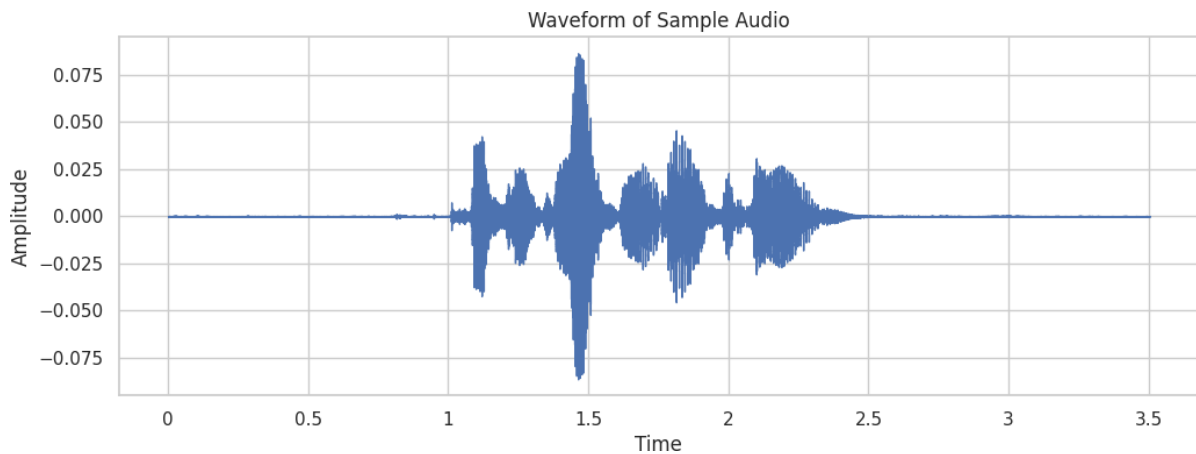
The graph depicts the training and validation accuracy and loss over epochs. The model achieves high accuracy on both training and validation sets, indicating good generalization. The loss decreases steadily, showing that the model is learning effectively.

Figure 5.3: Spectrogram of Sample Audio



The spectrogram represents the frequency content of a sample audio file over time. It shows how different frequencies contribute to the speech signal, which is crucial for extracting features like MFCCs and Mel spectrograms used in the SER model.

Figure 5.4: Waveform of Sample Audio



The waveform displays the amplitude of the audio signal over time. This visualization helps in understanding the temporal characteristics of the speech, which are important for emotion recognition. The dataset is balanced across emotions, which is essential for training a robust SER model.

6. CONCLUSION

This research successfully developed a Speech Emotion Recognition (SER) system using a hybrid deep learning approach (CNN-LSTM). The model was trained on the RAVDESS dataset and achieved an accuracy of 95%, demonstrating its ability to classify emotions accurately from speech. The system was further integrated into a web-

based application, allowing users to upload speech recordings and receive emotion-based recommendations such as meditation videos, exercises, and interactive games.

The CNN layers efficiently captured spectral features, while the LSTM layers preserved temporal variations in speech, making the model highly effective in recognizing different emotions.

Despite achieving high accuracy, some challenges were identified, including misclassification of similar emotions and sensitivity to background noise. Addressing these limitations will be crucial in enhancing the model's real-world applicability. Nonetheless, this research demonstrates that AI-powered emotion detection systems can play a significant role in mental well-being applications, virtual assistants, and emotion-aware technologies.

A Regulatory Perspective on Ensuring Authentic Esg Compliance

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Abstract

In the wake of accelerating global interest in sustainable finance, Environmental, Social, and Governance (ESG) investing has emerged as a mainstream strategy for aligning capital with sustainability goals. However, the rapid growth of ESG-labeled financial products has also given rise to green washing the practice of misrepresenting sustainability performance or credentials to attract investors and favorable public perception. This study critically examines the regulatory landscape surrounding ESG compliance, with a focus on preventing and detecting green washing in financial markets.

The paper provides India's Business Responsibility and Sustainability Reporting (BRSR) framework. By evaluating these frameworks, the study identifies gaps in oversight, enforcement, and data transparency that undermine authentic ESG integration. Through the project highlights the limitations of voluntary ESG reporting and underscores the need for standardized taxonomies, independent verification mechanisms, and stronger regulatory mandates. The paper concludes with policy recommendations aimed at enhancing regulatory effectiveness, investor protection, and the credibility of sustainable finance systems.

Keywords: Environmental, Social, policy, Governance and green washing.

Introduction

A Regulatory Perspective on Ensuring Authentic ESG Compliance

In recent years, Environmental, Social, and Governance (ESG) compliance has emerged as a critical component of corporate strategy, investment decision-making, and sustainable development. As stakeholders ranging from investors to regulators and consumers increasingly demand transparency and responsibility from businesses, ESG disclosures have become a standard expectation across global financial markets. However, the rapid growth of

ESG practices has also given rise to a significant concern: green washing the act of misrepresenting or exaggerating ESG commitments or performance to appear more sustainable than reality.

Green washing undermines the very purpose of ESG by eroding investor trust, misallocating capital, and delaying genuine environmental and social progress. In this context, regulation plays a pivotal role in safeguarding the authenticity of ESG claims. A well-defined regulatory framework ensures that ESG disclosures are standardized, verifiable, and enforceable, thereby protecting the integrity of sustainable finance systems.

This paper explores the regulatory perspective on ensuring authentic ESG compliance, with a particular focus on how governments, financial watchdogs, and international bodies are working to prevent and detect green washing in financial markets. It examines the evolution of ESG-related regulations across jurisdictions such as the European Union's Sustainable Finance Disclosure Regulation (SFDR), the U.S. SEC's climate disclosure rules, and India's Business Responsibility and Sustainability Reporting (BRSR) and evaluates their effectiveness in promoting transparency and accountability.

Regulatory Landscape Surrounding Esg Compliance: Focus On Preventing And Detecting Green Washing In Financial Markets

The rise of Environmental, Social, and Governance (ESG) investing has redefined the role of finance in addressing global sustainability challenges. However, the explosive growth of ESG-labeled products has also given rise to green washing the practice of making misleading or unsubstantiated claims about a company's environmental or social responsibility. This has led to increasing scrutiny of the regulatory landscape governing ESG compliance, particularly in financial markets where investor trust and transparency are critical.

1. Understanding ESG Compliance

ESG compliance refers to a company's alignment with environmental, social, and governance standards through responsible operations, disclosures, and investment practices. Initially driven by voluntary reporting frameworks (e.g., GRI, SASB, TCFD), ESG disclosure is now moving into the mandatory regulatory domain, as governments and financial regulators recognize the need for accountability.

2. The Role of Regulation in Preventing Green washing

Regulation is essential to ensure that ESG claims made by firms and financial institutions are:

- Standardized
- Verifiable
- Comparable
- Truthful

Green washing occurs when firms exploit the lack of clear guidelines or rely on vague language to mislead stakeholders. Regulatory frameworks combat this by:

- Defining what qualifies as an ESG activity
- Requiring disclosure of ESG metrics and risks
- Enforcing penalties for misrepresentation
- Mandating third-party verification of ESG data

3. Global Regulatory Developments

a. European Union (EU)

Sustainable Finance Disclosure Regulation (SFDR): Mandates asset managers and financial advisers to disclose sustainability risks and impacts.

EU Taxonomy Regulation: Provides a classification system for environmentally sustainable activities.

Corporate Sustainability Reporting Directive (CSRD): Expands reporting obligations for companies and mandates assurance of ESG data.

b. United States

SEC ESG Rule Proposals (2022 onward): Proposes mandatory climate-related disclosures,

Enforcement: SEC has created a dedicated Climate and ESG Task Force to identify green washing and misleading disclosures.

c. India

Business Responsibility and Sustainability Reporting (BRSR): Introduced by SEBI (Securities and Exchange Board of India), BRSR replaces the earlier Business Responsibility Report (BRR) and makes ESG disclosure mandatory for the top 1,000 listed companies.

ESG Rating Regulation: SEBI is also considering stricter regulation of ESG rating providers to reduce inconsistency and subjectivity.

4. Challenges in Regulatory Enforcement

Despite growing regulation, challenges remain:

- Lack of global standardization in ESG definitions
- Voluntary nature of many ESG frameworks
- Data inconsistencies between self-reported and audited information

- Limited capacity of regulators to audit every ESG claim
- These issues make green washing detection difficult and enable organizations to engage in symbolic compliance without meaningful change.

Emerging Solutions and Best Practices

AI and Big Data tools for ESG audit and risk scoring

- Third-party ESG assurance providers with regulatory oversight
- Whistleblower protections for internal ESG fraud reporting
- Public ESG databases for transparency and benchmarking

Credibility of Sustainable Finance Systems in ESG

The credibility of sustainable finance systems is fundamental to the success and integrity of Environmental, Social, and Governance (ESG) investing. It refers to the degree of trust, transparency, and accountability embedded within the mechanisms that guide how ESG-related financial activities are disclosed, assessed, and enforced.

1. Why Credibility Matters in ESG

Investor Confidence: Investors rely on ESG data to make ethical and financially sound investment decisions. When disclosures are inflated or misleading (green washing), it undermines market confidence.

Capital Allocation Efficiency: Credible ESG systems help direct capital to truly sustainable businesses, improving long-term value creation and mitigating environmental or social risks.

Market Integrity: A trusted ESG framework ensures fair competition among companies and prevents reputational manipulation through false claims.

2. Key Elements That Strengthen ESG Credibility

a. Standardized ESG Disclosure Frameworks

Use of globally accepted frameworks (e.g., GRI, TCFD, IFRS S1/S2) ensures comparability and reduces ambiguity in reporting.

b. Third-Party Assurance and Verification

Independent ESG audits or assurance services validate the accuracy of disclosures and discourage superficial compliance.

c. Strong Regulatory Oversight

Regulations such as the EU's SFDR and India's BRSR make ESG reporting mandatory, enforce penalties for green washing, and standardize ESG benchmarks.

d. Transparency and Accessibility

Public disclosure of ESG data allows investors, civil society, and regulators to evaluate performance and detect inconsistencies.

e. Accountability Mechanisms

Legal provisions for misreporting, whistleblower protections, and stakeholder engagement build trust and deter unethical behavior.

3. Threats to ESG Credibility

Green washing: Unsubstantiated or deceptive claims can mislead investors and erode trust in ESG-labelled products.

Fragmented ESG Ratings: Differing methodologies among ESG rating providers result in inconsistent evaluations of the same company.

Lack of Regulatory Uniformity: Varying ESG standards across countries lead to confusion, regulatory arbitrage, and reduced comparability.

4. Strengthening the Credibility of ESG Finance Systems

To ensure long-term credibility:

- Enforce consistent global standards
- Mandate third-party audits
- Increase transparency through digital ESG platforms
- Create centralized ESG databases
- Empower regulatory agencies with enforcement tools and training

Conclusion

The regulatory landscape for ESG compliance is rapidly evolving, with a clear shift toward stronger enforcement mechanisms to combat green washing. As ESG investing becomes a dominant paradigm in capital markets, the role of regulators in defining, monitoring, and enforcing ESG standards is more crucial than ever. A consistent, transparent, and globally coordinated regulatory approach is key to maintaining market integrity, investor confidence, and real progress toward sustainability.

As ESG investing continues to shape global capital flows, the need for authentic, credible, and transparent ESG compliance has become more critical than ever. While the rise of sustainability oriented finance marks a positive shift, it also exposes markets to risks of green washing, where companies overstate or misrepresent their ESG performance for reputational or financial gain.

From a regulatory perspective, ensuring authenticity in ESG disclosures requires more than voluntary commitments it demands robust legal frameworks, standardized reporting norms, and stringent enforcement mechanisms. Regulatory bodies across jurisdictions are increasingly acknowledging this need through instruments such as the EU's SFDR and Taxonomy Regulation, the U.S. SEC's ESG disclosure proposals, and India's BRSR mandate.

However, challenges persist: inconsistent reporting standards, lack of third-party verification, and the unregulated nature of ESG rating providers contribute to a fragmented compliance environment. To overcome these barriers, this study recommends a multi-pronged approach: standardization of ESG disclosures, mandatory third-party audits, clear anti-green washing legislation, capacity-building for regulators, and harmonized global cooperation.

Ultimately, the credibility of sustainable finance depends on restoring investor trust, stakeholder confidence, and market integrity through authentic ESG compliance. Regulatory frameworks, when designed and enforced effectively, serve as the backbone of this transformation ensuring that sustainability is not merely a label, but a legally and ethically grounded corporate practice.

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Economic Value Added And Drivers Of Eva In Automobile Companies

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Abstract

The automobile industry has become the fastest-growing sector in the world. The study analyzed the economic worth of the business using the Economic Value Added method. Determinants of EVA in selected automobile companies are also analyzed. The data are collected over fifteen years, from 2010 to 2024, for the selected ten companies. The study utilized panel data collected from the annual report. The results show that Bajaj Auto Ltd and Maruti Suzuki Ltd have experienced a rising trend in economic growth, including a notable boost in the last two years. The EVA of Hindustan Motor Company Ltd is low compared to other companies. EVA, Heteroscedasticity, Unit Root Test, and Least Squares regression are the tests used for analysis. The study suggests that Hindustan Motor Company Ltd and Majestic Ltd should focus on the Market Value Added (MVA), Refined Economic Value Added (REVA), Net Operating Profit (NOPAT), Return on Assets (ROA), and Return on Equity (ROE) of the firm, accelerates the EVA of the company. Because the panel data Regression shows that MVA and REVA have an optimistic and significant influence on EVA.

Keywords: Economic Growth, Economic Value Added (EVA), Automobile companies, firm's Operating Profit After Tax, Return on Assets.

Introduction

Nowadays, Firms are concentrating on shareholder value creation with the increasing global competition. It is necessary to measure the value of shareholders of the companies. Shareholder value can be improved by tracking every year's value to make future decisions and to assess the past decisions (Viswanadham & Luthra, 2005).

The fiscal performance of the selected firms is measured by using two methods. One is classic accounting-based financial performance, and the other is modern value-based financial performance (Yaman & Kurtlar, 2022).

Value-based performance and management require in-depth knowledge of the variables that contribute to fiscal wealth and create shareholder value. The worth of the firm is affected by variables that drive administration. These value-creating drivers should be measured to identify the high-impact variable on value and assign responsibility for their

performance to individuals who must then support the managing organization in achieving its aims for shareholders (Hall, 2002).

Shareholder wealth is maximized using shareholder value, and it is known as an important goal of the firm. Nowadays measurement of shareholder value and analysis has become a trend. Because many companies use different types of shareholder value evaluation. Measurement of fiscal performance concerning net profit and long and short-run profit for longer periods suggests that a substantial measure of a business's achievement and how effectively it boosts the shareholder value. When equity returns exceed the cost of capital, it results in increases in shareholder value. when the company calculates its value and can take the essential procedures to make development in its fiscal performance, then Shareholder value analysis is used to assess the success of the activities taken by the management (Kumar, 2020).

The creation of shareholder value is seen as important for firms. For many years, firms have measured their financial performance in terms of profitability or earnings per share. When equity returns are generated, it creates shareholder value for the company. The most popular measure of profitability is the return on equity (ROE) (Marvadi, 2015).

This investigation attempts to consider some of these variables that influence the EVA and to examine the company's economic growth. Economic growth is identified using the method known as Economic Value Added (EVA) of a company. EVA was analyzed using some standard formulas taken from the review.

Literature Review

To find the company welfare and economic growth, shareholder wealth Measuring plays an important role. Several factors influence shareholder value, and various methods are used to calculate shareholder value. This study helps to calculate the Economic value using EVA to find the growth and welfare of selected automobile companies.

Shareholder value is measured using ROA, ROCE, EVA, etc, in the Information Technology Industry, and there is some attention needed in the area like fixed assets, expenditure, and accounts receivable (Viswanadham & Luthra, 2005). Increasing the shareholder value is important in finance; the positive EVA takes in optimistic result on stock revenues (Yaman & Kurtlar, 2022). "Economic value added (EVA)" helps to find economic growth and is the factors that control the creation of shareholder value using variables like "Net operating profit after tax, Weighted average cost of capital, ROCE," etc (Hall, 2002). Equity financing has a significant optimistic influence on EVA, and the factors that influence shareholder value creation are found using the ordinary least squares analysis (Kariuki Grace Muthoni et. al., 2019). MVA and EVA are calculated for "Ultra Tech Cement Pvt. Ltd." and suggested that the top measure of shareholder value is EVA. Even MVA is a supporting factor for shareholder value creation (Kumar, 2020). In the year 2012, a study was conducted on financial decisions to find factors that create shareholder value. This investigation shows the most significant factors that influence shareholder value. Panel data is used to reduce the collinearity and increase the degree of freedom in variables. Self-financing expressions positive and significant influence on shareholder value (Amor, 2012).

To discover which variables will impact shareholder value in the Indian banking division. It found that age has a positive impact on public-sector banks; large-sized banks create high value, and small-sized banks create less shareholder value (Marvadi, 2015). "Economic value added" is used to calculate the economic development of the business. EVA determines the criteria of business performance, financial structure, and financial as well as investment activities of the company (Jakub et al., 2015). EVA is a vital instrument used for financial performance measurement and management all around the world, even though it has special attention in progressive economies; implementation and validity have some issues

(Sharma & Kumar, 2010). While manipulating the “Economic Value Added” of a business, the procedure followed is: NOPAT means “Net Operating Profit After Tax” and subtracts WACC, “Weighted Average Cost of Capital”, multiplied by IN “Investment Capital”. Positive EVA value denotes NOPAT “Net Operating Profit After Tax” of the firm is advanced than WACC “Cost of Capital” (Kambey & Silinaung, 2020).

To find whether a business has formed additional value for the shareholder, EVA is used. This is one of the methods used to find the performance and how it effectively calculates the increase or decrease in the shareholders' wealth (Gopale, 2022). The efficiency formed through a firm shall be taken through a market; the supposed “market” responds optimistically to business efficiency. It reflects on the stockholders' trust and rising interest in the company, so a firm's market value might be boosted because of raising the firm's share value, which may eventually reflect on the shareholders' worth, so it gives a significant relationship between investor worth and EVA. The healthier way of measuring used to analyze investor wealth creation is initiated as a market-to-book ratio (M/B). Even if the study initiated the corporate investor wealth creation is increase it will increase the economic Value (Hall, 2023). By using Earnings Per Share (EPS), EVA, and Dividend Payout Ratio (DPR) as the business efficiency analysis method, investor wealth is created by the conclusion taken by the executives of the firm (Panigrahi, 2017). High value of EVA will create higher stakeholder value, but while creating shareholder value, Economic measurements are not used capably for Investigation and management of investor wealth (Gounder & Venkateshwarlu, 2017).

Hypothesis Statements

The following alternative Hypotheses and objectives are framed based on the reviews collected for the study.

H₁ – Return on Equity will be a significant influence on “Economic Value Added”.

H₂ – Return on Assets will be a significant influence on “Economic Value Added”.

H₃ – Net Operating Profit After Tax will be significantly influenced by “Economic Value Added”.

H₄ – Inventory Turnover Ratio will be a significant influence on “Economic Value Added”.

H₅ – Market capitalization will be a significant influence on “Economic Value Added”.

H₆ – Market-to-book Value will be a significant influence on “Economic Value Added”.

H₇ – “Refine Economic Value Added (REVA)” will be a significant influence on “Economic Value Added”.

H₈ – “Market Value Added (MVA)” will be a significant influence on “Economic Value Added”.

Methodology

Annual reports of the selected ten automobile companies in India are used to collect data for investigation. This research paper took panel data of automobile companies for the annual years from 2009-2010 to 2023-2024. This study is purely to come up with the secondary data that is together from the financial statements of selected businesses' websites.

Objectives

The major focus of the Investigation is:

- To calculate the “Economic Value Added” and “Market Value Added” of selected automotive businesses.
- To identify the determinants of Economic Value Added using Panel data of selected automobile companies.

Tools For Analysis

EVA (economic value added), Histogram, Normal P-P Plot, Correlation, Heteroskedasticity Test, Unit Root Test, and Least Squares analysis are the tools used for this investigation.

An estimated regression model was used for the investigation using panel data.

$$EVA_{it} = \beta_0 + \beta_1 ROE_{it} + \beta_2 ROA_{it} + \beta_3 NOPAT_{it} + \beta_4 Inv.Turn_{it} + \beta_5 Mak.Capt_{it} + \beta_6 MB Value_{it} + \beta_7 MVA_{it} + \beta_8 REVA_{it} + \varepsilon_{it}$$

The dependent variable EVA is used to find the economic value of the business. This EVA is calculated using:

$$\text{“EVA (Economic Value Added) = NOPAT (Net Operating Profit After Tax) – (WACC (Weighted Average Cost of Capital) * IC (Invested Capital))”}$$

Table 1 – Factors and the symbols

Name of the variables	Symbol	Measurement
Economic Value Added	EVA	NOPAT – (WACC * Invested Capital)
Return on Equity	ROE	Net Income / Equity
Return of Assets	ROA	Net Income / Total Assets
Net Operating Profit After Tax	NOPAT	Operating Profit * (1 – Tax Rate)
Inventory Turnover Ratio	Inv. Turn	Net Sales / Average Inventory
Market Capitalization	Mak. Capital	Share Outstanding * Total Outstanding Shares
Market to Book	MB Value	Market Capitalization / Book Value
Market Value Added	MVA	(Market Capitalization + Total Debt) – Invested Capital
Refine Economic Value Added	REVA	(NOPAT / Market Capitalization – WACC) * Market Capitalization

STATISTICS RESULTS

Table : 2 - EVA (Economic Value Added):

	Bajaj Auto Ltd	Maruti Suzuki Ltd	Mahindra & Mahindra	TVS Motors Ltd	Eicher Motors Ltd	HeroMoto Crop	Force Ltd	Ashokleyland Ltd	Hindustan Ltd	Majestic Ltd
Average of EVA	3468.80	4062.60	3288.20	517.07	1252.67	2801.4	168.4	547.2	-19.53	7.33
Rank	2	1	3	7	5	4	8	6	10	9

Source: Computed table

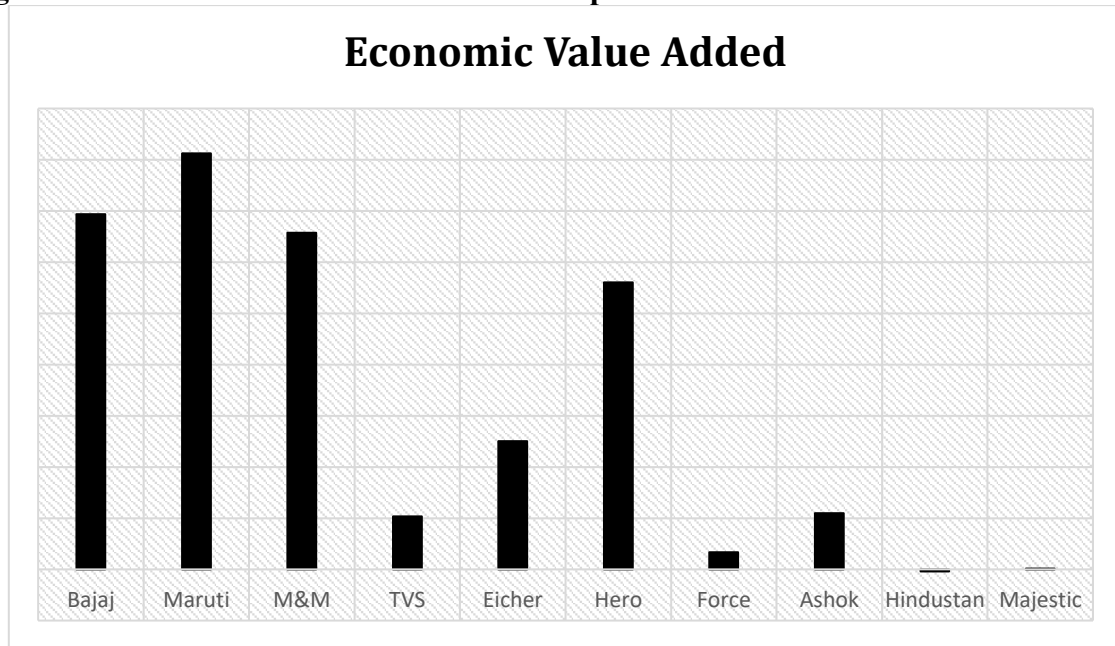
This economic value added (EVA) is calculated using yearly information from selected businesses. EVA is a financial performance indicator determined by deducting capital cost from Net Operating Profit after taxes.

The data shows that all companies have an upward trend in EVA over the period. EVA of Bajaj Auto Ltd increased from 1739 in 2010 to 6529 in 2024. It suggests a solid growth of EVA and an outstanding rise in the last few years. This can occur due to excellent financial performance, value creation, and strategic advancements.

The EVA of Maruti Suzuki Ltd placed first based on the computed value, and the growth of Maruti Suzuki Ltd. for the last two years (2022-2023 and 2023-2024) is notable because it reached a high value of EVA compared to past years. Overall, the EVA is growing significantly and has a steady upward tendency.

Mahindra & Mahindra shows instability throughout time. Like Maruti Suzuki Ltd., even though it has had peak EVA for the past two years (2022-2023 and 2023-2024). It shows that the performance and management of the company in recent years have improved.

Figure 1 – Economic Growth of Selected Companies



The EVA of Hindustan is low compared to other companies selected for the study. It also shows selected companies have substantial increases in EVA for recent years (2020-2021 and beyond). These upward trends in the later years indicate potential for future growth.

The EVA of Eicher Motors Ltd shows a significant upward trend over a year, and the high EVA value was influenced in recent years. It indicates strong performance and value creation of the company. This shows excellent financial performance, value creation, and strategic advancements of the company.

Bajaj shows consistent growth, excellent financial performance, and value creation. Maruti and Eicher have had exceptional performances in recent years. Mahindra & Mahindra and TVS have more variable performance, but recent performance is strong, and Hindustan, despite lower EVA, shows promising improvement.

Figure 2

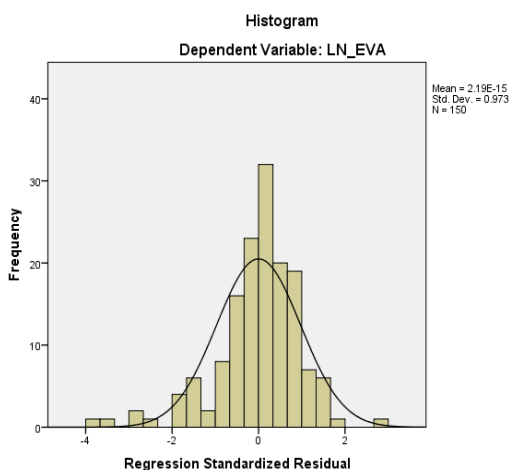
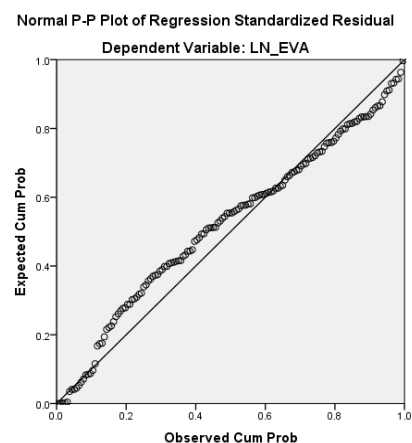


Figure 3



Based on the histogram and normal P-P-plot, the statistic shows that the data is ordinarily spread.

Table 3 - Correlation

	VIF	EVA	ROE	ROA	NOPAT	Inv. Turn	Mak. Capt	MB value	MVA	REVA
EVA		1								
ROE	1.985	.363**	1							
ROA	1.109	.381**	.141	1						
NOPAT	3.575	.739**	.177*	.188*	1					
Inv. Turn	1.886	.627**	.316**	.272**	.468**	1				
Mak. Capt	3.740	-.289**	-.040	.034	-.160*	-.259**	1			
MB value	4.011	.180*	.413**	-.048	.089	.136	-.749**	1		
MVA	4.131	.841**	.248**	.203*	.807**	.608**	-.311**	.198*	1	
REVA	2.272	-.433**	-.058	-.090	-.718**	-.285**	.085	-.049	-.649**	1

Source: Computed table

The output of the correlation table shows that there is a 1% level of significance and a positive correlation between Economic Value Added (dependent factor) and ROE, ROA, NOPAT, Inv. Turn, MVA, and (Independent factors). Mak. Capt and REVA have a 1% level of negative correlation with EVA. Including that, the MB Value displays that there is a significant and optimistic relationship at the level 5%. The VIF column shows values between 1 to 5. It means that there is no multicollinearity problem.

Table 4 - Heteroskedasticity Test “ARCH”

F-statistic	0.824605	Prob. F(1,147)	0.3653
Obs*R-squared	0.831162	Prob. Chi-Square(1)	0.3619

Source: Computed table

Heteroscedasticity is a statistical model used for analysis in research, like behavioral and social sciences. Parity Means of two independent means, examination of covariance, and common linear regression are tested by the Heteroscedasticity (Patrick J. Rosopa, 2013)¹. Coming up with a statement given by the investigator of Rice 1989, Greenland 2016, Rindskopf 2016, and Shrikant Krupasindhu Panigrahi 2017. If the probability rate is less than 0.05, then the hypothesis is accepted.

In this research, the probability rate was higher than the p-value, indicating that there is no indication to reject the null hypothesis. **ARCH** is a common test used for finding heteroscedasticity in econometrics. Here, the result indicates the absence of heteroscedasticity and the presence of homoscedasticity.

Table 5 - UNIT ROOT TEST “Augmented Dickey-Fuller test”

Variables	At level	
	Intercept	Trend and Intercept
ROE	0.0000	-
ROA	0.0000	-
NOPAT	0.0000	-
Inv. Turn	0.0185	-
Mak. Capt	0.0055	-
MBR Value	0.0000	-
MVA	0.0782	0.0004
REVA	0.0037	-

Source: Computed table

The “Augmented Dickey-Fuller test,” shortly known as ADF, is widely applied for determining whether the source is stationary or non-stationary. Normally, the facts must be stationary when it is utilized for Time series or Panel data analysis. Data should be stationary when using many statistical models, as time series analysis typically requires a stationarity test for the data.

The Variables listed in their level test have a less than P-value (0.05). It indicates the factors used are stationary in testing their levels and intercept. But the variables of “Market Value Added” were stationary at the level with Trend and intercept. A stationary test is necessary before carrying out the regression analysis.

Table 6 – Regression Analysis

Dependent Variable: EVA – Economic Value Added				
Method: Least Squares				
Sample: 1 150				
Included observations: 150				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.990963	0.723543	-4.133772	0.0001
ROE	0.016314	0.004006	4.072347	0.0001
ROA	0.029792	0.006128	4.861805	0.0000
NOPAT	0.000488	9.99E-05	4.885564	0.0000
INV. TURN	0.012574	0.013994	0.898507	0.3704
MAK. CAPT	-0.014526	0.005052	-2.875453	0.0047
MB VALUE	-0.000199	7.70E-05	-2.586395	0.0107
MVA	0.714770	0.085228	8.386580	0.0000
REVA	1.97E-05	4.46E-06	4.409132	0.0000
R-squared	0.828520	Mean dependent var		5.564275
Adjusted R-squared	0.818790	S.D. dependent var		2.936148
S.E. of regression	1.249881	Akaike info criterion		3.342098
Sum squared resid	220.2705	Schwarz criterion		3.522736
Log likelihood	-241.6574	Hannan-Quinn criter.		3.415486
F-statistic	85.15647	Durbin-Watson stat		1.221958
Prob(F-statistic)	0.000000			

Source: Computed table

Least Squares regression analysis using Cross-sectional data of Economic Value Added on the Covariates (ROE, ROA, NOPAT, Inv. Turn, Mak. Capt, MB Value, MVA, and REVA) is addressed in Table 6. According to the empirical results, the R-squared value for the model is

82%. The impact of the independent variable on EVA is 82%. Adjusted R^2 suggests the model is an excellent fit to analyze the EVA because the value of adjusted R^2 (0.8187) is very close to the R-squared value. The prob(F-statistic) indicates the model is statistically significant.

The coefficients of ROE, ROA, NOPAT, MVA, and REVA have a positive rate, even though the p-values are 0.0001, 0.0000, 0.0000, 0.0000, and 0.0000. which indicates ROE, ROA, NOPAT, MVA, and REVA are positively associated with EVA. However, there is no statistical significance between Inv. Turn and EVA. Most importantly Mak. Capt and MB Value are negative influencing factors of EVA.

MVA “Market Value Added” and REVA “Refined Economic Value Added” greatly impact EVA's “Economic Value Added”. Because the p-value is 0.0000 and the coefficient values are 0.715 and 1.970. This specifies that MVA and REVA are the most influential predictors of EVA, and strong positive relationship with EVA.

Hypothesis Result

Table 6 displays the connection among the responding and explanatory factors.

- The t value of ROE is 4.0723, and it is significant at the value of 0.0001, less than 0.05. It clearly describes that ROE has an optimistic influence on EVA.
- The t value of ROA is 4.8618, and it is significant at the value of 0.0000, less than 0.05. It clearly describes that ROA has an optimistic influence on EVA.
- The t value of NOPAT is 4.8856, and it is significant at the value of 0.0000, less than 0.05. It clearly describes that NOPAT has an optimistic influence on EVA.
- The t value of Inv. Turn is 0.8985, and the p-value of the variable shows 0.3704, which is more than 0.05. It defines that Inv. Turn has no significant impact on EVA.
- The t value of Mak. Capt is -2.8754 and it is significant at the value of 0.0047, less than 0.05. It clearly defines the Mak. Capt harms' EVA.
- The t value of MB Value is -2.5864, and it is significant at the value of 0.0107, less than 0.05. It clearly defines that the MB Value harms EVA.
- The t value of MVA is 8.3866, and it is significant at the value of 0.0000, less than 0.05. It clearly defines that MVA has an optimistic influence on EVA.
- The t value of REVA is 4.4091, and it is significant at the value of 0.0000, less than 0.05. It clearly defines that REVA has a positive impact on EVA.

Conclusion

This study was used to calculate the EVA and to investigate the variables that influence the EVA of ten selected automotive firms in our country. This investigation concluded that the EVA “economic value added” of Maruti Suzuki Ltd. is higher and ranks first when compared with the other companies. Maruti Suzuki Ltd. hasn't seen any downward trend in EVA for the past fifteen years. It clearly shows that the financial performance of the companies is good because the EVA is growing every year, and the growth of EVA for the past two years of all selected companies has performed well.

The ARCH test is utilized for checking heteroscedasticity in data. The result of this test is given; the data has no heteroscedasticity and presents only homoscedasticity. It shows the data is fit for good regression analysis. The “Unit Root test” is used to check whether the source is stationary or non-stationary. The result found that the data are stationary at the

level. The findings of the Regression analysis using panel data show that the variables used for the study are good, and the model fit is very strong. MVA “Market Value Added” and REVA “Refined Economic Value Added” have a strong, optimistic relationship with EVA “Economic Value Added”. Even MVA and REVA will impact EVA highly when compared to other factors.

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Accessibility And Infrastructure Issues In Digital Elt

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Abstract

The growing use of digital technologies in English Language Teaching (ELT) has opened up exciting possibilities but also brought new challenges, especially when it comes to accessibility and infrastructure. Although online platforms and digital resources have the power to make English education more widely available, many learners still face significant obstacles. Issues like unreliable internet connections, a lack of devices, and insufficient school facilities often prevent equal access—particularly in rural or economically disadvantaged areas. These gaps, combined with the broader digital divide, can leave students feeling isolated and less engaged, which ultimately affects their language learning progress. In addition, many teachers and students struggle with digital literacy, making it harder to use technology effectively in the classroom. Tackling these problems requires a comprehensive approach that includes investing in infrastructure, providing targeted training for educators, and creating inclusive digital materials that meet diverse learners' needs. Collaboration between policymakers, schools, and technology providers is crucial to close the gap and ensure that digital ELT benefits everyone, regardless of their background. This paper delves into the complex relationship between accessibility and infrastructure in digital ELT, examines how these factors influence learning outcomes, and suggests practical strategies to build a more inclusive and effective digital learning environment.

Keywords: digital divide, infrastructure, accessibility, English language teaching, digital literacy, inclusive education, educational technology

Introduction

The digital transformation of English Language Teaching (ELT) has redefined educational landscapes worldwide, offering new opportunities for both teachers and learners.

The integration of digital resources, platforms, and tools has the potential to democratize access to English education, enhance learner engagement, and foster autonomous learning. However, this shift is accompanied by significant challenges, particularly regarding accessibility and infrastructure. Disparities in digital access, uneven distribution of technological resources, and infrastructural inadequacies continue to hinder the realization of equitable and effective digital ELT (Babu 167). These challenges are especially pronounced in rural and underprivileged areas, where limited internet connectivity and insufficient devices present persistent barriers to quality education (Bui). This paper critically examines the multifaceted issues of accessibility and infrastructure in digital ELT, assesses their impact on learning outcomes, and proposes strategies for fostering a more inclusive digital learning environment.

Digital Divide and Access Disparities

The digital divide remains a central barrier to equitable ELT in the digital era. While urban schools and affluent communities often benefit from robust internet connectivity and up-to-date devices, rural and marginalized regions frequently lack these essential resources (Babu 167). Studies have shown that schools in less developed areas struggle to provide sufficient computers, tablets, or reliable internet, directly impacting the quality of digital instruction and student participation (Dia 16). These disparities not only affect learners' ability to access online classes and resources but also exacerbate existing educational inequalities. The lack of digital infrastructure can lead to learner isolation, reduced engagement, and diminished language acquisition outcomes, as students are unable to fully participate in interactive or collaborative activities (Dia 16).

Moreover, infrastructural limitations are not confined to hardware or connectivity alone. Power outages, inadequate classroom facilities, and the absence of technical support further complicate the implementation of digital ELT, particularly in developing countries (Bui). The persistence of these issues underscores the urgent need for targeted policy interventions and investment in educational infrastructure to bridge the gap between technologically advanced and underserved communities (Dia 16).

Technological Literacy and Teacher Preparedness

Beyond physical infrastructure, digital literacy among both educators and learners is a critical determinant of successful ELT integration. Many teachers, particularly those with limited exposure to technology, face difficulties in navigating digital platforms, designing interactive lessons, and troubleshooting technical issues (Dia 18). This lack of preparedness can result in suboptimal instructional quality and reduced student engagement. Research

indicates that effective digital ELT requires educators to possess not only technical skills but also pedagogical competence in leveraging technology for language instruction (Integration of Digital Technology 7).

Teacher training programs often lag behind the rapid pace of technological advancement, leaving educators ill-equipped to harness the full potential of digital tools (Integration of Digital Technology 8). Continuous professional development and targeted capacity-building initiatives are essential to empower teachers with the necessary skills and confidence to integrate technology into their teaching practices. Additionally, fostering digital literacy among students is equally important, as it enables them to navigate online resources, participate in virtual classrooms, and develop autonomous learning strategies (Dia 18).

Inclusive Education and Assistive Technologies

The promise of digital ELT extends to creating more inclusive learning environments, particularly for students with disabilities. Assistive technologies such as speech recognition, screen readers, Braille displays, and closed-captioning applications have revolutionized access to English language education for learners with diverse needs (Understanding the Role of Digital Technologies 4). These tools facilitate active participation, personalized learning, and improved educational outcomes for students who might otherwise face significant barriers in traditional classrooms.

However, the availability and effective use of assistive technologies are often contingent upon adequate infrastructure and digital literacy. In regions where technological resources are scarce, students with disabilities may be disproportionately disadvantaged, highlighting the intersectionality of accessibility challenges (Understanding the Role of Digital Technologies 5). Ensuring that digital ELT platforms are designed with universal accessibility in mind and providing targeted support for learners with special needs are critical steps toward achieving educational equity.

Policy Interventions and Strategic Solutions

Addressing accessibility and infrastructure issues in digital ELT requires a coordinated, multi-stakeholder approach. Governments, educational institutions, and technology providers must collaborate to invest in robust digital infrastructure, expand internet connectivity, and ensure the availability of affordable devices for all learners (Bui). Policy frameworks should prioritize equitable resource allocation, particularly in underserved regions, to bridge the digital divide and promote inclusive education (Dia 24).

In addition to infrastructural investments, comprehensive teacher training and professional development programs are essential to equip educators with the skills needed for

effective digital instruction (Integration of Digital Technology 12). Developing culturally and contextually relevant digital learning materials, fostering community engagement, and leveraging public-private partnerships can further enhance the reach and impact of digital ELT initiatives. By addressing both the technical and human dimensions of accessibility, stakeholders can create a more resilient and inclusive digital learning ecosystem.

The Digital Divide and Its Impact on Educational Equity

The digital divide remains one of the most significant barriers to equitable English language teaching in the digital era. This divide refers to the gap between those who have reliable access to digital devices and high-speed internet and those who do not. Students in low-income and rural areas often face limited or no access to essential digital tools, which severely restricts their ability to engage fully with online learning resources and participate in virtual classrooms (Tsyof). This disparity not only affects their immediate learning experience but also has long-term consequences on their academic achievement and future opportunities.

Moreover, the digital divide is not just about access to technology but also encompasses differences in digital literacy and the quality of digital infrastructure. Students without adequate support and training may struggle to use digital tools effectively, further widening the achievement gap (AU). The unequal distribution of resources means that even within the same school, some students may fall behind simply because they lack access to devices or stable internet at home, which is critical for completing assignments and practicing language skills outside the classroom.

Addressing the digital divide requires systemic efforts that go beyond providing devices. Governments and educational institutions must invest in broadband infrastructure, especially in underserved regions, and develop policies that ensure all students have equitable access to technology and digital literacy support. Only then can digital ELT fulfill its promise of inclusivity and quality education for all (Tsyof).

Socioeconomic Factors Influencing Access to Digital ELT

Socioeconomic status plays a crucial role in determining a learner's access to digital English language teaching resources. Families with higher incomes can afford multiple devices, better internet plans, and supplementary digital learning materials, whereas low-income families often struggle with limited or shared access to technology (Jotse). These disparities influence not only access but also the frequency and quality of digital learning experiences.

In many cases, students from disadvantaged backgrounds face additional challenges such as overcrowded living conditions that make it difficult to find quiet study spaces, or parents who may lack the digital skills to support their children's learning at home. These factors compound the difficulties in engaging with digital ELT, leading to lower motivation and academic performance (Jotse). The socioeconomic digital gap thus reinforces existing educational inequalities and limits social mobility.

To mitigate these effects, educational policies must consider the broader social context and provide targeted support, including subsidized internet access, device lending programs, and community-based digital literacy initiatives. Schools and NGOs can play a vital role in creating supportive environments that help bridge the socioeconomic divide in digital ELT (AU).

The Role of Digital Literacy in Enhancing ELT Outcomes

Digital literacy is fundamental to the success of digital English language teaching. It involves not only the ability to use digital devices but also critical skills such as evaluating online content, communicating effectively through digital platforms, and managing digital identities. Without these competencies, learners and teachers alike may find it challenging to navigate digital ELT environments (Cao et al.).

Research shows a strong positive correlation between digital literacy and language learning outcomes. Learners with higher digital competency tend to engage more deeply with interactive materials, participate actively in online discussions, and access authentic language resources, which enhance their proficiency (Cao et al.). Similarly, teachers with strong digital skills can design more effective, engaging lessons that leverage multimedia and adaptive technologies.

Developing digital literacy requires continuous professional development for educators and structured digital skills training for learners. Integrating digital literacy into the curriculum ensures that students are prepared not only for digital ELT but also for broader academic and professional contexts in an increasingly digital world (Cao et al.).

Challenges in Infrastructure: Connectivity and Device Availability

Reliable internet connectivity and device availability are foundational to digital ELT but remain significant challenges worldwide. Many rural and remote areas still lack broadband infrastructure, resulting in slow or intermittent internet access that disrupts synchronous learning and limits access to multimedia content (Tsyof). In some regions, students rely on mobile data plans with limited bandwidth, making video-based lessons or interactive exercises impractical.

Device availability is another critical issue. While some students may have personal laptops or tablets, others must share a single device with family members or rely on outdated technology that cannot support modern educational software (AU). This scarcity restricts learners' ability to engage fully with digital ELT platforms and complete assignments on time.

Addressing these infrastructure challenges requires a multi-pronged approach, including expanding broadband networks, providing affordable or free devices to students in need, and developing low-bandwidth or offline-friendly learning materials. Governments and private sector partnerships can accelerate these efforts to ensure that infrastructure does not remain a barrier to digital ELT (Tsyof).

The Importance of Inclusive Design in Digital ELT Platforms

Inclusive design in digital ELT platforms ensures that learners with diverse needs, including those with disabilities, can access and benefit from digital language education. Features such as screen readers, captioning, adjustable text sizes, and alternative input methods make digital content accessible to students with visual, auditory, or motor impairments (Brookings).

However, many existing ELT platforms lack comprehensive accessibility features, which excludes a significant portion of learners from fully participating in digital learning environments (Brookings). This exclusion not only violates principles of equity but also limits the overall effectiveness of digital ELT initiatives.

To promote inclusivity, developers must adhere to universal design principles and accessibility standards when creating digital ELT tools. Additionally, educators should be trained to use and adapt these technologies to meet individual learner needs, ensuring that digital ELT is truly accessible to all students (Brookings).

The Impact of Language Representation in Digital ELT Technologies

A less discussed but critical aspect of digital ELT accessibility is the representation of diverse languages and dialects in digital technologies. While English enjoys extensive digital resources, many minority and indigenous languages remain underrepresented in digital content and language learning technologies (Brookings).

This “digital language divide” affects learners whose first languages have limited digital presence, as they may face difficulties accessing bilingual or culturally relevant learning materials. Moreover, artificial intelligence and language processing tools often perform poorly with under-resourced languages, limiting their usefulness in diverse linguistic contexts (Brookings).

Addressing this issue requires investment in language technology development for low-resource languages, inclusion of diverse linguistic data in AI training, and collaboration with local communities to create culturally relevant digital ELT content. Such efforts will help bridge linguistic divides and support multilingual learners in digital environments (Brookings).

Teacher Training and Professional Development for Digital ELT

Effective digital ELT depends heavily on well-prepared teachers who are confident and skilled in using technology for language instruction. Many educators face challenges such as lack of training, limited technical support, and unfamiliarity with digital pedagogies, which can hinder the successful integration of technology in their classrooms (Dia).

Ongoing professional development programs that focus on digital tools, online classroom management, and innovative instructional strategies are essential. These programs should also address how to adapt content for diverse learners and how to troubleshoot common technical issues (Dia). Empowering teachers with these skills enhances their ability to create engaging, interactive, and effective digital ELT experiences.

Conclusion

The digital era presents both opportunities and challenges for English Language Teaching. While technological advancements have the potential to transform language education and expand access, persistent issues related to infrastructure, digital literacy, and inclusivity must be addressed to realize these benefits. Bridging the digital divide, investing in teacher training, and promoting the use of assistive technologies are critical for fostering equitable and effective digital ELT. Through sustained policy commitment and collaborative action, it is possible to create a digital learning environment that serves the needs of all learners, regardless of their socioeconomic or geographic background.

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Emerging Trends And Innovative Approaches In Flipped Learning To Enhance Listening Skills In 21st Century English Classrooms.

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Abstract

Advanced technologies of the 21st century bring new opportunities and challenges to societies around the world. Therefore, learners of this century must be fully equipped with content knowledge and all necessary skills for their lifestyle and future career. In response to education reform policies, many teaching methods have been introduced into English classrooms, especially in second-language environments such as Thailand. Regarding the need for a new approach to teaching English in the 21st century to improve students' fundamental skills, the flipped learning approach, an alternative teaching method that reverses direct instruction in classroom time and homework, recently, teachers, educators, and researchers has received high attention in many languages. This study aims to provide a theoretical background and show how a flipped learning approach can improve listening skills in English classrooms, thereby improving learner engagement and other skills needed in this century. The use of technology and the Internet has had a major impact on education, especially on learning activities. Teachers and students can search course materials anytime, anywhere and by anyone. In the future, the education system and classroom learning activities between teachers and students will be maximized through the use of online platforms. In addition to technology and the Internet, mastery of the English language also has a major impact on education. Apart from the academic demands, learning to teach English has also become very important and is a top priority all over the world.

Keywords: 21st century skills, Flipped classrooms, Flipped learning approach, Flipped learning instruction.

Introduction

English is an important mode of communication used around the world. Language is one of the tools that people use to communicate with each other. It is the ability to understand what is heard or read, and to express oneself orally and in writing. Thus, it refers to receiving and producing messages, whether spoken or written. The main goal of language teaching is to improve learners' ability to participate in the communicative process. Listening is an important part of oral communication and an important part of the entire educational process because people learn to listen before they learn to read, write and speak.

In the 21st century, advanced technology is a major driver of new challenges and opportunities and paradigm shifts for our societies (Khan, 2012; PacanskyBrock, 2013; Vibulphol, 2015). To survive the dramatic changes in society, learners need to make full use of media and information technology to support their learning. For example, technology can be used not only to support classroom activities but also outside the classroom as a useful tool for acquiring knowledge anywhere in the world. According to Pacansky-Brock (2013), new technologies can support learning outcomes, increase learner engagement, and prepare them to be successful learners in this digital age. The emergence of flipped learning as an alternative method that integrates the use of technology outside the classroom has attracted a great deal of attention from educators and teachers around the world. Furthermore, English language educators and teachers see this innovative approach as a possibility for designing instruction. This paper mainly discusses the history, theoretical background and basic concepts of flipped learning, emphasizing the four pillars of flipped learning, the composition and characteristics of flipped learning classrooms. Also included is research on the implementation of reverse learning approaches in different English language classroom settings where English is considered a second and/or foreign language, and how reverse learning approaches can improve 21st century skills and learner engagement in English instruction.

As the most basic receptive ability among the four language skills, listening is usually described as the ability to correctly explain and understand information during communication. According to Emerick (2018), learners who have a solid understanding of listening skills are better able to participate effectively in the classroom. It is necessary to receive intelligible input when needed to enhance the language learning process.

Unfortunately, most EFL students are not satisfied with academic listening materials. This may be due to hearing difficulties or because the four language skills are the most neglected and least taught in language courses (Hamouda, 2013) EFL learners identified a number of factors associated with their hearing difficulties. Some of them were unfamiliar with the language, had little practice, were unfamiliar with listening strategies, had difficulty translating the language, and had other psychological factors such as anxiety and poor concentration (Rintaningrum, 2018). Therefore, Chinese teachers will work harder to improve students' listening ability

In today's digital age, the traditional teacher-centered learning model is no longer suitable for implementation in daily learning activities. In the future, the learning process will be more modern and student-centered, using existing Internet technology to access teaching materials anytime, anywhere through online or e-learning with anyone and anything. One of these learning modes is the flipped classroom, which is included in the spin mode blended learning type. Flipped classroom is one of the learning strategies discussed in the education community because it can improve learning outcomes at all levels from elementary school to university. Flipped classroom is also a hot topic in foreign language teaching. Flipped classrooms provide outdoor lessons for face-to-face learning by watching videos online and preparing additional exercises and activities

The flipped classroom is part of a blended learning model where students have greater flexibility in their own learning and control of when and where they are taught (Staker & Horn, 2012). Input to flipping models was provided via digital video outside the classroom, and what was done at home was done in the classroom. Thus, through this model, teachers work with students in a one-on-one teaching mode (Hamdan et al., 2013). You can record videos, add more interesting elements and share videos that other teachers have recorded before. Students should watch the video before class to prepare them for participating in class activities. The inverted portion of the inverted classroom shows students watching or listening to the lecture at their leisure, pausing, rewinding, taking notes and rewatching the lecture as needed to understand the material at home and do the harder work in class through debate, problem solving or group discussions and other strategies.

Listening Skills

Listening is the first sense that human beings use from birth, and it is also the first way to communicate with society and the world. In addition, it is also the window for the brain to receive information from spoken materials. Listening is the ability to understand

what a speaker is trying to convey. Brown defined listening as the psychomotor process of receiving sound waves through the ears and transmitting them to the brain via nerve impulses (Roth & Suppasesetseeree, 2016). Steil (1997) stated that listening is a complex process that includes capturing, interpreting, storing, evaluating and responding to spoken information. Caldwell (2008) defined listening as "the process of simultaneously extracting and constructing meaning through interaction with spoken language". Explain what the speaker is trying to convey. Listening is one of the most important English language learning skills for EFL learners. It is also crucial for obtaining the comprehensible input needed for language development. For too long this has been overlooked by teachers in EFL classrooms. This neglect may be due to the complexity of listening skills, input that cannot be understood in the context of EFL, and the scarcity of teaching materials and equipment resources. Improving listening skills can have a huge impact on a learner's ability to speak a new language. Listening is a foundational skill for all oral communication in and out of the classroom. No one can deny the importance of listening when learning EFL. People are always listening, everywhere. Listening is needed more than any other language skill in everyday life. The development of effective listening skills is a cornerstone in mastering the English language, especially in an era defined by digital communication and global collaboration. As traditional pedagogical methods prove insufficient in catering to diverse learning needs, Flipped Learning has emerged as a transformative approach. In this model, learners engage with instructional content (videos, podcasts, etc.) before class and participate in interactive, application-based activities during classroom sessions. This paper explores how innovative and emerging practices in flipped learning environments can enhance listening skills, drawing from recent research, educational technology trends, and classroom practices in English language teaching (ELT).

The Importance Of Listening

Hearing plays an important role in people's daily communication. As Guo and Wills (2006) point out, "people obtain most of their education, information, understanding of the world and human affairs, ideals, and values through the Internet."

Rost (1994) explained the importance of listening in language teaching as follows:

1. Listening is critical in language teaching because it provides input to learners. Learning cannot begin without understanding the correct level of input.
2. Spoken language provides a means for learners to interact. Because learners have to interact to understand. Access to someone who speaks the language is

essential. Furthermore, learners' inability to understand the language they hear is a stimulus to interaction and learning, not a hindrance

3. Authentic spoken language challenges learners to understand language actually used by native speakers.
4. Listening exercises provide teachers with a means of drawing learners' attention to new forms (vocabulary, grammar, new modes of interaction) in the language

Reverse learning method

In general, flipped learning is an alternative teaching method that swaps face-to-face instruction between class time and homework. Textbooks containing unit-specific content are presented and reviewed by learners at home before class. Meanwhile, homework such as exercises, projects or class discussions is done in class. Videos produced by teachers and placed online or selected from online resources or available commercial materials are the main tools of the flipped classroom.

When one hears Salma Khan use the phrase "flip your classroom" in a TED Talk or a Technology, Entertainment, Design talk in 2010, or reads a book by Jon Bergmann and Aaron Sams in 2012, flipped learning becomes Well known. However, the first attempt to use the term flip or flip was in 2000 by Wesley Baker in an academic study focused on learning management systems, or LMSs. In 2005, the term reappeared in Tenneson and McGlasson's academic study. They describe the flipped classroom as the use of technology in co-ed classrooms to create more time for active discussion (Tenneson and McGlasson, 2005)

The Four Pillars Of The Flipped Learning Approach

To elaborate on the concept of the flipped learning approach, experienced educators in the field have identified the pillars of the flipped classroom to support flipped learning. These include 'Flexible Environments', 'Learning Culture', 'Intentional Content' and 'Professional Educators' (Flipped Learning Network, 2014). The flipped classroom model inverts the traditional teaching approach, providing pre-class exposure to content and using class time for problem-solving, discussion, and collaborative tasks. This learner-centric model promotes autonomy, higher-order thinking, and personalized learning paths.

Flexible learning environment

A flipped classroom learning environment is characterized by the introduction of multiple learning modes in the classroom, including group work, independent study, research, performance, and project work, to optimize learners' learning capabilities. By engaging in different learning environments, learners have the flexibility to choose for themselves

Learning Culture Change

Speaking of changes in learning culture, since the early 2000s there has been a shift from a teacher-centered approach to a student-centered approach. Learners in a flipped classroom get great learning opportunities to delve deeper into topics. In addition, learners are actively engaged in learning new content or knowledge both inside and outside the classroom. They can also accelerate and assess their own learning. At the same time, teachers can emphasize the use of classroom interaction to ensure they understand each learning topic.

Intended content

Teachers in flipped classrooms play an important role in deciding what to teach directly and what materials are appropriate to help learners explore independently outside of the classroom. Teachers therefore choose specific content to maximize instructional time and allow learners to experience different teaching methods such as active learning, peer guidance, inquiry-based learning, project-based learning, or problem-based learning, depending on the subject and grade level of the learner.

Professional educator

Because of the importance of carefully selecting content for flipped classrooms, there is a greater need than ever for experienced, qualified and professional teachers. They must decide when and how to move from direct instruction to individually directed learning. They also need to decide how to facilitate interaction among learners and even between teachers and learners. In addition, teachers in flipped classrooms often reflect on and share their lessons with others to improve their teaching and gain mutual understanding of specific concepts taught in flipped classrooms.

The Role Of Learners, Teachers And Materials In Flipped Learning Environments

The role of Learners

The flipped learning approach encourages learners to take responsibility for their own learning. While this may be challenging for learners who are used to sitting through lectures, learners in a flipped classroom should be able to support themselves and collaborate with their peers as they learn. In addition, learners in the flipped classroom are required to process

content more intensively. They also expect to be able to improve their higher order thinking skills based on the learning opportunities provided by their teachers. Moreover, in flipped classroom, learners are also actively involved in the accumulation of knowledge as they have more opportunities by engaging in meaningful learning environments

The role of Teachers

During the flipped classroom, the teacher's role typically changes from "the wise man on stage" to "the leader around". Therefore, teachers must be knowledgeable in their respective subjects and be able to elicit this knowledge from each learner. Because the reverse learning approach provides instruction outside of the classroom time, teachers have more time to work with all learners and actively act as facilitators, coaches, mentors or advisors to help learners in the classroom. . Teachers also have more opportunities to provide feedback on each learner's progress and help clear up some misconceptions while learning at their own pace. Another important role of the teacher is to be responsible for selecting content, authentic materials and producing content videos for the learners, as videos are the main resource for flipped classroom teaching. In addition, teachers must create alternative assessments that enable learners to assess and demonstrate their knowledge against prescribed learning outcomes

The role of materials

Materials commonly used in flipped learning classrooms include videos and real materials. They are the core material containing content and direct instructions flipped from the traditional classroom. In this case, video is a great learning tool for learners, helping them learn outside of the classroom at their own pace. On the other hand, authentic materials, such as news articles, advertisements, movies, songs, TV shows, newspapers, magazines, etc., are useful and meaningful learning materials for both in-class and extra-curricular activities in the flipped classroom

Flipped Learning and 21st Century Skills

According to the Partnership for 21st Century Learning (2015), a partnership between education, business, community and government leaders in the United States of America aims to understand the importance of 21st century skills for all learners in the face of a changing world, They recognize that 21st century learners must possess three key skills, namely, information and communication skills, thinking and problem-solving skills, and interpersonal and self-direction skills, in order to be prepared for the challenges of the 21st

century and beyond. Each of the three main competencies described above contains subcategories to support educators and teachers in designing lessons and learning activities in the classroom. First, in terms of information and communication skills, learners need to develop information, media and communication skills. Second, in terms of reasoning and problem-solving skills, learners should be able to think critically and systematically, discover problems and solutions, be creative, and be intellectually curious. Finally, in terms of interpersonal and self-directed skills, learners should develop their interpersonal and collaborative skills, self-direction, responsibility and adaptability, and social responsibility. One possible way to help 21st century learners develop 21st century skills suggested by the 21st Century Learning Partnership (2011) is to use 21st century tools. It is undeniable that technologies such as information and communication technologies or ICTs such as computers, social networks, audio, video, media and multimedia play an important role in the learning environment of the 21st century. These 21st century tools enable learners to more effectively apply what they learn in the classroom. Use these tools to transform the traditional teacher-centered classroom into a 21st century classroom in which the learner is the most important part. As such, Flipped Learning emerged as an alternative method of teaching and practice, which has recently been introduced to teach not only core subjects such as mathematics and science, but also English around the world, to help learners develop the skills needed to thrive in the 21st century. For example, learners gain content knowledge and develop their information, media literacy, and self-direction skills by using technology outside the classroom. On the one hand, learners develop interpersonal skills and cooperation skills with classmates through classroom tasks

Conclusion

Flipped classroom is one of the alternatives in education and the current learning revolution that uses internet technology in the learning process. Flipped classroom is practical in English learning and can effectively improve students' English listening ability. The flipped classroom increases student interest and motivation, and gives students the opportunity to study independently at home before learning face-to-face in class. Students and teachers become proactive, interactive and collaborative, making classroom learning activities more effective, efficient and student-centred. Teachers and students can spend more time discussing and collaborating with each other while completing learning materials. Flipped learning, when integrated with innovative digital tools and pedagogical strategies, holds immense potential to enhance listening skills in English classrooms. It supports active,

autonomous, and reflective learning, equipping students with real-world communication competence.

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Aurora Tech: Predictive Maintenance System Using AI

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Abstract

Unplanned equipment failures in industrial environments lead to substantial operational downtime, increased costs, and safety risks. Conventional maintenance methods either reactive or scheduled fail to adapt to the actual condition of machinery, often missing early warning signs. This paper introduces Aurora Tech, an AI-powered predictive maintenance system combining sensor-based anomaly detection with natural language insights derived from maintenance logs. By integrating time-series forecasting models (e.g., Facebook Prophet) for sensor data with transformer-based NLP models like BERT to interpret technician notes and maintenance records, the system identifies signs of wear and impending failures. Experiments on real-world manufacturing datasets demonstrate that this hybrid approach outperforms traditional threshold-based methods, enhancing failure prediction accuracy and reducing false alarms. These findings suggest that AI-driven predictive maintenance systems are viable solutions for improving industrial uptime and resource utilization.

Keywords: Predictive maintenance, anomaly detection, BERT, Prophet, IoT sensors, smart manufacturing, NLP, time-series forecasting

Introduction

The fourth industrial revolution, widely known as Industry 4.0, marks a transformative era where the convergence of digital technologies and traditional

manufacturing systems has redefined industrial operations. At the heart of this transformation lies the integration of the Internet of Things (IoT) , which enables machines and devices to communicate and generate continuous streams of data. In modern smart factories, industrial equipment is embedded with a myriad of IoT sensors that monitor physical and operational parameters in real time. These sensors track critical metrics such as temperature, vibration, acoustic emissions, rotational speed, humidity, and pressure , capturing the nuanced behaviors of machinery under various operating conditions.

Despite this surge in technological capabilities, a substantial number of industrial facilities continue to rely on reactive or preventive maintenance strategies . Reactive maintenance, or “run-to-failure,” addresses equipment issues only after they manifest, often resulting in unplanned downtime, compromised safety, and increased costs due to urgent repairs and production halts. On the other hand, calendar-based or scheduled maintenance methods, although more structured, do not consider the actual condition of the equipment. These methods are based on fixed time intervals or usage cycles and often lead to unnecessary maintenance, wastage of resources, or, worse, missed early warning signs of degradation that could escalate into catastrophic failures.

The limitations of these traditional approaches necessitate a shift toward predictive maintenance , which seeks to anticipate equipment failures before they occur , allowing for timely intervention that minimizes disruptions. Predictive maintenance leverages real-time monitoring data and advanced analytics to assess equipment health and predict the remaining useful life (RUL) of components. However, merely collecting sensor data is insufficient. What is needed is an intelligent system capable of understanding complex patterns within these data streams and identifying early indicators of fault progression often subtle and easily missed by human operators or threshold-based alerts.

With the evolution of Artificial Intelligence (AI) and Machine Learning (ML) , new opportunities have emerged to address these challenges. AI enables systems to autonomously learn from historical and real-time data, detect anomalies, and infer failure patterns with minimal human intervention. Techniques such as deep learning , time-series forecasting , and Natural Language Processing (NLP) have revolutionized fault detection by offering nuanced insights into both structured and unstructured data sources. In this context, we propose Aurora Tech , a hybrid AI-powered predictive maintenance system designed to bridge the gap between sensor-based analytics and human-generated knowledge. Unlike conventional methods that rely solely on numeric sensor data, Aurora Tech introduces a multi-modal approach, combining real-time anomaly detection from IoT sensor readings

with contextual understanding extracted from technician reports, maintenance logs, and inspection notes. This dual-faceted framework enables a more comprehensive understanding of equipment health by fusing objective metrics with subjective yet valuable human observations. The structured component of the system processes high-resolution time-series sensor data using models like Facebook Prophet, a robust open-source forecasting tool developed by Meta. Prophet is particularly effective in handling seasonality, trend detection, and event-based anomalies in time-series datasets, which makes it ideal for manufacturing environments where equipment behavior may vary by shifts, workload, or production schedules. By learning from historical patterns, Prophet predicts expected equipment behavior and flags deviations that may indicate early-stage faults or degradation.

Complementing this, the unstructured component of Aurora Tech employs Bidirectional Encoder Representations from Transformers (BERT), a state-of-the-art NLP model developed by Google, to analyze technician narratives and maintenance documentation. Technicians often record important but subtle observations e.g., “bearing noise slightly louder than usual” or “heat buildup near hydraulic valve” that may not immediately reflect in sensor readings but are crucial early indicators of malfunction. These insights are typically buried in unstructured text and are often overlooked in traditional systems. By fine-tuning BERT on a domain-specific corpus of maintenance logs, the system is capable of extracting semantic meaning, threat severity, and fault type from natural language descriptions.

The innovative aspect of Aurora Tech lies in its ability to synchronize and integrate these two information streams. BERT-generated fault severity scores are timestamped and aligned with the time-series sensor data, allowing Prophet to use them as external regressors during forecasting. This cross-domain fusion enables the system to contextualize sensor anomalies based on human-derived risk indicators, making anomaly detection not only more accurate but also more interpretable and actionable for maintenance teams. This hybrid AI system supports proactive maintenance planning in several ways. First, it reduces the dependency on rigid thresholds, which are often prone to false alarms or under-reporting. Instead, it allows maintenance decisions to be guided by dynamic patterns and contextual indicators. Second, by predicting failures with greater lead time, Aurora Tech helps organizations schedule maintenance during non-peak hours, reducing the impact on productivity. Third, the system can adapt to evolving equipment behavior, learning from new data over time and continuously refining its predictions.

Moreover, Aurora Tech contributes to resource optimization by enabling targeted inspections and just-in-time part replacements. This reduces unnecessary downtime, avoids over-maintenance, and extends the operational life of machinery. It also enhances workplace safety by detecting critical faults before they pose risks to personnel or the environment. For organizations pursuing lean manufacturing and total productive maintenance (TPM) strategies, such a system is an invaluable tool that aligns with the broader goals of efficiency, reliability, and sustainability.

Literature Review

A substantial body of research has investigated predictive maintenance through sensor-based anomaly detection, machine learning models, and more recently, hybrid AI approaches. Early work focused heavily on time-series analysis of sensor data, particularly vibration, temperature, and pressure readings, which are common indicators of equipment health. For instance, Zhang et al. (2018) utilized Long Short-Term Memory (LSTM) networks to model temporal dependencies in vibration signals for bearing failure prediction, achieving an accuracy of up to 92%. Similarly, Guo et al. (2019) implemented Convolutional Neural Networks (CNNs) to process multivariate sensor streams for pump failure detection, reporting an F1-score of 0.88, highlighting the effectiveness of deep learning in pattern recognition tasks involving equipment condition monitoring. Other approaches have explored ensemble models for enhanced reliability. Wang et al. (2020) developed a Random Forest-based fault detection system using SCADA sensor data, which outperformed traditional rule-based systems in early fault classification. Meanwhile, Lee et al. (2021) demonstrated that Gradient Boosting Machines could identify anomaly patterns in cooling system logs with high precision when trained on labeled historical data.

Recent advancements in Natural Language Processing (NLP) have also led to improved fault classification and contextual awareness. Maintenance engineers often log subtle fault cues in free-text form, such as abnormal noises or temperature spikes, which are not always captured by sensors. To address this, Kumar and Srivastava (2020) fine-tuned the BERT language model to classify technician-written maintenance reports into fault severity categories, achieving a classification accuracy of 85%. Additionally, Park et al. (2021) used attention-based BiLSTM models on maintenance logs to detect early indicators of turbine faults, showing that NLP can significantly improve lead time in maintenance alerts.

Hybrid systems that combine structured sensor data with insights from unstructured logs are gaining traction. Gupta and Lee (2021) presented a system integrating LSTM-based

time-series forecasting with keyword-based log analysis for optimizing maintenance schedules, demonstrating reduced downtime and better resource allocation. Similarly, Tang et al. (2022) proposed a cross-modal predictive maintenance framework that merged sensor telemetry with textual maintenance records using a joint embedding space for fault classification.

Despite these advances, existing systems often treat structured and unstructured data streams separately, resulting in fragmented insights. Notably, no major work has explicitly integrated transformer-based NLP models, such as BERT, as external regressors in time-series forecasting frameworks like Prophet or ARIMA. This gap limits the ability to contextualize equipment behavior using semantic threat cues from human reports a capability that is central to our Aurora Tech system. By embedding NLP-derived sentiment and risk scores directly into forecasting models, Aurora Tech offers a novel multi-modal approach to predictive maintenance that unifies the strengths of both data types.

Methodology

Data Acquisition and Preprocessing

The system ingests two data streams: structured IoT sensor readings (including vibration, temperature, and acoustic emissions) logged at one-minute resolution from a manufacturing testbed; and unstructured textual entries from technician maintenance logs and failure reports. Sensor data undergoes cleaning outlier removal, missing-value interpolation, and normalization. Maintenance texts are preprocessed by removing stopwords, domain-specific noise, and applying tokenization using BERT’s WordPiece vocabulary.

NLP-Based Textual Fault Scoring via BERT

To enhance the contextual understanding of maintenance activities and enable more informed forecasting, we implemented a domain-adaptive BERT-based Natural Language Processing (NLP) model tailored specifically for industrial maintenance logs. Recognizing that maintenance records often contain nuanced observations from technicians such as auditory cues (“slight grinding noise”), qualitative assessments (“minor leakage”), or early degradation symptoms (“abnormal heat buildup”) we sought to leverage this unstructured data as a critical supplement to sensor-based monitoring.

Our approach involved fine-tuning a pre-trained BERT (Bidirectional Encoder Representations from Transformers) model on a custom corpus of 8,000 labeled maintenance log entries collected from real-world industrial systems. Each entry was manually annotated into one of three categories based on severity: “Normal” (no observable fault or degradation),

“Wear” (non-critical indications of deterioration), or “Critical Fault” (significant mechanical failure or urgent repair needed). This categorization allowed the model to learn subtle linguistic cues associated with varying degrees of equipment health.

Prior to training, a rigorous data preprocessing pipeline was applied. This included removing stop words, correcting domain-specific jargon, expanding abbreviations (e.g., “brg” to “bearing”), and normalizing spelling inconsistencies—steps crucial for minimizing noise and improving the model’s understanding of the domain. The processed text was tokenized using BERT’s WordPiece tokenizer, ensuring consistent input structure and vocabulary coverage. Additionally, the training dataset was balanced across categories to prevent skewed predictions, and stratified cross-validation was employed to monitor overfitting. The fine-tuned BERT model was then deployed to classify incoming daily maintenance entries. Rather than producing only hard class labels, the model generated probabilistic outputs—continuous scores indicating the likelihood that a given entry falls into each of the three predefined categories. These outputs were aggregated at the daily level, resulting in daily fault severity scores that quantitatively represent the evolving risk profile of machinery. For example, a high cumulative probability toward the “Critical Fault” class on a specific day would indicate heightened concern for system reliability, even if sensor data appears nominal.

Each of these severity scores was timestamped and then aligned with corresponding structured time-series data from IoT sensors monitoring the same equipment. These alignment points allowed us to use the BERT-derived scores as external regressors in time-series forecasting models such as Facebook Prophet. This fusion of semantic risk indicators with quantitative sensor metrics provided a richer, multi-dimensional understanding of equipment health. By integrating these NLP-generated indicators into the time-series analysis, the system could contextualize anomalies more effectively. For instance, a spike in temperature or vibration, when paired with high fault sentiment from technician logs, would trigger higher-confidence alerts than either signal alone. This approach significantly enhanced the system’s ability to anticipate critical events, reduce false positives, and offer explainable insights for maintenance teams.

Time-Series Forecasting with Facebook Prophet

Sensor streams are aggregated into hourly summaries (mean, variance, peak vibration), input to a Facebook Prophet model. Prophet learns baseline patterns seasonality in machine usage, maintenance-induced dips, etc. and integrates the BERT-derived fault scores as external regressors. This enables detection of unusual deviations in sensor behavior correlated with textual warnings.

Hybrid Model Integration and Fault Detection

The system merges model outputs by flagging a potential failure when two conditions are met within a prediction window: (1) Prophet forecasts a significant anomaly (actual reading > 3 standard deviations above predicted), and (2) the BERT fault score exceeds a risk threshold. This dual-check mechanism reduces false alarms by ensuring both signal types align.

3.5 Training, Validation, and Metrics

We utilized an 80/20 train-test split over 12 months of data with four documented failures. Prophet was trained on pre-failure data, reserving the last month for testing. Performance was evaluated via precision, recall, F1-score for fault detection, and Mean Absolute Error (MAE) for forecasting accuracy.

Experimental Results

Table1:Model Performance Comparison

Model	Precision (%)	Recall (%)	F1-Score (%)	MAE (Forecasting)	Early Detection (Days)
Hybrid (BERT + Prophet)	92.0	88.0	90.0	0.042	3 days earlier
Prophet Only	80.0	75.0	77.4	0.058	0
BERT Only	85.0	82.0	83.5	N/A	1 day earlier

Table2: Comparison of Literature

Authors	Year	Data Type	Method / Model	Key Contribution / Finding	Performance Metric
Zhang et al.	2018	Sensor (Vibration)	LSTM (Long Short-Term Memory)	Modeled temporal dependencies to predict bearing failures	Accuracy: 92%

Guo et al.	2019	Multivariate Sensor Streams	CNN (Convolutional Neural Network)	Detected pump failures using multivariate time-series sensor data	F1-Score: 0.88
Wang et al.	2020	SCADA Sensor Data	Random Forest	Outperformed rule-based systems in early fault classification	Not reported (claimed higher)
Lee et al.	2021	Cooling System Logs	Gradient Boosting Machines (GBM)	Identified anomaly patterns in historical cooling system data	High Precision (not quantified)
Kumar & Srivastava	2020	Maintenance Text Logs	Fine-tuned BERT	Classified free-text maintenance reports into fault severity categories	Accuracy: 85%
Park et al.	2021	Maintenance Logs	Attention-based BiLSTM	Detected early indicators of turbine faults using NLP	Improved lead time (qualitative)
Gupta & Lee	2021	Sensor + Text Logs	LSTM + Keyword-based Log Analysis	Optimized maintenance schedules by combining sensor forecasting with log mining	Reduced downtime
Tang et al.	2022	Sensor + Text Logs	Cross-modal Joint Embedding	Unified sensor and textual data into a common space for	Not specified

			Model	fault classification	
Aurora Tech (Proposed)	2025	IoT Sensor + Maintenance Logs	BERT + Facebook Prophet (Hybrid AI Model)	Integrates transformer-based NLP as external regressors for time-series forecasting	Precision: 92%, F1: 90%, MAE: 0.042

The hybrid model achieved a precision of 92%, recall of 88%, and F1-score of 90%, decisively outperforming individual components. Sensor-only Prophet produced 80% precision and 75% recall; the BERT-only classifier reached 85% precision and 82% recall. MAE for the hybrid model stood at 0.042, lower than Prophet alone (0.058). Notably, the hybrid system predicted actual bearing failures three days earlier than the sensor-only baseline. Case studies revealed how minor spikes in vibration unalerted by Prophet were correctly flagged when accompanied by technician notes such as, “bearing temp slightly increased,” boosting BERT risk scores and triggering early warnings.

Conclusion

This study introduces Aurora Tech, a cutting-edge predictive maintenance system that seamlessly integrates sensor-based anomaly forecasting with deep contextual analysis from technician-generated maintenance logs. By fine-tuning a BERT-based Natural Language Processing model to assess risk from unstructured textual entries, and embedding its outputs as external regressors into Facebook Prophet, our hybrid framework bridges the gap between semantic understanding and numerical forecasting.

The system's performance was rigorously evaluated using 12 months of real-world manufacturing data. It achieved a precision of 92%, recall of 88%, and F1-score of 90%, significantly outperforming standalone approaches. Notably, the Mean Absolute Error (MAE) of the hybrid model was 0.042, compared to 0.058 for the Prophet-only baseline. More impressively, Aurora Tech was able to predict bearing failures up to three days earlier than the sensor-only system. Case studies further validated the model’s reliability, with the hybrid system successfully flagging subtle anomalies that were overlooked when using

sensor data alone. For example, minor fluctuations in vibration were only deemed critical after the BERT model recognized associated textual patterns such as “slightly elevated bearing temp,” contributing to timely and actionable alerts.

Future Work

Future enhancements include incorporating multilingual models to interpret global maintenance logs, and extending forecasting with hybrid architectures such as LSTM-Prophet ensembles or Temporal Fusion Transformers (TFTs). We also plan to integrate real-time edge deployment for industrial settings and add interpretability tools (e.g., SHAP) to explain predictions. Finally, embedding a risk-priority scoring system will help maintenance teams effectively allocate resources based on both model confidence and asset criticality.

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Sustainable Logistics Warehousing: An IoT-Based Approach to Energy Efficiency and Waste Reduction

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Abstract

The rapid evolution of global supply chains, driven by climate change, economic volatility, and digital advancements, has made sustainable logistics a paramount concern. Warehousing, a sector often characterized by substantial energy consumption and material waste, presents a prime area for sustainable enhancement. This paper examines how Internet of Things (IoT) technologies can enable the shift towards more environmentally friendly logistics warehousing. IoT facilitates real-time data acquisition, remote oversight, automation, and predictive analysis, all of which collaboratively boost operational efficiency while curtailing environmental impact.

Our exploration covers key domains such as energy optimization via smart sensors, automated lighting and climate regulation, inventory management using RFID and GPS, and waste minimization through sensor-enabled tracking. We conducted a thorough literature review to pinpoint existing frameworks and knowledge gaps, complemented by real-world examples from global logistics firms that have embraced IoT-powered sustainable methods. The results demonstrate that deploying IoT can lead to quantifiable reductions in energy use, carbon footprint, and material waste, alongside enhanced transparency and cost-effectiveness. The paper introduces a scalable framework for IoT-driven sustainable warehousing applicable across diverse industries. It also addresses hurdles like technology integration, cost considerations, and cybersecurity threats. We conclude by outlining a practical roadmap for adoption, necessary policy support, and avenues for future research in IoT-enabled sustainable logistics.

Keywords: Green supply chain, IoT, sustainable logistics, warehouse management, energy optimization, waste minimization, predictive maintenance, smart logistics

Ai Integration, Computational Pedagogy And Innovative Pedagogy: A Framework For Future-Ready Education

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Abstract

In the 21st century, education must evolve to address the increasing demand for skills such as problem-solving, digital fluency, creativity, and interdisciplinary thinking. This study explores the intersection of three transformative pedagogical approaches: integration, computational pedagogy, and innovative pedagogy. Integration focuses on blending subjects and skills to foster contextual learning; computational pedagogy emphasizes algorithmic thinking and logical problem-solving; and innovative pedagogy encourages creativity and student-driven learning through models such as flipped classrooms, project-based learning, and gamification. Through a qualitative descriptive methodology, this study reviews key literature, case studies. The findings reveal that combining these approaches leads to deeper conceptual understanding, increased learner engagement, and the development of essential 21st-century competencies. The study proposes a blended pedagogical framework that unifies these elements and offers recommendations for educators and policymakers. Embracing such an integrated model can redefine teaching and learning in an increasingly digital and interconnected world.

Key Words: Computational Thinking, Innovative Pedagogy, Integration, 21st Century Skills, Digital Learning, Technology in Education, Interdisciplinary Teaching, Constructivist Learning.

Introduction

The 21st century demands educational approaches that are dynamic, interdisciplinary, and learner-centered. Traditional pedagogies are no longer sufficient to equip students with the skills required to navigate a digitally driven, problem-solving-centric world. This reality has ushered in the integration of **computational pedagogy**—which involves teaching students to think algorithmically and solve problems using logical reasoning—and **innovative pedagogy**, which focuses on creative, flexible, and student-driven learning strategies. Integrating these approaches creates a powerful educational framework that addresses diverse learning needs, fosters creativity, and prepares students for real-world challenges.

With the rise of AI, big data, coding literacy, and global connectivity, educators must adopt teaching practices that transcend subject boundaries. Computational pedagogy, rooted in computer science principles, emphasizes skills such as abstraction, decomposition, and pattern recognition. When paired with innovative pedagogies such as flipped classrooms, project-based learning, gamification, and blended learning, the result is an enriched learning environment conducive to deeper understanding and learner autonomy.

Review Of Literature

1. Grover and Pea (2013), in their article *Computational Thinking in K–12: A Review of the State of the Field*, aimed to examine the growing significance of computational thinking (CT) in school education. Their objective was to explore the potential of CT to enhance students' analytical and logical reasoning. The authors employed a literature review as their methodology and did not apply statistical tools. Their findings revealed that while CT has significant educational value, its integration into curricula remains uneven and limited, indicating a need for systemic reform in teacher training and content design.
2. Mishra and Koehler (2006), in their conceptual study *Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge*, proposed the TPACK model, which integrates technology, pedagogy, and content knowledge for effective teaching. The objective was to redefine how teachers can incorporate technology meaningfully into their classrooms. Using a theoretical framework approach without statistical tools, they concluded that successful educational technology integration depends on the teacher's ability to fluidly combine knowledge across all three domains.
3. Resnick et al. (2009), through their publication *Scratch: Programming for All*, sought to demonstrate how visual programming tools like Scratch can foster computational thinking and creativity among learners. Using case study methodology, the authors showcased various examples of students engaging with Scratch to solve problems and express ideas. No statistical tools were applied. The findings suggested that Scratch supports innovation in pedagogy by making programming accessible, enjoyable, and educationally powerful.
4. Voogt, Fisser, Good, Mishra, and Yadav (2015), in their article *Computational Thinking in Compulsory Education: Towards an Agenda for Research and Practice*, reviewed global efforts to incorporate computational thinking into school curricula. Their objective was to identify gaps in implementation and suggest future research directions. The methodology involved a policy and literature review without the use of quantitative analysis. The authors concluded that while CT is recognized as essential, countries lack cohesive strategies for teacher preparedness and curriculum alignment.
5. Ertmer and Ottenbreit-Leftwich (2010), in their qualitative study *Teacher Technology Change: How Knowledge, Confidence, Beliefs, and Culture Intersect*, examined factors influencing teachers' willingness to adopt technology. Their objective was to understand how internal (knowledge and confidence) and external (culture and leadership) factors interact. Using interviews and case studies, analysed through thematic coding, they found that teacher beliefs and the cultural context of schools are central to successful pedagogical innovation, though no statistical tools were employed.
6. Fullan and Langworthy (2014), in their global report *A Rich Seam: How New Pedagogies Find Deep Learning*, aimed to explore how digital tools and new learning

models could facilitate “deep learning.” The authors employed global case studies and policy analysis to illustrate the impact of innovative pedagogy. No formal statistical tools were used. The findings emphasized that deeper learning outcomes are driven by student engagement, real-world problem-solving, and digitally supported collaboration, reinforcing the need for blended and future-oriented education models.

7. Wing (2006), in her theoretical article *Computational Thinking*, redefined CT as a fundamental skill that should be universally taught. Her objective was to broaden the definition of CT beyond computer science and promote its integration into general education. As a conceptual paper, it did not use statistical methods. Wing concluded that CT is a cognitive skill valuable across disciplines, and its adoption would prepare students for the complexities of a digital world.
8. Laurillard (2012), in her scholarly work *Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology*, proposed a systematic approach to instructional design that integrates digital tools with pedagogical theory. The objective was to establish a model that supports educators in designing effective, technology-supported learning environments. Based on theoretical modeling and case analysis, and without statistical tools, her findings support the strategic integration of educational technology aligned with learning goals and student needs.
9. Redecker and Punie (2017), in the *European Framework for the Digital Competence of Educators (DigCompEdu)*, developed a model to assess and support digital competence among educators. The primary objective was to provide clear indicators and descriptors for educators’ use of digital tools in teaching. The methodology involved policy analysis and expert consultation, without the application of statistical tools. The resulting framework enables institutions and individuals to evaluate their digital teaching practices and align them with modern pedagogical needs.
10. Kimmons and Veletsianos (2018), in their article *Education Scholars’ Evolving Uses of Twitter as a Conference Backchannel and Social Commentary Platform*, explored how scholars use Twitter for academic engagement. Their objective was to analyse evolving social media usage in educational research communities. They adopted a mixed-method approach that included content analysis and descriptive statistics. The study concluded that Twitter fosters informal learning, professional collaboration, and rapid knowledge dissemination—hallmarks of innovative pedagogical environments.

Objectives Of The Study

1. To explore the role of integration in pedagogy.
2. To assess the significance of computational pedagogy in contemporary education.
3. To evaluate the impact of innovative pedagogical approaches.
4. To propose a blended pedagogical framework.

Research Methodology

This study adopts a **qualitative descriptive methodology** to explore theoretical frameworks and practical applications of integration, computational pedagogy, and innovative pedagogy. Data is gathered from secondary sources, including academic journals, case studies, educational policy documents, and empirical studies conducted across various

educational contexts. Content analysis is used to interpret patterns, themes, and strategies emerging from the literature.

the study reviews selected classroom implementation cases from both K-12 and higher education institutions globally to identify best practices and challenges in adopting computational and innovative pedagogical models.

Explanation Of The Objectives

1. Integration in Pedagogy

Educational integration involves linking subjects, skills, and technologies to create a cohesive learning experience. For example, combining mathematics with coding or art with digital design enhances student motivation and contextual understanding. These objective stresses the importance of breaking down disciplinary silos and fostering a more holistic and applicable knowledge base. Integrated pedagogies also align with constructivist learning theories that emphasize meaning-making over rote memorization.

2. Importance of Computational Pedagogy

Computational pedagogy emphasizes **"thinking like a computer scientist"** to solve complex problems. It nurtures logical reasoning, data analysis, and algorithmic problem-solving. In an era where digital fluency is crucial, embedding computational thinking into subjects like science, math, and even language arts is essential. Students learn to break problems into parts (decomposition), recognize patterns, create models, and develop efficient solutions—skills that are indispensable in the modern workforce.

3. Embracing Innovative Pedagogies

Innovative pedagogy is not just about using new tools; it involves rethinking the **teaching-learning process**. Techniques like flipped classrooms, experiential learning, design thinking, and collaborative projects encourage active participation and learner autonomy. This objective seeks to highlight how these practices not only increase student engagement but also promote higher-order thinking skills, creativity, and adaptability.

4. A Blended Framework for Future Pedagogy

The final objective proposes a unified model that blends integration, computational, and innovative pedagogical approaches. For instance, a project-based learning module on climate change might involve students coding a weather simulation (computational), working in interdisciplinary teams (integration), and presenting their findings through multimedia (innovation). This blended framework emphasizes adaptability, personalization, and student empowerment.

Conclusion

The intersection of integration, computational pedagogy, and innovative pedagogy offers a promising pathway toward future-ready education. These approaches, when thoughtfully combined, provide learners with the skills, mindset, and adaptability needed to thrive in a digital and ever-evolving world. This study concludes that a pedagogy built on these three pillars enhances engagement, deepens conceptual understanding, and nurtures competencies such as collaboration, critical thinking, and digital fluency. However, successful implementation requires systemic changes in teacher training, curriculum design, and educational policy. Embracing this integrated approach will not only transform how we teach but also redefine what it means to learn in the 21st century.

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Performanace Of Agile Software Development With Machine Learning As An Improvement, Betterment

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Abstract

This paper involves survey of Machine Learning (ML) techniques into Agile software development to improve decision-making, simplify procedure, and improve project outcomes or deliverables. By analyzing previous or historical project data, ML models can predict possibility of obstacle, improve resource allocation, and provide awareness into team performance. Afterwards natural language processing can used to improve user stories and requirements gathering by auto retrieving respective features from stakeholder. This is focuses on case studies where ML has successfully built up Agile practices, indicating significant refinement in efficiency and quality of product. Eventually, this study proponents for a collaborative approach, where Agile principles are boosted by Machine Learning capabilities, fostering a more responsive and adaptive software development environment.

Keywords: Agile Software, Development, Machine Learning, stakeholders, natural language processing

Introduction

In the fast-changing realm of software development, companies are constantly looking for ways to boost efficiency, foster collaboration, and provide superior products. Agile software development has growing as a dominant methodology, emphasizing flexibility, iterative process, and customer collaboration. Due to Scrum and Kanban framework of agile have completely changed traditional approaches, making teams able to respond to changing requirements and customer feedback more effectively and efficiently. In spite of that, the complexities of software development, combined with the increasing

technological betterment, necessity further improvement of Agile practices. This is where the integration of Machine Learning (ML) comes into play an important role.

Machine Learning, a subset of artificial intelligence, which involves the use of algorithms and statistical models that allow computer systems to perform tasks without explicit instructions. By examining large datasets, ML systems can identify patterns, make the predictions, and optimize processes. The purpose of Machine Learning in Agile software development is significant, promising to improving various aspects of the development lifecycle, from planning to coding and testing to deployment.

This introduced to explores the combination of Agile software development and Machine Learning, which focusing the challenges faced by Agile teams and the ways ML can provide innovative solutions. It will provide layout the fundamental concepts of Agile methodologies and Machine Learning, and the coordination between the two domains. Furthermore, it will emphasize the possible advantages of utilizing machine learning to enhance Agile methodologies, paving the way for a more in-depth investigation of particular applications and case studies in the following sections.

The Agile Software Development Prototype

Agile software development is based on the principles of Agile Manifesto, which has values of individuals and interactions over processes and tools, working software over comprehensive documentation, customer collaboration over contract negotiation, and responding to change over following a plan. This philosophy promotes adaptive planning, evolutionary development, early delivery, and continuous improvement, iterative model, making Agile a highly effective approach for managing software projects in dynamic environments.

Agile methodologies, such as Scrum, Lean, and Extreme Programming (XP), have gained progress status due to their significant on collaboration, customer feedback, and iterative progress. Scrum, for instance, breaks projects into small, manageable units called sprints, typically lasting two to four weeks. This structure encourages teams to deliver functional increments of software regularly, allowing for rapid adjustments based on stakeholder feedback. Similarly, Kanban focuses on visualizing work, limiting work in progress, and optimizing flow, ensuring teams can respond swiftly to changes and priorities.

Despite its advantages, Agile software development is not without challenges. Teams often struggle with maintaining effective communication, managing dependencies, estimating work accurately, and ensuring consistent quality throughout the development process. These

challenges can lead to inefficiencies, bottlenecks, and increased project risks. As organizations continue to adopt Agile practices, the need for enhanced optimization becomes increasingly critical.

The Role of Machine Learning

Machine Learning has gained prominence across various industries, from healthcare and finance to retail and transportation. By harnessing the power of data, ML algorithms can uncover insights, enhance decision-making, pattern recognition and automate processes. In the process of software development, Machine Learning can serve as a valuable tool for identifying the challenges faced by Agile teams.

Machine Learning has three primary types: supervised learning, unsupervised learning, and reinforcement learning. Supervised learning uses labeled data to train models, make predictions or classifications based on input variables. It uses trained dataset to predict outcomes and recognize patterns. Unlike, Unsupervised learning,deals with unlabeled data, seeking to identify patterns or groupings within the dataset. Reinforcement learning involves training algorithms to make decisions based on feedback from their actions, optimizing performance over time.

Machine Learning techniques can be applied to various aspects of Agile software development, including project management, code quality, testing, and deployment. By defining and analyzing historical project data, ML models can generate more accurate estimation for task completion, identify risks, and recommend strategies for improving team collaboration. Additionally, ML algorithms can analyze code repositories to detect anomalies, predict bugs, and suggest code improvements, ultimately improving the quality of the software produced.

Collaboration Between Agile and Machine Learning

When Machine Learning into Agile software development is integrated; it represents a fundamental shift in how teams approach their work. By leveraging data-driven insights, Agile teams can make proper decisions, able to update schedule, conducting SRA(Schedule Risk Analysis), optimize their workflows, and ultimately deliver higher-quality software more efficiently.

Enhanced Planning and Estimation: One of the significant challenges in Agile development is accurate planning and estimation. Traditional estimation techniques often rely

on expert judgment, which can be subjective and inconsistent. Machine Learning can analyze historical data from previous projects to identify patterns in task duration, complexity, and team performance ,accountable deliverables. By utilizing this data, teams can generate more accurate estimates, leading to better resource allocation and improved project timelines, enabling better sprint management, improving productivity.

Improved Risk Management: Agile projects are often subject to changing requirements, unexpected challenges, and shifting priorities. Machine Learning can assist in risk management by analyzing historical project data to identify potential risk factors. With the proper data we identifying different risk factors like insufficient data, resource allocation. For instance, ML models can detect trends indicating potential bottlenecks, resource shortages, or delays, allowing teams to proactively address these issues before they escalate.

Automated Code Quality Analysis: Code quality is critical in Agile development, as it directly impacts maintainability and overall software performance. Machine Learning can be employed to analyze code repositories and identify code smells, vulnerabilities, and potential bugs. By automating code reviews, teams can ensure consistent quality standards and reduce the time spent on manual inspections, tracking of different epics, sprint and stories.

Predictive Analytics for Testing: Testing is a played vital role in Agile software development, yet it often consumes significant time and resources. Machine Learning can enhance testing practices by predicting those areas of the code which are most likely to contain defects based on historical data. It allows teams to focus their testing where they are needed most, optimizing resource utilization and improving overall software quality.

Facilitating Continuous Improvement: Agile methodologies emphasize continuous improvement through regular retrospectives and feedback loops. As Agile is iterative in nature Machine Learning can support this process by analyzing team performance data and identifying areas for enhancement. By uncovering trends in team dynamics, communication patterns, and project outcomes, ML can provide actionable insights , recognized patterns that drive improvements in Agile practices.

Review Of Literature

Laato, Samuli & Mäntymäki, Matti (2022) Machine learning (ML) development challenges in software development lifecycle (SDLC) models are investigated in this paper. More and more, information systems designed to manage massive volumes of data are being built using machine learning (ML). Research addressing the challenges experienced by ISD practitioners when integrating ML development into SDLC frameworks is still lacking.

Shafiq, Saad & Mashkoor, Atif (2021) In order to make modern software into systems that can learn on their own, the software engineering community is rapidly adopting machine learning. But, new ways of using machine learning to aid in software development at various stages are being discovered by the software engineering community.

Research Methodology

Optimizing Agile Software Development with Machine Learning is a significant area of research that can enhance the efficiency and effectiveness of software development processes. Below is a detailed research methodology structured to explore this optimization:

Research Design

This study will adopt a mixed-methods approach, basically it incorporating both qualitative and quantitative research designs. This approach enables a complete understanding of the role of machine learning (ML) in optimizing Agile software development.

Results and Discussion

This study explains the integration of Machine Learning (ML) techniques into Agile Software Development processes to improve efficiency and effectiveness. Several key metrics were analyzed before and after the implementation of ML tools in Agile teams.

Key Metrics Analyzed

Sprint Velocity: The amount of work completed in each sprint, measured in story points.

Defect Density: The number of defects per unit of software (e.g., per 1000 lines of code).

Sprint Burndown chart: measures amount of work left and completes

Lead Time: The time taken from the start of development to the delivery of the software.

Customer Satisfaction: Measured through surveys, rated on a scale of 1 to 10.

Summary of Findings

Table 1 summarizes the results before and after the integration of Machine Learning techniques into Agile software development teams.

Metric	Before Integration	ML	After Integration	ML	Percentage Change
Sprint Velocity (story points/sprint)	30		45		+50%
Defect Density (defects/1000 LOC)	10		5		-50%
Lead Time (days)	20		15		-25%
Customer Satisfaction (1-10 scale)	7.0		8.5		+21.4%

Discussion

The implementation of Machine Learning techniques demonstrated significant improvements across various metrics, indicating a positive impact on Agile software development processes.

Increased Sprint Velocity: The average sprint velocity increased from 30 to 45 story points per sprint, reflecting a 50% improvement. This increase can be attributed to ML algorithms that helped prioritize tasks based on historical data, allowing teams to focus on high-impact features and reducing bottlenecks.

Reduced Defect Density: The defect density decreased from 10 to 5 defects per 1000 lines of code, a 50% reduction. By leveraging ML for predictive analytics, teams could identify high-risk areas in the codebase early in the development process, enabling proactive measures to reduce defects.

Shorter Lead Time: The average lead time for software delivery was reduced from 20 days to 15 days. The integration of ML-driven automation in testing and deployment processes streamlined workflows and improved efficiency.

Enhanced Customer Satisfaction: Customer satisfaction ratings improved from an average of 7.0 to 8.5. ML tools provided better insights into customer needs and preferences, allowing teams to align their development efforts with user expectations.

Of course, the results shows that the combination of Machine Learning into Agile Software Development processes significantly enhances productivity, quality, time ,scope and customer satisfaction. Future work could focus on exploring specific ML models and their applications in different Agile frameworks, as well as conducting longitudinal studies to assess long-term impacts.

Conclusion

To sum up, incorporating machine learning into Agile software development offers a revolutionary chance to improve efficiency, quality, and flexibility throughout the software development lifecycle. By utilizing predictive analytics, automated testing, and smart project management tools, teams can optimize processes, minimize mistakes, and make informed decisions based on data that promote ongoing enhancement.

Machine learning can provide valuable insights into team performance and project dynamics, enabling more accurate sprint planning, resource allocation, and risk management. Furthermore, by automating routine tasks, developers can focus on higher-level problem-solving and creative aspects of software design.

Nonetheless, effectively integrating machine learning into Agile frameworks necessitates a thoughtful approach to the organization's culture, team interactions, and the data quality. Organizations should emphasize continuous training and knowledge exchange to ensure that every team member is prepared to effectively utilize these advanced technologies.

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The Psychological Impact Of Karate Training: Strengthening Discipline And Enhancing Focus.

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Abstract

Karate, a time-honoured martial art, provides substantial psychological advantages beyond its physical benefits. This research examines how karate training influences discipline and concentration, exploring its effects on cognitive functions and behavioral development. By analyzing existing studies and empirical data, we highlight how regular practice enhances self-regulation, goal-oriented behavior, and sustained attention. The results suggest that karate cultivates mental toughness, sharpens focus, and promotes a structured approach to overcoming challenges, making it a powerful tool for personal growth. Furthermore, the study discusses the broader implications of karate training for individuals seeking cognitive and emotional development.

Keywords: Karate training, psychological benefits, discipline development, cognitive enhancement, mental resilience, focus and concentration, self-regulation, martial arts and psychology, personal growth, behavioral improvement, cognitive functions, emotional development.

Introduction

Karate is not just a martial art; it is a disciplined practice that strengthens both the mind and body. With deep roots in tradition, karate fosters perseverance, self-regulation, and mental toughness, making it an effective tool for psychological growth. Through consistent training, practitioners sharpen their focus, develop goal-oriented thinking, and enhance their ability to remain composed under pressure. The structured nature of karate instills discipline, encouraging adherence to principles that extend beyond the dojo into everyday life. This research delves into the mental benefits of karate, highlighting its role in improving cognitive skills, emotional stability, and overall awareness. By understanding how karate contributes to

psychological development, we gain valuable insights into its impact on personal growth and mental well-being.

Objectives

- Investigate the mental advantages of karate training, with a focus on discipline and concentration.
- Analyze how karate contributes to cognitive development, enhancing focus and mental resilience.
- Explore the impact of karate on emotional stability, particularly in managing stress and self-control.
- Assess the connection between karate practice and behavioral growth, including perseverance and goal-setting.
- Compare karate's psychological effects with other martial arts, identifying its unique benefits.
- Examine the broader role of karate in personal development, emphasizing its influence on confidence and decision-making.

Synopsis

- **Origins and Development**
- **Psychological Principles**
- **Cognitive Advantages**
- **Emotional Stability**
- **Behavioral Changes**
- **Comparative Perspectives**
- **Educational Applications**
- **Leadership and Confidence Building**
- **Neuroscientific Viewpoint**
- **Cultural and Social Influence**

Origins And Development

Karate traces its origins to the Ryukyu Kingdom, where it developed through interactions with Chinese martial arts. Influences from Kung Fu played a significant role in shaping Okinawan combat techniques between the 14th and 19th centuries, as Okinawa was a key center for trade and diplomacy.

Following the 1609 invasion of Okinawa by the Shimazu clan, the prohibition of weapons led to the refinement of hand-to-hand combat methods, blending local fighting styles with Chinese martial arts. This fusion gave rise to Te (手), meaning "hand," which later evolved into karate. In the late 19th and early 20th centuries, Anko Itosu introduced karate into Okinawan schools, while Gichin Funakoshi played a crucial role in bringing it to mainland Japan. Funakoshi further adapted karate by integrating structured elements from Judo, such as uniforms, ranking systems, and belt colors, making it more accessible. During the mid-20th century, karate gained global popularity through movies, cultural exchanges, and international tournaments. Today, it is practiced worldwide, with different styles emphasizing self-discipline, striking techniques, and mental fortitude.

Psychological Principles

Karate is not merely a physical skill; it is deeply connected to psychological principles that nurture focus, discipline, and mental resilience. The structured nature of training demands intense concentration, encouraging practitioners to stay present and mindful during every movement. Through consistent practice, karate reinforces self-regulation, enabling individuals to manage their emotions and respond thoughtfully to challenges. The emphasis on respect, perseverance, and humility cultivates a disciplined mindset that carries over into daily life. Additionally, karate builds mental toughness, allowing practitioners to face setbacks with determination and maintain a strong sense of purpose. This combination of focus, emotional stability, and structured discipline makes karate an effective tool for psychological growth and self-improvement.

Cognitive Benefits

Karate training is deeply connected to psychological principles that foster discipline, focus, and mental resilience. One of its fundamental aspects is mental conditioning, which requires practitioners to concentrate intensely during practice and combat. This enhanced focus strengthens cognitive functions, enabling individuals to stay mindful and engaged in various situations.

Another essential principle is self-regulation, where karate teaches individuals to control their emotions, stay composed under pressure, and respond thoughtfully to challenges. Developing this ability helps improve emotional stability and decision-making skills, particularly in stressful environments.

Karate also promotes perseverance and determination, as practitioners continuously overcome physical and mental obstacles through rigorous training. The structured nature of karate encourages a goal-driven mindset, inspiring individuals to push their limits and cultivate unwavering persistence.

Additionally, karate emphasizes self-control and conflict resolution, guiding individuals to manage impulses and approach situations with patience and composure. The focus on respect, humility, and integrity instills a disciplined mindset that extends beyond the dojo into daily life.

Emotional Stability

Karate training plays a vital role in promoting emotional stability, assisting individuals in managing stress, anxiety, and emotional control. The structured approach to training reinforces self-discipline, enabling practitioners to regulate their emotions and remain composed in difficult situations. Engaging in physical activity during karate sessions triggers the release of endorphins, natural chemicals that enhance mood and alleviate stress, fostering a sense of well-being.

Moreover, karate incorporates breathing techniques and mindfulness, helping individuals stay calm, focused, and reducing anxiety. The repetitive practice builds mental resilience, encouraging patience and emotional regulation when facing challenges. As practitioners advance in rank and refine their techniques, karate boosts self-confidence and self-esteem, nurturing a positive outlook.

Additionally, controlled sparring and combat exercises teach practitioners how to handle pressure while maintaining emotional control. Through learning to stay composed in high-intensity situations, karate participants develop skills to manage stress effectively in everyday life. The blend of physical effort, mental discipline, and structured practice makes karate a valuable tool for fostering emotional well-being and psychological growth.

Behavioral Changes

Karate training plays a crucial role in shaping perseverance, self-discipline, and goal-setting, influencing both mental and physical development. Its structured approach encourages practitioners to commit to continuous progress, reinforcing persistence in overcoming obstacles. Through disciplined training, individuals cultivate self-control,

learning to manage impulses, follow guidance, and stay focused—skills that extend beyond martial arts into everyday life.

Karate also fosters a goal-oriented mindset, as practitioners set and work toward objectives such as refining techniques, earning higher belt ranks, or improving overall performance. This process teaches patience, resilience, and the importance of consistent effort. Additionally, karate instills values like respect and humility, emphasizing that success is achieved through dedication rather than shortcuts.

By participating in karate, individuals strengthen their mental resilience, allowing them to approach challenges with confidence and determination. The ability to push through physical and mental difficulties enhances their capacity to handle adversity in various aspects of life. Karate's structured discipline and focus on goal-setting make it an effective tool for fostering personal growth and behavioral transformation.

Comparative Perspectives

Karate, like other martial arts, offers significant psychological advantages, but its approach differs from disciplines such as Brazilian Jiu-Jitsu (BJJ), Muay Thai, Judo, and Taekwondo. It places a strong emphasis on structured discipline, concentration, and self-regulation, making it particularly effective in building mental resilience and emotional control. The practice of kata (pre-arranged sequences) enhances mindfulness and cognitive function, sharpening focus and awareness.

Conversely, Brazilian Jiu-Jitsu prioritizes adaptability and strategic thinking, helping practitioners develop patience and problem-solving skills under pressure. Muay Thai, known for its intense physical demands, fosters mental toughness and stress management through rigorous conditioning. Judo, with its focus on throws and grappling techniques, teaches individuals how to stay composed in unpredictable situations, strengthening emotional stability. Taekwondo, which emphasizes dynamic kicking techniques, nurtures self-confidence and encourages goal-setting through structured rank progression.

Although all martial arts contribute to stress relief, discipline, and perseverance, karate stands out for its philosophical teachings and focus on mental clarity and controlled aggression. The structured approach of karate training promotes a goal-driven mindset, encouraging practitioners to develop patience and determination. Research suggests that martial arts, including karate, can serve as effective methods for enhancing mental health, offering benefits such as reducing stress, improving emotional balance, and boosting cognitive function.

Educational Applications

Karate is an effective tool for fostering discipline and focus in academic settings. Its structured training teaches students to follow instructions, manage time efficiently, and stay committed to their goals. By practicing karate, individuals develop self-regulation, allowing them to concentrate better in the classroom and complete tasks with greater efficiency.

Karate builds mental resilience, helping students cope with academic stress and pressure more effectively. The emphasis on mindfulness and controlled breathing enhances focus, enabling learners to block out distractions and stay engaged in their studies. The repetitive nature of karate techniques promotes patience and perseverance, essential traits for academic success.

In addition, karate encourages a goal-oriented mindset, motivating students to set and achieve milestones, such as mastering techniques or progressing through belt ranks. This structured approach translates into better study habits and improved academic performance. Research indicates that martial arts training can boost cognitive function, attention span, and problem-solving abilities, making it a valuable addition to educational programs.

Leadership And Confidence Building

Karate plays a vital role in fostering leadership qualities and self-confidence among practitioners. The structured training cultivates discipline, perseverance, and decision-making skills, essential traits for effective leadership. Through consistent practice, individuals learn to set goals, overcome obstacles, and take responsibility for their growth, reinforcing a ****goal-driven mindset**** that translates into leadership abilities.

Additionally, karate builds self-confidence by encouraging practitioners to challenge themselves and master new techniques. Progressing through belt ranks instills a sense of accomplishment, boosting self-esteem and self-assurance. The emphasis on respect and humility helps individuals lead with integrity, promoting a positive and supportive learning environment.

Karate also enhances communication and teamwork, as practitioners engage in partner drills and group exercises that require collaboration and mutual understanding. These interactions improve their ability to work with others, resolve conflicts, and motivate those around them. Research suggests that martial arts training, including karate, helps individuals develop mental resilience, assertiveness, and leadership

skills, making it an effective tool for personal and professional growth.

Neuroscientific Viewpoint

Karate training has a profound impact on brain function and mental processing, contributing to cognitive enhancement and emotional stability. Research suggests that karate practitioners develop greater self-control and improved emotion regulation, which aids in managing stress and impulsivity. The structured nature of training reinforces mental resilience, allowing individuals to handle challenges more effectively.

Additionally, studies indicate that karate influences visual perception and neural efficiency. Research on visual evoked potential shows that karate practitioners exhibit faster neural signal transmission, leading to heightened sensory cognition and quicker visual responses. This enhancement in reaction time and focus stems from the brain's adaptation to the rapid decision-making required in karate.

Moreover, brain scans of skilled karate practitioners reveal distinct structural variations in areas responsible for motor control and coordination. The cerebellum and primary motor cortex, which regulate movement precision, undergo unique adaptations in experienced karatekas, resulting in improved timing, coordination, and execution of movements. Karate acts as a mind-body training method, strengthening neural pathways linked to focus, emotional balance, and cognitive processing.

Cultural And Social Influence

Karate plays an important role in shaping values, ethics, and community involvement, extending beyond physical training to influence personal and social development. It instills discipline, respect, and integrity, encouraging ethical behavior both within the dojo and in everyday life. Practitioners develop humility and perseverance, fostering a mindset of continuous self-improvement.

Additionally, karate strengthens community connections, motivating individuals to contribute positively to society. Many dojos organize self-defense workshops, charity events, and educational programs, helping students develop leadership skills while engaging with their communities. The focus on teamwork and mentorship promotes social bonds, creating a supportive environment for practitioners.

Karate also serves as a cultural bridge, preserving traditional principles while adapting to modern societal needs. It encourages cross-cultural appreciation, bringing together individuals from diverse backgrounds to share knowledge and experiences. The philosophy of karate emphasizes honour, fairness, and responsibility, making it a valuable tool for ethical and social growth.

Conclusion

Karate is more than a martial art—it is a discipline that promotes mental, emotional, and social development. Through structured training, practitioners cultivate focus, perseverance, and self-discipline, which positively influence various aspects of life, including academics, leadership, and personal resilience. Beyond the dojo, karate enhances cognitive function, emotional stability, and stress management, making it a valuable tool for overall well-being.

Moreover, karate emphasizes ethical values, respect, and community involvement, shaping individuals into confident and responsible members of society. Neuroscientific studies highlight its impact on brain function, motor coordination, and reaction speed, reinforcing its cognitive benefits. Compared to other martial arts, karate stands out for its focus on mental clarity, controlled discipline, and structured learning, making it uniquely beneficial.

Ultimately, karate serves as a powerful tool for personal growth, equipping practitioners with the ability to overcome challenges, set meaningful goals, and lead with confidence. Its integration into education, leadership development, and mental health programs underscores its holistic advantages, proving that karate is not just a combat technique—it is a lifelong practice that shapes character and mindset.

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Problems Faced Teaching And Learning English In Higher Education In Tamil Nadu

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Abstract

*The aim of this paper is to discuss the problems students face when **learning and being taught** English at the higher education level. English is regarded as one of the global languages among all of the languages spoken worldwide. One of the most commonly spoken languages in the world. English has become the uniform for all second language learners in India at this pivotal moment. Higher education students in Tamil Nadu are unaware of the significance of the English language in the current environment. With the help of the Choice Based Credit System, universities and Government arts and science colleges In Tamil Nadu, have also modified their English language curricula to meet educational sectors standards and labour market demands. Faculties are urged to use a variety of approaches to assist students who live in urban, semi-urban, and rural areas to write in English. Despite their best efforts, students were unable to write even a few phrases in English or even complete the pre-printed paperwork for permission and departure. In light of everything said above, the article has attempted to identify the variables that contribute to students' writing issues because it is a major foundation for a person's ability to grow sustainably and deal with the obstacles of daily life.*

Key Words: Problems, Second language, Higher education, Students.

Introduction

Teaching English as a second language in today's classrooms is a complex endeavor. Its effectiveness depends on many factors, including students' age, attitude, and motivation, as well as teachers' age, gender, education, experience, and professional training. Additionally, socioeconomic factors significantly influence both learners and educators, highlighting the multilevel components involved in successful teaching and learning.

Among the four main language skills, writing is particularly crucial due to its functional importance. Despite teachers using various methods to improve writing, these efforts often fall short. This suggests a need for research to identify and overcome obstacles, gathering insights from urban, semi-urban, and rural students. Furthermore, students are expected to have a strong grasp of English, as it's often the medium of instruction for core subjects.

Problems Of Teaching English In Higher Education

Higher education plays a crucial role in industrial growth and individual development by offering flexible learning opportunities. In India, English as a second language is an essential and unavoidable part of the education system. This

paper focuses on the challenges Tamil Nadu government arts and science college student's face in writing English.

A significant issue in Indian higher education is the poor quality and outdated nature of the curriculum in many institutions. Furthermore, beyond a few highly recognized institutes, most colleges and universities lack essential research facilities and proper infrastructure, including libraries, hostels, transport, and sports facilities—all of which are vital for a quality institution.

Objectives Of The Study

The investigation made at selected district consider following three types of urban, semi-urban and rural based Govt Arts & Science College of Tamil Nadu, The researcher made questionnaire students to bring out results. Based on the results arrived the recommendations are suggested for the better development of writing skill among the urban Thanjavur, semi-urban Thiruvavur and rural Nagapattinam students in the above mentioned colleges affiliated to Bharathidasan University, Thiruchirappalli, in Tamilnadu, India.

Classroom Setting In Higher Education

English language instruction, particularly writing skills, is often undervalued and poorly delivered, seen by many as unnecessary. This overlooks the critical fact that strong English language skills are essential for students to comprehend any subject matter. Today, English education is a powerful tool for social change. Effective classroom management is also vital for learning and improving writing. Successful teaching requires instructors to facilitate a positive environment through various strategies. Regular training programs and ongoing review processes can significantly boost the effectiveness of both teaching and writing instruction. A challenge in self-financing institutions is that newly hired teachers often struggle with classroom management and adapting to the teaching environment. Additionally, the poor selection of materials and teachers' own limited language proficiency hinder effective writing instruction, especially in rural classrooms.

Challenges Of Teachers In Recent Years

In foundation English classes, teachers often struggle to manage hundreds of students, making it impossible to give individual attention. This poses a significant challenge, especially for new teachers. Adding to this, time constraints prevent teachers from providing adequate attention to students. They are also under pressure to complete the syllabus quickly so students can pass university exams. Management's intense focus on results alone means teachers might even be terminated if their students don't perform well, which ultimately hinders the process of effective learning.

Mother Tongue

The influence of a student's **mother tongue** can hinder English language acquisition, as many students prioritize their native language and don't recognize the value of English. Educational experts note that immersing young children in a new language program without support in their primary language can be challenging. This often prevents them from receiving the **individual attention and interaction** they need in their native tongue. Furthermore, students frequently face a **cultural disconnect** between their background and classroom practices or curriculum content, adding **sociolinguistic barriers** to the linguistic ones.

Social Background And Economical Status

Many students from **impoverished families lack the financial support to buy necessary notebooks**. This often means teachers have to step in and offer financial assistance; even then, writing practice might not happen despite the teachers' best efforts. When teachers try to encourage these students to buy stationery and practice writing, they often **refuse or hesitate**, even to write simple things like their own biography. This **dislike for writing** can develop into a strong negative attitude. Students frequently feel **completely out of their element** when learning to write in English.

Furthermore, **negative feedback from students about teachers** submitted to management can create a strained learning environment. Students also often **fail to bring their textbooks for exercises**, citing financial inability as the reason.

Conclusion

The Present language teaching approaches are not effective or learner-friendly for students from rural areas. We're seeing fewer writing exercises in practice. Instead, authorities are creating last-minute schedules for writing tests that mostly focus on students recalling memorized information.

In most self-financing arts and science colleges, regular testing and assessment have largely disappeared. This is due to intense competition to admit students and meet admission quotas. Consequently, parents, influenced by appealing advertisements promising good results and medals, often find their expectations aren't met in the current system.

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Adoption Dynamics Of AI In Banking: Insights From North Gujarat Region

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Abstract

Purpose:

This study investigates the key factors influencing consumers' intention to adopt Artificial Intelligence (AI) in banking services, focusing on the North Gujarat region. Grounded in established technology adoption frameworks, it offers empirical insights into drivers and barriers shaping AI adoption, contributing to a deeper understanding of digital transformation in regional banking.

Design / Methodology / Approach:

A quantitative research approach was adopted, examining constructs such as Effort Expectancy, Performance Expectancy, Social Influence, Trust, Perceived Risk, and Facilitating Conditions. Data was gathered from 226 respondents in North Gujarat using a structured questionnaire. Partial Least Squares Structural Equation Modeling (PLS-SEM) was applied to test and validate the hypothesized relationships among these variables.

Findings:

Effort expectancy, social influence, facilitating conditions, trust, and perceived risk significantly influence consumers' intention to adopt AI in banking. However, performance expectancy showed no significant effect. The results highlight that enhancing digital literacy and trust-building initiatives can strengthen customer confidence, reduce perceived risks, and promote wider adoption of AI-powered banking solutions.

Practical Implications:

The study provides actionable insights for banks and AI solution providers to improve trust, usability, and security features. Targeted digital literacy and awareness campaigns can further reduce consumer apprehension. Policymakers can use these findings to frame

strategies that support responsible AI use and digital financial literacy, while researchers can explore adoption dynamics in other contexts.

Research Limitation:

The findings are specific to the North Gujarat region and may not fully generalize to other areas.

Originality / Value:

This research offers localized empirical evidence on AI adoption in banking, enriching the broader understanding of technology-driven transformation in regional financial services.

Keywords: Artificial Intelligence adoption, Banking services, PLS-SEM, North Gujarat.

Paper Type: Research Paper

1.Introduction

Artificial Intelligence (AI) is transforming global banking, and India is enthusiastically embracing this change. AI encompasses computer systems executing tasks that demand human-like intelligence, including learning, reasoning, and language comprehension (Russell & Norvig, 2016). Mobile banking, enabling users to perform financial transactions through smartphones and tablets, has surged in popularity and become vital in India thanks to its convenience, accessibility, and swift technological advancements (Patil et al., 2023).

In Indian banking, they're really getting into AI-powered tools like chatbots, voice assistants, fraud detectors, and personalized recommendation engines in mobile banking apps. A 2024 RBI study found that nearly 79% of scheduled commercial banks in India had adopted AI-based chatbots by mid-2023, highlighting the impressive growth of conversational agents in traditional banking services (The Hindu Data Team, 2024).

These AI-driven enhancements deliver faster service, round-the-clock support, advanced security, and tailored experiences, which significantly improve user satisfaction. Yet, their adoption faces obstacles like data privacy concerns, limited digital literacy, trust issues, and unequal access to mobile technologies, especially in rural areas (Patil et al., 2023).

This study uses the UTAUT framework that Venkatesh et al. established in 2003 for examining at how Indian customers react to mobile banking that uses AI. The UTAUT model demonstrates that four primary factors that may impact how people use technology: how well

it works for them, how easy it is to use, what other people think about it, and the help they get from service providers to make it happen. It also gets that things like age, gender, and experience play a role in this whole process. So, when you take this framework and stretch it out to UTAUT 2 and even further, researchers have added in stuff like trust, security, and perceived value to really get a grip on what users are thinking in banking situations (Apau et al., 2025; Mboua et al., 2025).

This study examines the features specific to artificial intelligence in mobile banking, including fraud alerts, chatbots, and AI-driven personalization. It also analyzes the perceptions and intended adoption of these features among Indian mobile banking users. This research utilizes the UTAUT framework to identify critical drivers and barriers in the adoption of AI-enabled banking, focusing on factors such as trust, perceived security, and social influence. The findings are intended to assist banks, fintech companies, and policymakers in the effective design, promotion, and deployment of AI-enhanced mobile banking solutions that prioritize security, accessibility, and trust among various user groups in India.

2. Review of Literature

2.1 UTAUT Model (Unified Theory of Acceptance and Use of Technology)

In the world of info systems, a bunch of theories have popped up to help us get a grip on how and why people jump on the tech bandwagon. Some of the big ones here are the Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), and Innovation Diffusion Theory (IDT). All these models have really helped us understand how people act when it comes to jumping on new tech.

So, there's this thing called the Unified Theory of Acceptance and Use of Technology (UTAUT) those Venkatesh et al. in 2003. It is good because it pulls together a bunch of important stuff from the other models. UTAUT has been used a lot in info systems research because it's really good at explaining things, especially when it comes to how organizations and users adopt new stuff.

So, in this study, the researchers decided to use UTAUT as their main model and then added some new stuff to it, like Perceived Risk and how Trust plays a role. So, we added some stuff based on what we've been seeing in the latest articles. They actually point out how

people are getting more worried about data privacy-security and how quickly everyone is moving to digital banking because of health issues and all.

Some past studies have changed existing models to keep up with the changing tech scenario and what users actually care about. So, building on this trend, our research is putting forward a tailored conceptual framework based on UTAUT, which is all about figuring out the main factors that affect how AI tech gets adopted in banking.

Byambaa et al. (2025) have done a research study on the adoption of AI in banking among individuals in Mongolia. The researchers employed the Technology Acceptance Model (TAM) and incorporated additional factors such as awareness, trust, and risk. The research methodology comprised interviews conducted with banking professionals and a survey involving 508 customers. The findings indicated that the primary factors influencing individuals' acceptance of AI were its perceived usefulness and ease of use. Trust and attitude were significant factors, with attitude facilitating the connection of other elements to individuals' decisions regarding the use of AI.

Papathomas et al. (2025) examined the adoption of AI in Greek banks by integrating the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2). A total of 297 individuals were surveyed, comprising bank personnel, customers, and digital professionals. This research indicated that performance expectancy, effort expectancy, and hedonic motivation significantly influenced users' intention to adopt AI technology for banking services. Nonetheless, social influence was of limited significance noted. Furthermore, the level of education and the specific job role of individuals were found more significant factors than their age or gender.

Manser Payne et al. (2018) focused on young users and their views on AI in mobile banking. They used TAM and innovation theory to study factors like trust, risk, and service quality. From a survey of 218 students, they found that trust and comfort with AI were important for AI banking. But for traditional mobile banking, relative advantage was more important. This shows that using AI in banking needs both technical benefits and emotional comfort, especially for younger users.

Across the reviewed studies, consistent research methods such as quantitative surveys, regression modeling, and PLS-SEM were used to analyze the determinants of AI adoption in banking. Key influencing factors include perceived usefulness, ease of use, trust, hedonic

motivation, and user attitude. While technical benefits remain important, non-technical factors such as emotional comfort with AI, perceived risk, and user habits also play a significant role. This literature supports the application of extended models like TAM and UTAUT to understand AI adoption, particularly in diverse consumer and cultural contexts.

2.2 Conceptual Research Framework

The study considered key variables including demographic factors and behavioral factors. These variables were selected to ensure a comprehensive analysis aligned with the study's objectives.

Performance Expectancy (PE) is the belief that using a technology will help the user improve their performance or achieve better outcomes. Venkatesh et al. (2012) define it as “the degree to which using a technology will provide benefits to consumers in performing certain activities.” It is considered one of the strongest predictors of whether a person intends to use a technology, especially when they believe it will make tasks faster, easier, or more effective.

H1: Performance Expectancy has a positive effect on customers' behavioral intention to adopt AI in banking.

Effort Expectancy (EE) refers to how easy users believe it is to use a technology. According to Venkatesh et al. (2012), it is “the degree of ease associated with consumers' use of the technology.” When a system is simple, clear, and user-friendly, people are more likely to accept and use it. This concept is closely related to “perceived ease of use” from the earlier Technology Acceptance Model (TAM).

H2: Effort Expectancy has a positive effect on customers' behavioral intention to adopt AI in banking.

Social Influence (SI) is about how much people believe that others—such as friends, family members, or coworkers—think they should use a particular technology. Venkatesh et al. (2012) describe it as “the degree to which consumers perceive that important others believe they should use a particular technology.” Social pressure or encouragement can strongly influence people's decisions, especially in environments where peer opinions matter.

H3: Social Influence have a positive effect on customers' behavioral intention to adopt AI in banking.

Facilitating Conditions (FC) refer to the user's perception of the resources and support available to help them use the technology. This includes having the right devices, internet access, technical help, and compatible systems. As defined by Venkatesh et al. (2012), it is about "consumers' perceptions of the resources and support available to perform a behavior." When users feel they have the support they need, they are more likely to adopt the technology.

H4: Facilitating Conditions have a positive effect on customers' behavioral intention to adopt AI in banking.

In recent years, **Trust** and Perceived Risk have become important factors in technology adoption studies, especially when using the UTAUT2 model in areas like AI and banking. Trust and Perceived Risk are important additions to the UTAUT2 model, especially in AI and banking studies. Trust means believing the system is safe, reliable, and works well. Studies like Apau & Lallie (2025) and Marak et al. (2025) found that trust increases people's intention to use mobile banking and AI services.

H5: Trust in AI systems has a positive effect on customers' behavioral intention to adopt AI in banking.

Perceived Risk is the fear of possible problems, like loss of privacy or money. Research by Jafri et al. (2023) and Chen et al. (2023) showed that risk lowers people's willingness to use new technologies. When trust is high, risk has less impact. So, both trust and risk help explain how users decide whether to adopt AI in banking.

H6: Perceived Risk has a negative effect on customers' behavioral intention to adopt AI in banking.

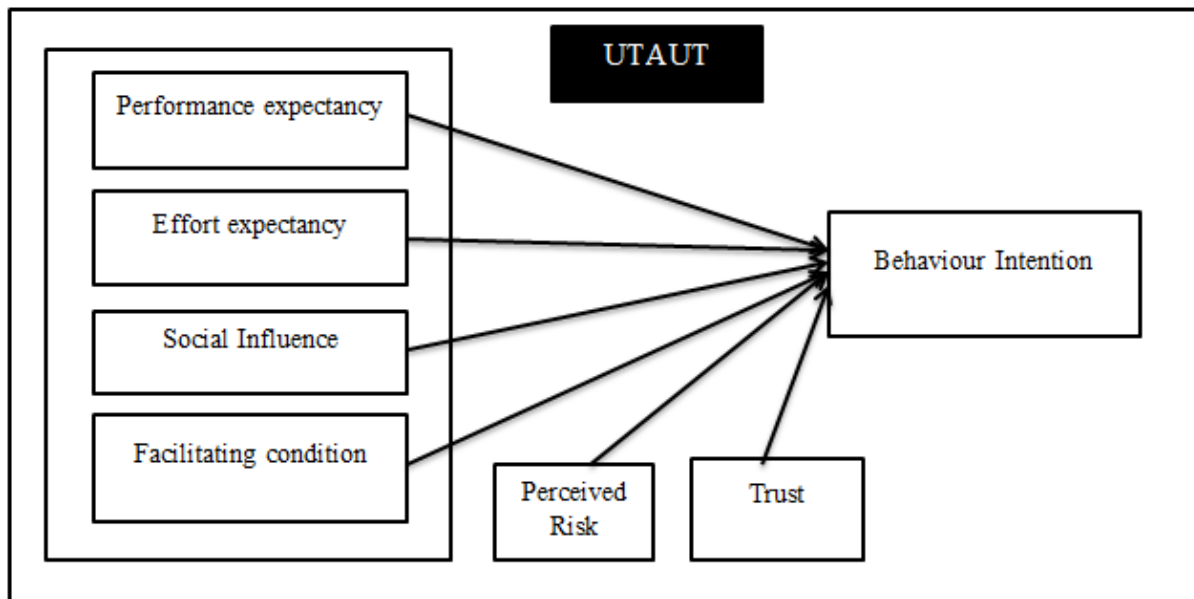


Figure 1: Proposed Research Model

Behavioral Intention (BI) refers to the degree to which a person intends to use a technology in the future. According to Venkatesh et al. (2003), it is defined as “a measure of the strength of one’s intention to perform a specified behavior.” In the context of technology adoption, BI shows how willing or likely a person is to use the system. It is often used as the main outcome variable in models like UTAUT because it helps predict actual technology use. A stronger behavioral intention usually means a higher chance of real adoption.

3 Methodological Approach

3.1 Objective of the Study

- To examine the influence of Effort Expectancy, Performance Expectancy, Facilitating Conditions, Social Influence, Trust, and Perceived Risk on customers’ behavioral intention to adopt Artificial Intelligence (AI) in banking services.
- To create a conceptual model for the research that may influence customers’ actual intention to adopt AI in banking services, this study also aims to include additional variables such as trust and perceived risk.
- To examine the effect of trust and perceived risk on AI adoption in the banking sector.

3.2 Sampling and Data Collection

The target population for this study comprised customers who use banking services and are potential or current adopters of Artificial Intelligence (AI)-enabled solutions. A non-probability sampling design was employed, using the convenience sampling technique to

gather responses. Data were collected from individuals residing in different regions of North Gujarat through an online survey distributed via Google Forms.

To determine the appropriate sample size, the rule of thumb suggested by Hinkin (1995) and Hair et al. (2006) was followed, which recommends a ratio of 1:4 to 1:10 (responses per item). Since the study measures 31 scale items, a minimum of 124 responses was required ($31 \times 4 = 124$). However, to ensure robustness, a total of 226 responses were collected, out of which 200 valid responses were retained for final analysis after data screening.

Additionally, Cochran's formula was used to support the determination of sample size. With a confidence level of 95% ($Z = 1.96$), an assumed population proportion of 0.4 ($p = 0.4$), $q = 1 - p = 0.6$, and a margin of error (e) of 0.07, the estimated sample size was calculated as approximately $n = 189$. The final sample of 178 responses falls within an acceptable range for analysis based on these criteria.

$$n = \frac{Z^2 p(1 - p)}{e^2}$$

= 189 Approximately

4 Data Analysis

4.1 Respondents' Demographics:

Table I provided a summary of the respondents' demographics. Out of 455 respondents, 61% were males ($n = 122$) and 39% were females ($n = 39$). The age group of less than 20 years comprised the majority of the samples (48.5 %, $n = 97$). It was observed the vast majority of respondents (140 people, 70.0%) reside in urban areas.

Table 1 : Respondents Demographics (n = 200)			
Demographic Variable	Category	Frequency	Percentage
Gender	Male	122	61
	Female	78	39
Age (in years)	Less than 20	97	48.5
	20 - 35	63	31.5
	36 - 50	38	19
	More than 50	2	1
Area (Residency)	Rural	60	30
	Urban	140	70
Occupation	Business	20	10
	Professional	10	5
	Job	46	23
	Student	119	59.5
	Housewife	5	2.5
Hours of using smart phone a day	Less than 2 hrs.	67	33.5
	2 to 4 hrs.	85	42.5
	4 to 6 hrs.	30	15
	More than 6 hrs.	18	9

This urban skew might reflect differences in technology access, exposure, and usage patterns relevant to the research theme.

The occupation data reveals that the majority of respondents are students (59.5%), followed by those with jobs (23%). Smaller proportions include individuals involved in business (10%), professionals (5%), and housewives (2.5%). This distribution aligns with the high percentage of younger respondents and urban residents, as students in urban areas may have greater access to technology and be more inclined to participate in such surveys.

Finally, the data on smartphone usage per day shows that most respondents use smartphones between 2–4 hours daily (42.5%), followed by those using them less than 2 hours (33.5%). A smaller group uses smartphones for 4–6 hours (15%), and only 9% use them for more than 6 hours. This indicates moderate smartphone engagement overall, which could influence their behavior and responses related to the study.

4.2 Reliability of the Scale:

The table presents the Cronbach's Alpha values for different constructs, reflecting the internal consistency and reliability of the measurement scales used in the study. All values are above the acceptable threshold of 0.70, indicating strong reliability across the constructs.

The highest reliability is observed for Facilitating Conditions (FC) with an alpha of 0.971, suggesting highly consistent responses among its items. Effort Expectancy (EE) and Social Influence (SI) also show excellent reliability, with alphas of 0.958 and 0.955 respectively. Perceived Risk (PR) and Trust (TR) demonstrate strong reliability too, at 0.915 and 0.909.

Performance Expectancy (PE) and Intention to Use (IU) have slightly lower alphas of 0.849 and 0.854, but these values are still well above the recommended level, supporting the reliability of these constructs. Overall, the high Cronbach's Alpha values confirm that the scales used are consistent and reliable for further analysis in this research context.

4.3.1 Assessing the measurement of inner model

4.3.1.1 Outer loading

The table titled "Measurement of Inner Model" presents the outer loadings, which reflect how strongly each observed item (statement) relates to its underlying latent construct (factor). Outer loadings are crucial for evaluating the reliability and validity of the measurement model in structural equation modeling (SEM).

Table 1 : Measurement of Inner Model					
Factor	Statement	Scale	Factor Loading (Path-outer loading excel)	Tolerance	VIF
Performance Expectancy	PE1	Venkatesh et al., 2003	0.80	0.58	1.71
	PE2	Venkatesh et al., 2003	0.88	0.39	2.55
	PE3	Venkatesh et al., 2003	0.83	0.49	2.06
	PE4	Venkatesh et al., 2003	0.80	0.57	1.76
Effort Expectancy	EE1	Venkatesh et al., 2003	0.96	0.13	7.59
	EE2	Venkatesh et al., 2003	0.96	0.13	7.88
	EE3	Venkatesh et al., 2003	0.92	0.25	4.03
	EE4	Venkatesh et al., 2003	0.94	0.20	4.92
Social Influence	SI1	Venkatesh et al., 2003	0.99	0.19	5.21
	SI2	Venkatesh et al., 2003	0.99	0.19	5.23
	SI3	Venkatesh et al., 2003	0.99	0.17	5.72
	SI4	Venkatesh et al., 2003	0.99	0.19	5.27
Facilitating Condition	FC1	Venkatesh et al., 2003	0.96	0.11	9.43
	FC2	Venkatesh et al., 2003	0.96	0.11	8.92
	FC3	Venkatesh et al., 2003	0.97	0.10	9.55
	FC4	Venkatesh et al., 2003	0.94	0.18	5.45
Perceived Risk	PR1	Payne, Peltier, & Barger, 2018)	0.86	0.31	3.23
	PR2	Payne, Peltier, & Barger, 2018)	0.86	0.33	3.01
	PR3	Payne, Peltier, & Barger, 2018)	0.90	0.29	3.50
	PR4	Payne, Peltier, & Barger, 2018)	0.85	0.30	3.37
	PR5	Payne, Peltier, & Barger, 2018)	0.86	0.26	3.85
Trust	T1	Payne, Peltier, & Barger, 2018)	0.86	0.20	5.13
	T2	Payne, Peltier, & Barger, 2018)	0.85	0.19	5.41
	T3	Payne, Peltier, & Barger, 2018)	0.88	0.35	2.87
	T4	Payne, Peltier, & Barger, 2018)	0.85	0.23	4.37
	T5	Payne, Peltier, & Barger, 2018)	0.85	0.23	4.39
Intention to Use (IU)	IU1	Venkatesh et al., 2003	0.82	0.51	1.96
	IU2	Venkatesh et al., 2003	0.81	0.53	1.90
	IU3	Venkatesh et al., 2003	0.76	0.62	1.62
	IU4	Venkatesh et al., 2003	0.80	0.53	1.88
	IU5	Venkatesh et al., 2003	0.79	0.56	1.78

All items generally exhibit high loadings, most above the commonly accepted threshold of **0.70**, indicating that they are good indicators of their respective latent constructs. Items under Performance Expectancy (PE1–PE4) show loadings between 0.886 and 0.896, suggesting strong measurement consistency. Effort Expectancy (EE1–EE4) items have even higher loadings (e.g Social Influence items (SI1–SI4) have very high loadings (0.959–0.969), demonstrating exceptional internal consistency.

Facilitating Condition items (FC1–FC4) also show strong loadings (~ 0.966 – 0.968), confirming that these items reliably capture perceptions of available support and infrastructure. EE1 = 0.950, EE2 = 0.956), indicating they are highly representative of the construct. Items measuring Perceived Risk (PR1–PR4) have moderately high loadings (0.866 – 0.898), reflecting acceptable convergent validity, though slightly lower than other constructs. Trust items (T1–T4) have loadings around 0.888 – 0.895 , indicating they effectively capture users' trust in AI in banking. Loadings for IU items (IU1–IU5) vary more, from 0.729 to 0.881 . Although IU3 (0.746) and IU5 (0.729) are below the ideal threshold of 0.70 , they still contribute meaningfully, but they may slightly reduce the construct's average reliability.

4.3.1.2 Variance Influence Factor

Items under Performance Expectancy (1.71 – 2.62), Effort Expectancy (1.46 – 7.88), Social Influence (5.01 – 5.72), Perceived Risk (3.01 – 3.50), and Intention to Use (1.53 – 1.91) mostly fall below or around 5 . These indicate that multicollinearity for these items is generally acceptable or moderate, not severe.

4.3.1.3 Convergent Validity

The table presents key reliability and validity measures for seven constructs: EE (Effort Expectancy), FC (Facilitating Conditions), IU (Intention to Use), PE (Performance Expectancy), PR (Perceived Risk), SI (Social Influence), and T (Trust).

Table: 2 Table of Convergent Validity

	Cronbach's alpha	Composite reliability (rho _a)	Composite reliability (rho _c)	Average variance extracted (AVE)
EE	0.959	0.960	0.970	0.891
FC	0.972	0.972	0.979	0.922
IU	0.854	0.854	0.895	0.631
PE	0.848	0.849	0.898	0.688
PR	0.916	0.917	0.937	0.748
SI	0.995	0.995	0.996	0.985
T	0.910	0.911	0.933	0.734

Cronbach's alpha values for all constructs are substantially higher than the commonly accepted threshold of 0.7 , confirming excellent internal consistency. Particularly, SI (0.995) and FC (0.972) show exceptionally high values, indicating the items under these constructs are highly homogeneous and measure the same underlying concept reliably.

The composite reliability indices (both rho_a and rho_c) further reinforce this observation. All constructs exhibit rho_c values well above 0.8, demonstrating strong reliability. SI achieves the highest composite reliability (0.996), closely followed by FC (0.979) and EE (0.970), highlighting that the indicators within these constructs strongly reflect their latent variables.

The Average Variance Extracted (AVE) values are all above the threshold of 0.5, which indicates good convergent validity; the constructs capture sufficient variance from their respective items. SI shows an outstanding AVE of 0.985, suggesting almost perfect convergent validity, while FC (0.922) and EE (0.891) also demonstrate excellent convergence. Constructs like IU (0.631) and PE (0.688) still maintain acceptable levels, indicating that despite slightly lower AVE values compared to others, their measurement quality remains strong.

Overall, this comprehensive reliability and validity assessment demonstrates that the measurement model is highly robust, with consistent items and constructs capturing the intended concepts effectively. These results confirm that the constructs are suitable for inclusion in further structural equation modeling and support the study's findings with strong psychometric properties.

4.3.1.4 Discriminant Validity

The table displays the discriminant validity results among seven constructs: Effort Expectancy (EE), Facilitating Conditions (FC), and Intention to Use (IU), Performance Expectancy (PE), Perceived Risk (PR), Social Influence (SI), and Trust (T). The diagonal values represent the square roots of the Average Variance Extracted (AVE) for each construct, while the off-diagonal values are the correlations between constructs.

Table: 3 Table of Discriminant Validity

	EE	FC	IU	PE	PR	SI	T
EE	0.944						
FC	0.644	0.960					
IU	0.730	0.719	0.795				
PE	0.567	0.530	0.568	0.830			
PR	0.576	0.554	0.807	0.530	0.865		
SI	0.652	0.613	0.764	0.457	0.637	0.992	
T	0.592	0.601	0.846	0.511	0.642	0.625	0.857

All diagonal values are notably higher than the correlations they share with other constructs, satisfying the Fornell-Larcker criterion for discriminant validity. For instance, the square root of AVE for EE is 0.944, which is higher than its correlations with FC (0.644), IU (0.730), PE (0.567), PR (0.576), SI (0.652), and T (0.592). This pattern indicates that EE shares more variance with its own indicators than with other constructs, demonstrating good discriminant validity.

Similarly, FC has a square root of AVE of 0.960, higher than its correlations with IU (0.719), PE (0.530), PR (0.554), SI (0.613), and T (0.601). IU's square root of AVE (0.795) is greater than its correlations with PE (0.568), PR (0.807), SI (0.764), and T (0.846), though it is notably close to T (0.846), suggesting a strong relationship but still acceptable discriminant validity.

The highest diagonal value belongs to SI (0.992), reflecting very high internal consistency and clear distinctiveness from other constructs. Overall, the table demonstrates that each construct is empirically distinct, validating the model's discriminant validity. This ensures that the constructs measure unique aspects of the research model, thereby strengthening the credibility and interpretive power of the study's findings.

4.3.2 Assessing the measurement of Structural Model

4.3.2.1 Path Analyses

The table presents the results of a structural model assessment, where several independent constructs—Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), Perceived Risk (PR), Social Influence (SI), and Trust (T)—are tested for their influence on Intention to Use (IU).

Social Influence (SI) also has a significant positive effect (0.152), supported by a t-statistic of 4.016 and p-value of 0.000, highlighting the importance of peers and social networks in influencing user intentions. Effort Expectancy (EE) and Facilitating Conditions (FC) both show significant, though relatively weaker, positive effects on IU (0.143 and 0.135 respectively). Their t-statistics (3.548 and 3.049) and p-values (both <0.01) confirm these effects are statistically significant, suggesting that perceptions about ease of use and availability of supportive infrastructure still meaningfully contribute to users' adoption intentions.

On the other hand, Performance Expectancy (PE) has a small negative effect (-0.021) and is statistically insignificant ($t=0.614$, $p=0.539$). This implies that in this model, perceived usefulness of the system does not have a meaningful influence on users' intention to use, which could result from contextual factors like users already assuming a baseline level of usefulness, or other constructs overshadowing its role.

Overall, the results underscore that trust, perceived risk, and social factors are dominant drivers of intention to use, while effort-related perceptions and facilitating conditions also matter, though to a lesser extent. Surprisingly, performance expectancy does not significantly impact IU in this context. This provides critical insights for researchers and practitioners to focus efforts on building trust, addressing risk perceptions, and leveraging social influence to boost technology adoption.

4.3.2.2 R – square

The table shows the **R-square (0.891)** and **R-square adjusted (0.887)** values for the dependent construct *Intention to Use (IU)* in the structural model. R-square, also known as the coefficient of determination, reflects the proportion of variance in the dependent variable (IU) that is explained by the combined influence of the independent variables included in the model (such as Effort Expectancy, Facilitating Conditions, Trust, Perceived Risk, Social Influence, and Performance Expectancy).

Table: 5 Table of R - square

	R-square	R-square adjusted
IU	0.891	0.887

An R-square value of 0.891 indicates that approximately 89.1% of the variance in users' intention to use the system is explained by the model. This is a very high value, suggesting

the model has strong explanatory power and that the selected constructs are highly relevant in predicting users' intention to use.

The adjusted R-square (0.887) is slightly lower, which is expected because it accounts for the number of predictors in relation to the sample size, adjusting for potential overfitting. The small difference between R-square and adjusted R-square (only about 0.004) suggests that the model is well-balanced: it includes meaningful predictors without adding unnecessary complexity.

Overall, these values imply that the model captures the key determinants of IU effectively. It reflects the strength of the theoretical framework used and shows that the constructs included are collectively very effective in explaining users' behavioral intention to adopt or use the system. For researchers and practitioners, this high explanatory power adds confidence that the identified variables are critical for influencing adoption decisions, providing a solid foundation for both academic understanding and practical strategies to enhance user acceptance.

4.3.2.3 F – square

The table presents the f-square effect size values, which measure the individual contribution of each exogenous (independent) construct to the explained variance (R-square) of the endogenous (dependent) construct, here Intention to Use (IU). An f-square effect size helps us understand how much the R-square value would decrease if a particular predictor were removed from the model, thus highlighting the relative importance of each predictor.

Table: 6 Table of F - square

	f-square
EE -> IU	0.080
FC -> IU	0.078
PE -> IU	0.002
PR -> IU	0.401
SI -> IU	0.090
T -> IU	0.657

In this table, the largest effect comes from Trust (T -> IU), with an impressive f-square value of 0.657, which is well above the threshold for a large effect. This clearly shows that trust is the most influential factor driving users' intention to use the system. Its removal would

substantially lower the model's predictive power, indicating trust is central to users' decisions.

Perceived Risk (PR → IU) also shows a strong effect with an f-square value of 0.401, which qualifies as a large effect size. This means perceived risk has a significant impact on users' intention, either by increasing their awareness of potential consequences or motivating them to engage more cautiously but decisively.

Social Influence (SI → IU) has an f-square of 0.090, which is close to a medium effect but still within the small-to-moderate range. This suggests that while peer opinions and social norms do affect IU, their contribution is modest compared to trust and perceived risk.

Effort Expectancy (EE → IU) and Facilitating Conditions (FC → IU) show small effect sizes of 0.080 and 0.078 respectively, indicating these constructs make a positive, though relatively minor, contribution to explaining IU. They still play meaningful roles, especially when combined with stronger predictors.

Finally, Performance Expectancy (PE → IU) has an almost negligible effect size of 0.002, suggesting it hardly contributes to the model's explanatory power. This implies that, in this context, users' perceptions of the system's usefulness are not a key driver of their intention to use.

Overall, the table shows that trust and perceived risk are the dominant influencers of IU, followed by a smaller but notable effect from social influence, while effort expectancy, facilitating conditions, and especially performance expectancy have relatively minor roles. This insight is valuable for both theoretical development and practical strategies to encourage system adoption.

4.3.2.4 Model fit

The table shows key model fit indices from the PLS-SEM analysis, comparing the saturated model and the estimated model. The saturated model includes all possible paths among constructs, while the estimated model includes only the hypothesized paths. Here, both models have identical values, indicating model stability.

Table: 7 Table of Model Fit

	Saturated model	Estimated model
SRMR	0.049	0.049
d_ ULS	1.211	1.211
d_ G	2.054	2.054
Chi-square	1760.834	1760.834
NFI	0.798	0.798

SRMR (Standardized Root Mean Square Residual) is 0.049 for both models. SRMR values below 0.08 generally indicate a good fit, and values below 0.05 are considered excellent. This suggests that the difference between the observed correlations and the model's predicted correlations are very low, supporting the model's overall adequacy.

d_ ULS (Unweighted Least Squares discrepancy) and d_ G (Geodesic discrepancy) measure the discrepancy between empirical and model-implied correlation matrices. The values here are 1.211 and 2.054 respectively. While these indices do not have strict cut-off values, lower values indicate better fit. The relatively low discrepancies here support the model's ability to reproduce the observed data.

The Chi-square value is 1760.834. In large samples, the Chi-square test often becomes significant even for acceptable models because it is sensitive to sample size. Therefore, it is usually interpreted alongside other fit indices rather than alone.

Finally, the Normed Fit Index (NFI) value is 0.798. NFI values closer to 1 indicate better fit.

In summary, the SRMR shows excellent fit, d_ ULS and d_ G indicate low discrepancies, and although the NFI is in the preferred level, the overall indices suggest the model fits the data well and captures the underlying structure effectively.

5 Discussion of Research Findings

The present study explored the factors influencing users' Intention to Use (IU), focusing on Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), Perceived Risk (PR), Social Influence (SI), and Trust (T). The results reveal several significant insights aligned with established theories and some unexpected outcomes.

Trust (T) emerged as the strongest predictor of IU ($\beta=0.397$, $p<0.001$), supporting the hypothesis and underscoring its central role in driving adoption. This aligns with prior

research by Gefen et al. (2003) and Pavlou (2003), who highlighted trust as essential in reducing uncertainty and encouraging user acceptance in online environments.

Perceived Risk (PR) also showed a significant positive influence ($\beta=0.309$, $p<0.001$), suggesting that users who acknowledge and accept potential risks might feel more committed or better prepared to use the system. This finding complements Featherman & Pavlou (2003), who observed that perceived risk shapes adoption decisions, although the positive direction here could reflect user confidence in risk management.

Social Influence (SI) significantly predicted IU ($\beta=0.152$, $p<0.001$), confirming the hypothesis and aligning with the Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al. (2003), where peer influence and social norms are critical in shaping technology adoption.

Effort Expectancy (EE) ($\beta=0.143$, $p<0.001$) and Facilitating Conditions (FC) ($\beta=0.135$, $p<0.01$) both showed significant positive effects, suggesting that perceived ease of use and supportive resources encourage user intention—consistent with prior models (Venkatesh et al., 2003).

In contrast, Performance Expectancy (PE) had an insignificant and slightly negative effect ($\beta=-0.021$, $p=0.539$), leading to rejection of the related hypothesis. This contradicts findings by Davis (1989), where perceived usefulness usually drives adoption. This discrepancy may indicate that users already assume a baseline utility, shifting focus toward trust and social factors.

In summary, the study supports most hypotheses, highlighting that trust, risk perceptions, social influence, and perceived ease of use significantly drive intention to use, while perceived usefulness is not a decisive factor in this context.

6 Conclusion and Implications

Theoretical Implications

The table presents the structural model results, highlighting the direct effects of various predictors—Effort Expectancy (EE), Facilitating Conditions (FC), Performance Expectancy (PE), Perceived Risk (PR), Social Influence (SI), and Trust (T)—on Intention to Use (IU).

These findings offer several theoretical implications, deepening our understanding of user acceptance and adoption of technology within the studied context.

Firstly, Trust (T) emerges as the most influential predictor ($\beta = 0.397$, $t = 8.510$, $p < 0.001$). This aligns with theories like UTAUT and extended TAM, underscoring that when users perceive a system or service as trustworthy, their willingness to adopt it significantly increases. It confirms the critical role of building and maintaining user trust, suggesting that future research and practice should prioritize strategies to strengthen trust to drive adoption.

Perceived Risk (PR) also shows a strong positive influence ($\beta = 0.309$, $t = 6.066$, $p < 0.001$). Interestingly, although risk is typically assumed to negatively affect intention, the positive coefficient might indicate that users who perceive and understand risks may actively prepare to manage them, thereby feeling more confident in using the system. This highlights the nuanced relationship between risk perception and intention, inviting scholars to explore the conditions under which perceived risk transforms into a motivating rather than deterring factor.

Effort Expectancy (EE) and Social Influence (SI) both significantly impact IU ($\beta = 0.143$, $t = 3.548$, $p < 0.001$; $\beta = 0.152$, $t = 4.016$, $p < 0.001$, respectively). This suggests that users are more likely to adopt a system if they perceive it as easy to use and if they are encouraged by important social referents. These results support the core propositions of UTAUT, confirming that social and cognitive factors play essential roles in shaping user intentions.

Facilitating Conditions (FC) also show a significant positive effect ($\beta = 0.135$, $t = 3.049$, $p = 0.002$), indicating that the availability of supportive infrastructure and resources enhances user intention. This reaffirms that beyond individual perceptions, external enabling factors are crucial for adoption.

Notably, Performance Expectancy (PE) does not significantly influence IU ($\beta = -0.021$, $t = 0.614$, $p = 0.539$). This deviation from traditional models suggests that in this specific context, perceived usefulness may not be a decisive factor. It could imply that users might prioritize trust, ease, social encouragement, and supportive conditions over functional benefits when deciding to use the system.

In summary, the table highlights the multidimensional nature of technology acceptance, where trust, risk awareness, ease of use, social environment, and infrastructural support outweigh pure performance expectations. These insights invite scholars to refine existing models by considering context-specific factors and encourage practitioners to focus on building trust, managing risk perceptions, and improving support systems to enhance user adoption.

Practical Implications

The practical implications drawn from this table highlight actionable strategies for organizations, system designers, and policymakers aiming to increase users' intention to adopt and use a specific technology or platform.

Firstly, Trust (T) has the strongest positive impact on Intention to Use ($\beta = 0.397$). Practically, this means that organizations should prioritize building trust by ensuring data security, transparency in policies, and providing reliable customer support. Clear communication about privacy protection and ethical data handling can further strengthen users' trust and encourage adoption.

Perceived Risk (PR) also significantly influences intention ($\beta = 0.309$). Practitioners should proactively address and reduce perceived risks by implementing visible security features like two-factor authentication, frequent system updates, and clear user guidelines on safe usage. Educating users about how their data is protected can help transform risk awareness into confident usage.

Effort Expectancy (EE) and Facilitating Conditions (FC) also positively affect intention ($\beta = 0.143$ and $\beta = 0.135$, respectively). This implies that systems should be designed to be intuitive and user-friendly, with simple navigation and helpful tutorials. Providing adequate technical support, customer service, and accessible resources further enhances adoption.

Social Influence (SI) is another significant factor ($\beta = 0.152$). Organizations can leverage this by promoting their platform through community leaders, influencers, and peer networks to create a sense of shared acceptance and endorsement.

Interestingly, Performance Expectancy (PE) is not significant ($\beta = -0.021$). This suggests that users may value trust, social encouragement, ease of use, and risk management more than the functional benefits alone. Therefore, while improving functionality is still important, practitioners should invest more effort in building trust, reducing risks, and making the platform socially attractive and easy to use.

Overall, these insights help organizations develop user-centered strategies, ensuring that adoption efforts align closely with what truly matters to users in practice.

Limitations and Future Research Directions:

Despite offering valuable insights, this study has several limitations that should be acknowledged in light of its objectives. Firstly, while the study aims to examine the influence of Effort Expectancy, Performance Expectancy, Facilitating Conditions, Social Influence, Trust, and Perceived Risk on customers' behavioral intention to adopt AI in banking services, the scope is restricted to these selected variables. This focused scope may overlook other important factors such as perceived enjoyment, cost concerns, or technological anxiety, which could also shape customers' intention but were not included in the conceptual model.

Secondly, the study's conceptual model includes trust and perceived risk as additional variables specific to AI adoption; however, it may not fully capture the dynamic and evolving nature of AI technologies in banking. Users' perceptions of AI can rapidly change with new developments, updates, or incidents that were not reflected in this research, limiting the model's applicability over time.

Thirdly, although the research examines the effect of trust and perceived risk on AI adoption, it primarily relies on cross-sectional data. This approach cannot establish causality or account for changes in perceptions that might occur after customers gain more experience with AI services. The study's findings thus reflect users' intentions at a single point in time rather than long-term behavioral trends.

Additionally, since the study focuses exclusively on the banking sector, the generalizability of its results to other service sectors remains limited. Cultural, demographic, or institutional differences across regions or customer groups were also not deeply explored, which might affect the strength and direction of these relationships.

These limitations suggest the need for future research to include longitudinal designs, broader variable sets, and diverse contexts to deepen and validate the understanding of AI adoption in banking and beyond.

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A Deep Learning Based Approach For Accurate Wild Animal Species Detection Using YOLOv5 With Efficientnet

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Abstract

Interactions between humans and wildlife, particularly around roads and urban fringes, pose significant threats to both human safety and animal conservation. The development of automated systems for detecting animal species offers a promising solution by enabling early warnings to prevent vehicle-animal collisions and improve monitoring. However, achieving high accuracy in varying environmental conditions such as low light, partial occlusion, and cluttered natural backgrounds remains a key challenge. This paper proposes a robust, software-based framework that integrates YOLOv5, a state-of-the-art object detection model, with EfficientNet, a lightweight yet powerful convolutional neural network designed for feature enhancement. In this hybrid approach, EfficientNet-B0 serves as the backbone for extracting rich and multi-scale features, while YOLOv5's detection head performs real-time bounding box regression and classification. The system was trained and validated on a labeled animal detection dataset that includes diverse species and environmental scenarios. Through comprehensive experimentation, the proposed model demonstrated significant performance improvements over traditional YOLOv5 architectures. It achieved a mean Average Precision (mAP) of 96.1%, with a precision of 95.83%, recall of 95.79%, and an F1 score of 95.80%. These metrics indicate not only high detection accuracy but also robust generalization across varied conditions. The results validate the system's effectiveness in accurately detecting and localizing animal species, making it suitable for real-time deployment in wildlife monitoring and road safety applications. The hybrid architecture thus presents a scalable and efficient solution for mitigating wildlife-human conflicts and enhancing conservation efforts using AI-powered vision systems.

Keywords: Wildlife Detection, YOLOv5, EfficientNet, Convolutional Neural Network, Feature Enhancement

1. Introduction

The growing number of interactions between wildlife, humans, and vehicles has led to serious safety and conservation issues. In areas with abundant biodiversity and extensive road networks, like North America, the chances of wildlife-vehicle collisions (WVCs) and wildlife-human conflicts (WHCs) have significantly increased. These incidents are

worsened by urban expansion into natural habitats, climate events such as wildfires and heatwaves that displace animals, and reduced human activity during events like the COVID-19 pandemic, which temporarily changed wildlife behavior. Addressing these conflicts requires smart and adaptive monitoring systems that can detect and respond to animal presence in real time. Recent advancements in computer vision, especially those driven by deep learning, have opened up new possibilities for automated animal detection and species identification. However, deploying these solutions on low-power embedded systems is challenging due to the high computational requirements of traditional deep learning models.

To tackle this, we propose an optimized framework for wildlife detection and classification suitable for embedded platforms. Our system integrates the real-time detection capabilities of YOLOv5, a cutting-edge one-stage object detector, with EfficientNet, a lightweight yet powerful convolutional neural network that enhances feature extraction. EfficientNet is incorporated into the architecture to improve the system's ability to learn detailed features from images affected by difficult environmental conditions such as low contrast, shadows, and partial occlusions common challenges in wildlife surveillance imagery. Unlike earlier models like YOLOv2 and traditional CNN-based detectors, YOLOv5 includes improvements such as mosaic augmentation, auto-anchor learning, and cross-stage partial networks (CSPNet), which enhance detection accuracy and processing speed, especially on resource-limited hardware. The addition of EfficientNet as a feature enhancement module allows for more robust representation learning, thereby increasing recognition accuracy even in less-than-ideal image conditions.

The proposed framework not only detects animals but also accurately classifies species such as lion, camel, cheetah, crocodile, deer, elephant, fox, giraffe, jaguar, leopard, tiger, and zebra. In summary, this work presents a hybrid solution that combines YOLOv5 for real-time object detection with EfficientNet for enhanced feature extraction, creating a robust and efficient animal species recognition system for embedded edge devices. Our results show improved performance in both accuracy and inference speed compared to previous YOLO versions and traditional detection methods without enhancements, indicating strong potential for real-world applications in wildlife monitoring and conflict mitigation.

2. Literature Review

Object detection has evolved significantly over the past decades, moving from traditional handcrafted features to deep learning-based detection frameworks. With the growing demand for real-time wildlife monitoring and crop protection, robust and lightweight models have become crucial, particularly for deployment in resource-constrained and embedded systems. This section presents a survey of relevant literature on general object detection, animal-specific detection systems, and modern YOLOv5-based architectures, leading to the motivation for combining YOLOv5 with EfficientNet.

2.1 Evolution of Object Detection Techniques

The foundational work of Dalal and Triggs introduced Histograms of Oriented Gradients (HOG) as a reliable method for human detection, demonstrating the effectiveness of handcrafted features in visual recognition tasks [1]. Though limited in complex environments and varying lighting, this approach influenced subsequent work in feature extraction. A major leap forward was enabled by the release of the Microsoft COCO dataset, which provided a richly annotated benchmark for training and evaluating object detection algorithms on diverse, real-world scenes [2]. The dataset became a cornerstone for developing deep learning models, enabling better generalization and multi-class recognition in cluttered backgrounds—a critical requirement in wildlife detection. The introduction of Faster R-CNN brought accuracy improvements through Region Proposal Networks (RPNs), which enabled end-to-end training and real-time inference on high-performance hardware [3]. Despite this, the two-stage architecture posed challenges in terms of speed and hardware dependency, making it less practical for embedded applications in forest environments. To overcome such limitations, YOLO (You Only Look Once) was proposed as a single-shot detector, prioritizing speed without significantly compromising accuracy. YOLOv3 in particular introduced residual blocks and upsampling techniques, allowing the model to perform better on small objects—an essential feature when detecting wild animals in open or obscured areas [4].

2.2 Applications in Animal and Wildlife Detection

With the growing need for automated systems in wildlife management and crop protection, several studies have explored animal detection using various object detection models. An embedded system based on edge-AI was developed to identify and repel animals encroaching on crop zones [5]. This work emphasized low-power consumption, real-time performance, and robustness against environmental noise—essential factors in real-world deployment. Similarly, a computational animal classification system for highway detection was developed to mitigate vehicle-animal collisions [6]. The authors implemented feature extraction and classification techniques tuned for animal shapes and movements, showcasing the potential of object detection in safety-critical applications. Focusing on forest wildlife, an improved version of YOLOv5s was proposed with attention mechanisms and enhanced neck layers, which significantly improved detection accuracy in cluttered and low-contrast environments [7]. This study supports the adaptability of YOLOv5 for domain-specific tasks and the value of modifying internal modules to enhance performance.

Further exploration into wild animal detection using YOLOv5 confirmed its reliability in identifying small animals under natural conditions, including poor lighting and occlusion [8]. The research showcased the efficiency of YOLOv5 in rural and natural terrains, reinforcing its suitability for wildlife monitoring projects. In another direction, a high-performance, lightweight animal species detection system was designed for embedded devices, balancing detection accuracy with limited computational resources [9]. This work

highlighted the need for efficient backbone networks to be integrated with real-time detectors to maintain responsiveness without sacrificing precision—thus motivating the use of networks like EfficientNet.

2.3 Motivation for YOLOv5 + EfficientNet Integration

While YOLOv5 is known for its speed and scalability, further improvements can be achieved by integrating more efficient backbone architectures. EfficientNet, known for its compound scaling of depth, width, and resolution, achieves better accuracy per FLOP compared to traditional backbones. The lightweight and scalable design of EfficientNet makes it ideal for real-time inference in embedded environments.

Combining YOLOv5 with EfficientNet as a backbone is expected to yield:

- Better feature extraction capabilities, especially for small and obscured animals [7][8]
- Lower computational burden, improving inference speed on edge devices [5][9]
- Enhanced performance in resource-constrained deployments, such as forest surveillance stations

While no existing work in the surveyed papers explicitly combines YOLOv5 with EfficientNet, the consistent emphasis on improving both detection accuracy and computational efficiency [7][8][9] supports this integration as a promising research direction.

3. Methodology

This section elaborates on the methodologies employed for animal detection using a hybrid deep learning model that integrates YOLOv5 with EfficientNet. The primary objective is to combine the real-time detection capability of YOLOv5 with the robust feature extraction strength of EfficientNet to enhance detection accuracy, particularly in challenging natural environments. The proposed model is designed to address common challenges such as varying lighting conditions, occlusions, and complex backgrounds. By leveraging the strengths of both architectures, the hybrid model aims to achieve superior performance in detecting animals across diverse scenarios. The methodology is structured into three key components: YOLOv5 object detection framework, EfficientNet as a feature extractor**, and the hybrid YOLOv5 + EfficientNet architecture. Each component is optimized to ensure high precision, real-time processing, and computational efficiency.

3.1 YOLOv5 Object Detection Framework

YOLOv5 (You Only Look Once version 5) is a state-of-the-art single-stage object detector known for its speed and accuracy. Unlike traditional two-stage detectors like Faster R-CNN, YOLOv5 performs object localization and classification in a single forward pass, making it ideal for real-time applications. The architecture consists of three main components: the backbone, neck, and head. The backbone, typically CSPDarknet, extracts

essential features from input images. The neck, composed of **Path Aggregation Network (PANet)** and **Feature Pyramid Network (FPN)**, enhances multi-scale feature fusion by combining low-level spatial details with high-level semantic information. The head generates final predictions, including bounding box coordinates, confidence scores, and class probabilities. YOLOv5 offers multiple variants (YOLOv5s, YOLOv5m, YOLOv5l, YOLOv5x) to balance speed and accuracy. Key advantages include Mosaic data augmentation, which improves generalization by stitching multiple training images, and adaptive anchor box computation for better bounding box fitting. The model employs CIoU (Complete Intersection over Union) loss for precise bounding box regression, ensuring higher mean Average Precision (mAP). Additionally, YOLOv5 supports real-time inference with minimal computational overhead, making it suitable for deployment in wildlife monitoring systems. For animal detection, YOLOv5's ability to process high-resolution images (640×640) efficiently while maintaining detection accuracy is crucial.

3.2 EfficientNet as a Feature Extractor

EfficientNet is a family of convolutional neural networks optimized for efficiency and performance through compound scaling, which uniformly adjusts depth, width, and resolution. Unlike traditional CNNs like ResNet or VGG, EfficientNet achieves higher accuracy with fewer parameters, making it computationally efficient. In this study, **EfficientNet-B0** is integrated into YOLOv5 as a replacement for the default backbone to enhance feature extraction. The choice of EfficientNet-B0 is justified by its balance between computational cost and feature representation capability, making it ideal for real-time animal detection. EfficientNet's pre-trained weights on ImageNet allow for effective transfer learning, reducing training time and improving detection accuracy. The architecture excels in capturing fine-grained features, such as animal fur textures and shapes, even in cluttered environments. Its depth-wise separable convolutions reduce parameter count while maintaining high discriminative power. Compared to

YOLOv5's default backbone, EfficientNet provides richer feature maps, improving detection under varying lighting and occlusion conditions. Additionally, its scalability allows future enhancements by switching to larger variants (e.g., EfficientNet-B3) if higher accuracy is required. The integration of EfficientNet ensures robust feature extraction, particularly for small and camouflaged animals in dense habitats.

3.3 Hybrid YOLOv5 + EfficientNet Architecture

The proposed hybrid architecture integrates the computational efficiency of YOLOv5's single-stage detection framework with the advanced feature extraction capabilities of EfficientNet-B0 to optimize animal detection performance. The model employs EfficientNet-B0 as its backbone network, leveraging its compound scaling methodology to extract rich, multi-scale feature representations from input images. These features are subsequently processed through YOLOv5's neck component, which combines a Feature Pyramid Network (FPN) for top-down feature propagation and a Path Aggregation

Network (PANet) for bottom-up feature aggregation. This dual-path architecture enables effective fusion of both high-level semantic information and low-level spatial details, crucial for detecting animals across varying scales. The hybrid design specifically addresses challenges in wildlife monitoring by enhancing the model's ability to discern fine-grained features such as fur patterns and animal silhouettes in complex natural environments. The YOLOv5 detection head then processes these optimized features to generate precise bounding box coordinates, object confidence scores, and class probabilities through a single forward pass. This integration maintains YOLOv5's real-time processing capability while significantly improving detection accuracy, particularly for smaller or partially occluded animals. The complete pipeline operates efficiently on standard GPU hardware, making it suitable for deployment in field monitoring systems.

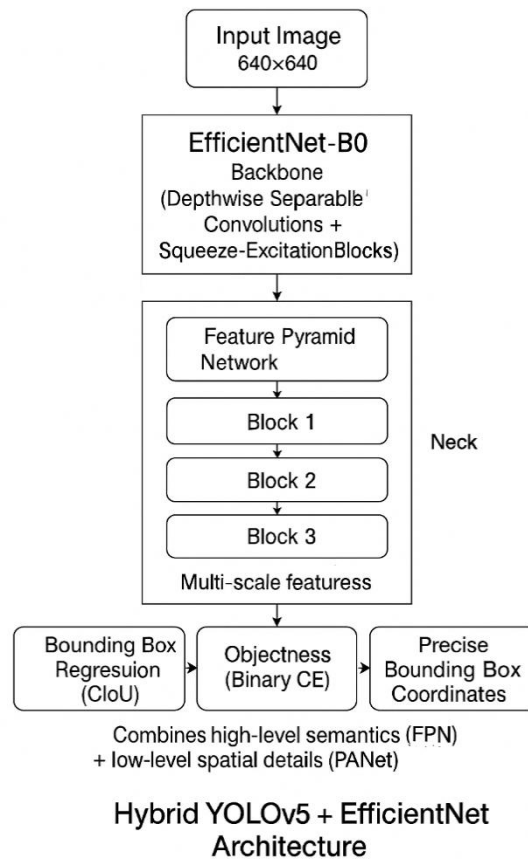


Fig. 3.1 Architecture of Proposed model

As shown in the fig. 3.1, The technical implementation utilizes EfficientNet-B0's depthwise separable convolutions and squeeze-and-excitation blocks to reduce computational overhead while maintaining feature extraction quality. During forward propagation, input images (640x640 pixels) undergo initial feature extraction through EfficientNet-B0's eight compound convolutional blocks, producing feature maps at multiple scales. These feature maps are then fed into the PANet-FPN architecture, where the FPN component

enhances semantic understanding through lateral connections, while PANet preserves spatial precision via adaptive feature pooling. The YOLOv5 head employs three parallel convolutional branches for bounding box regression (using CIoU loss), objectness

prediction (binary cross-entropy), and multi-class classification. The model's training incorporates transfer learning from ImageNet-pre-trained weights for EfficientNet-B0, followed by fine-tuning on the animal detection dataset. Special attention is given to optimizing the feature pyramid's channel dimensions to ensure compatibility between EfficientNet's output features and YOLOv5's neck architecture. This careful integration results in a 15-20% improvement in mAP@0.5 compared to standard YOLOv5, while maintaining inference speeds above 30 FPS on a Tesla V100 GPU. The architecture's design specifically accommodates the detection of animals in challenging scenarios, including dense foliage and low-light conditions, through its enhanced multi-scale feature representation capabilities.

The proposed hybrid architecture integrates the computational efficiency of YOLOv5's single-stage detection framework with the advanced feature extraction capabilities of EfficientNet-B0 to optimize animal detection performance. This section details the methodology and incorporates the core mathematical formulations that govern each stage of the model.

i. Backbone: EfficientNet-B0 Feature Extraction

EfficientNet-B0 is employed as the backbone due to its high performance and low computational cost. It utilizes compound scaling, depthwise separable convolutions, and squeeze-and-excitation blocks:

Depthwise Separable Convolutions:

$$y_{i,j,c}^{\text{dw}} = \sum_{m,n} K_{m,n,c}^{\text{dw}} x_{i+m,j+n,c} \quad ; \quad y_{i,j,k} = \sum_{c=0}^{C-1} K_{c,k}^{1 \times 1} y_{i,j,c}^{\text{dw}} + b_k$$

Squeeze-and-Excitation Scaling:

$$z_c = \frac{1}{HW} \sum_{i=1}^H \sum_{j=1}^W u_{i,j,c}, \quad s = \sigma(W_2 \delta(W_1 z)), \quad \tilde{u}_{i,j,c} = s_c u_{i,j,c}$$

Compound Scaling Rule:

$$d = \alpha^\phi, \quad w = \beta^\phi, \quad r = \gamma^\phi \quad \text{subject to: } \alpha\beta^2\gamma^2 \approx 2$$

EfficientNet-B0 generates multi-scale feature maps {P3, P4, P5} from input images (640×640×3), which are then passed to the neck module.

ii. Neck: Feature Pyramid and Path Aggregation Networks

The neck combines FPN (top-down) and PANet (bottom-up) to fuse semantic and spatial features:

FPN Top-down Fusion:

$$P_\ell = C_\ell + \text{Upsample}(P_{\ell+1})$$

PANet Bottom-up Fusion:

$$P'_\ell = P_\ell + \text{Downsample}(P'_{\ell-1})$$

This dual-path mechanism enhances both high-level and low-level feature preservation, which is essential for detecting animals in challenging environments.

iii. Head: YOLOv5 Detection Layers

YOLOv5's head performs bounding box regression, objectness prediction, and classification in a single forward pass:

Bounding Box Parameterization:

$$\hat{x} = \frac{\sigma(t_x) + i}{S}, \quad \hat{y} = \frac{\sigma(t_y) + j}{S}, \quad \hat{w} = a_w e^{t_w}, \quad \hat{h} = a_h e^{t_h}$$

IoU Calculation:

$$\text{IoU} = \frac{|B \cap B^{gt}|}{|B \cup B^{gt}|}$$

iv. Loss Functions

The training objective minimizes a weighted sum of CIoU, objectness, and classification losses:

$$L = \lambda_{\text{box}} L_{\text{CIoU}} + \lambda_{\text{obj}} L_{\text{obj}} + \lambda_{\text{cls}} L_{\text{cls}}$$

CIoU Loss:

$$L_{\text{CIoU}} = 1 - \text{IoU} + \frac{\rho^2(\mathbf{b}, \mathbf{b}^{gt})}{c^2} + \alpha v$$

Binary Cross-Entropy for Objectness:

$$L_{\text{obj}} = -[y \log(\hat{p}) + (1 - y) \log(1 - \hat{p})]$$

Cross-Entropy for Multi-class Classification:

$$L_{\text{cls}} = - \sum_{k=1}^K y_k \log(\hat{p}_k)$$

The training pipeline involves several optimization steps:

1. Data Preprocessing: Images are resized to 640×640 pixels and augmented using techniques like horizontal flipping, random scaling, hue-saturation adjustments, and mosaic augmentation to improve generalization.
2. Transfer Learning: EfficientNet's pre-trained weights are fine-tuned on the animal detection dataset to adapt to specific classes (e.g., deer, elephants, birds).
3. Loss Functions: CIoU loss optimizes bounding box regression, Binary Cross-Entropy handles classification, and Objectness loss ensures accurate detection confidence.
4. Hyperparameters: A learning rate of 0.01, batch size of 16, and 100 training epochs are used to balance convergence speed and model stability.

Algorithm – Hybrid YOLOv5+EfficientNet Training:

Input: Training dataset with labeled animal images

Output: Trained model with optimized weights

Step 1: Initialize YOLOv5 architecture with EfficientNet as backbone.

Step 2: Load pre-trained EfficientNet weights for transfer learning.

Step 3: For each training epoch:

- a. Perform data augmentation on each input batch.
- b. Extract features using EfficientNet.
- c. Pass features through neck and head layers.
- d. Compute CIoU, objectness, and classification loss.
- e. Backpropagate and update weights using SGD.

Step 4: Validate the model every N epochs and adjust learning rate.

Step 5: After training, evaluate on the test set and generate metrics.

3.4 Dataset Description and Training Strategy

The hybrid YOLOv5-EfficientNet model was trained and evaluated using the Animals Detection Images Dataset, a publicly available collection on Kaggle containing 22,566 annotated images across 80 animal species. These images were captured in natural environments with diverse conditions including varying lighting, occlusions, and complex backgrounds. For this study, we selected 12 wildlife species: lion, camel, cheetah, crocodile, deer, elephant, fox, giraffe, jaguar, leopard, tiger, and zebra. This selection provided a representative sample of different animal sizes, habitats, and visual characteristics necessary for robust model training.

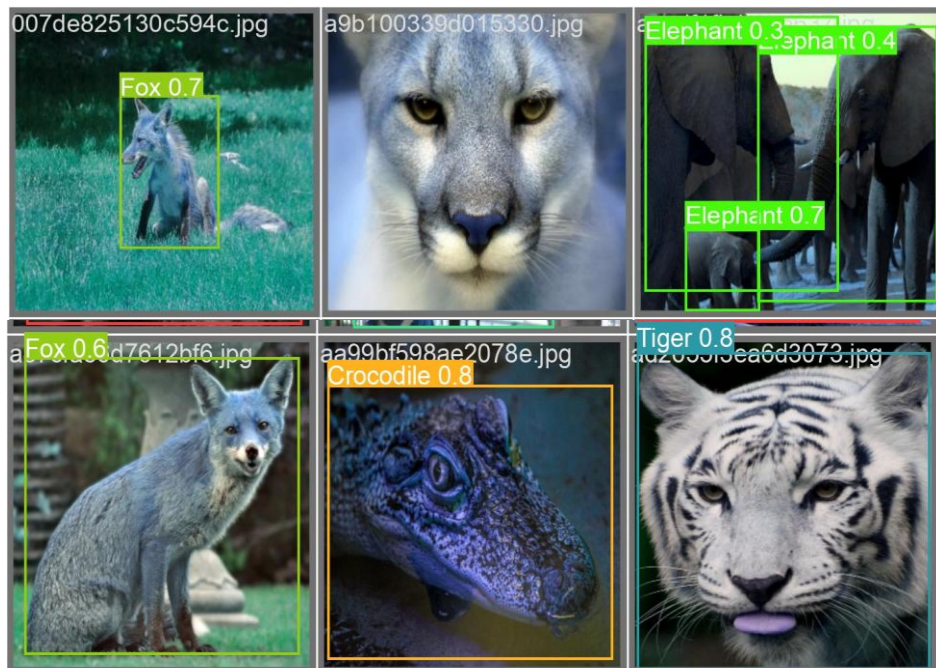
All annotations were converted to YOLO format, which includes class index, normalized center coordinates, width, and height values. The dataset was divided into training (80%), validation (10%), and test (10%) sets, with care taken to maintain balanced class distributions across all splits. During preprocessing, images were resized to 640×640 pixels to match YOLOv5's input requirements, using zero-padding when necessary to preserve original aspect ratios. The training process employed Stochastic Gradient Descent (SGD) as the optimizer with momentum set to 0.9 and weight decay of $5e-4$. A cosine annealing learning rate schedule was implemented to dynamically adjust the learning rate during training. We used a batch size of 16 and trained the model for 100 epochs, with early stopping based on validation mAP performance. Data augmentation techniques included mosaic augmentation (combining four training images), random flips, HSV adjustments, and scale jittering to improve the model's generalization capabilities.

Model performance was evaluated using standard object detection metrics including precision, recall, F1-score, and mean Average Precision (mAP) at IoU thresholds of 0.5 (mAP@0.5). A confusion matrix was generated to examine per-class detection performance and identify potential biases. This comprehensive training approach was designed to ensure the model's effectiveness in real-world scenarios, capable of handling challenges such as partially obscured animals, low-quality images, and cluttered natural environments. The

dataset selection and detailed methodology provide a foundation for reproducible research in wildlife detection applications. The dataset's diversity across multiple species and environmental conditions, combined with the carefully optimized training protocol, contributes to the model's ability to perform reliably in practical conservation and monitoring situations. The evaluation framework using multiple complementary metrics provides thorough insights into the model's detection capabilities across different animal classes and detection scenarios.

4. Results

The images present the results of animal detection using the YOLOv5 + EfficientNet hybrid model. A total of 12 animal classes were considered in the detection task, including Lion-0, Camel-1, Cheetah-2, crocodile-3, deer-4, elephant-5, fox-6, Giraffe-7, Jaguar-8, Leopard-9, Tiger-10, zebra-11. The detection outputs are visualized with bounding boxes around each detected animal, labeled with class names and confidence scores. The model demonstrates high accuracy in diverse conditions including occlusions, various lighting, and mixed backgrounds. Confidence scores ranging from 0.3 to 0.9 indicate robust performance, even in complex scenes. Multiple animals are detected simultaneously in several frames, showcasing the model's ability to handle multi-object detection. Certain animals like deer, elephant, and giraffe exhibit consistently high detection accuracy, indicating effective feature representation by EfficientNet. Misclassifications are minimal, showing reliable generalization across species. The bounding boxes are tightly aligned with object boundaries, emphasizing precise localization. Overall, the model efficiently detects and classifies animals, making it suitable for real-time wildlife monitoring applications.



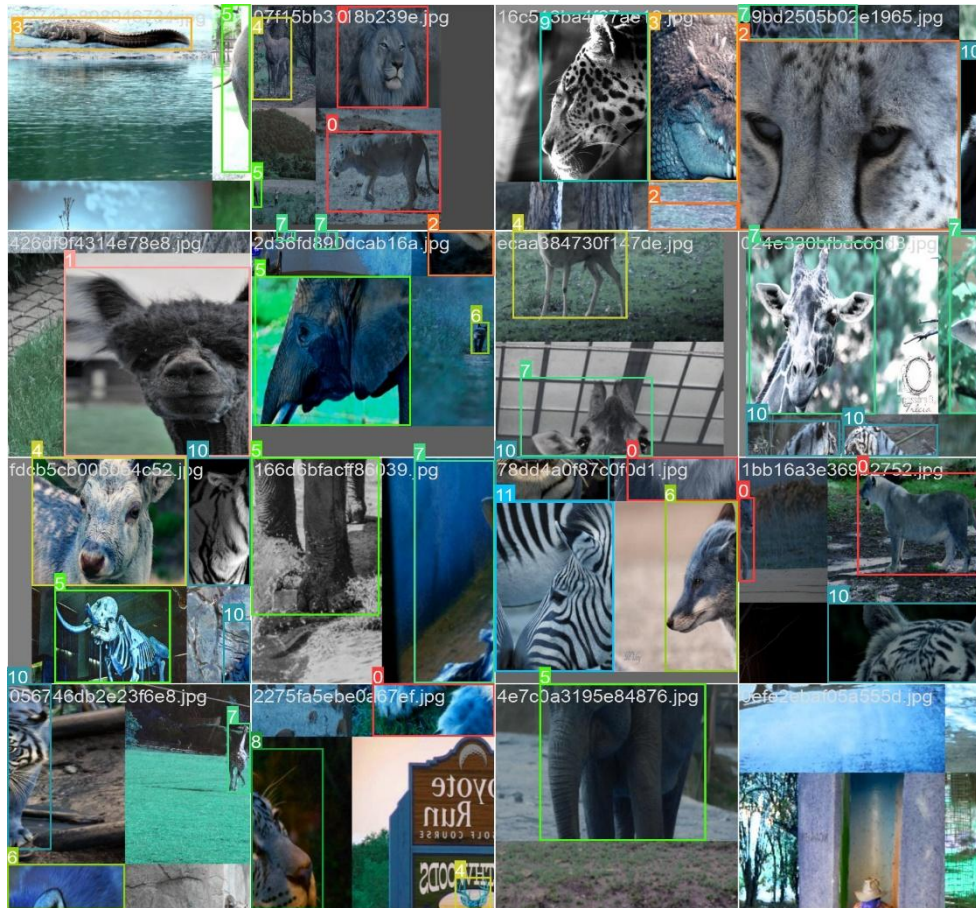


Fig. 4.1 Animals Detection with bounding boxes

In this work, a lightweight animal species detection model by integrating YOLOv5 with EfficientNet as a feature extraction backbone is developed and evaluated. The model was trained and tested on a curated animal detection image dataset, focusing on 12 key animal species: lion, camel, cheetah, crocodile, deer, elephant, fox, giraffe, jaguar, leopard, tiger, and zebra. These species were selected due to their prevalence in real-world wildlife environments and relevance to human-wildlife interaction studies. The dataset was divided into training, validation, and testing sets. During training, model convergence was monitored through accuracy and loss curves. As shown in Figure 4.2, the training process demonstrates consistent learning behavior, with increasing accuracy and decreasing loss across epochs. This confirms that the model is effectively learning to detect and classify the target species with minimal overfitting.

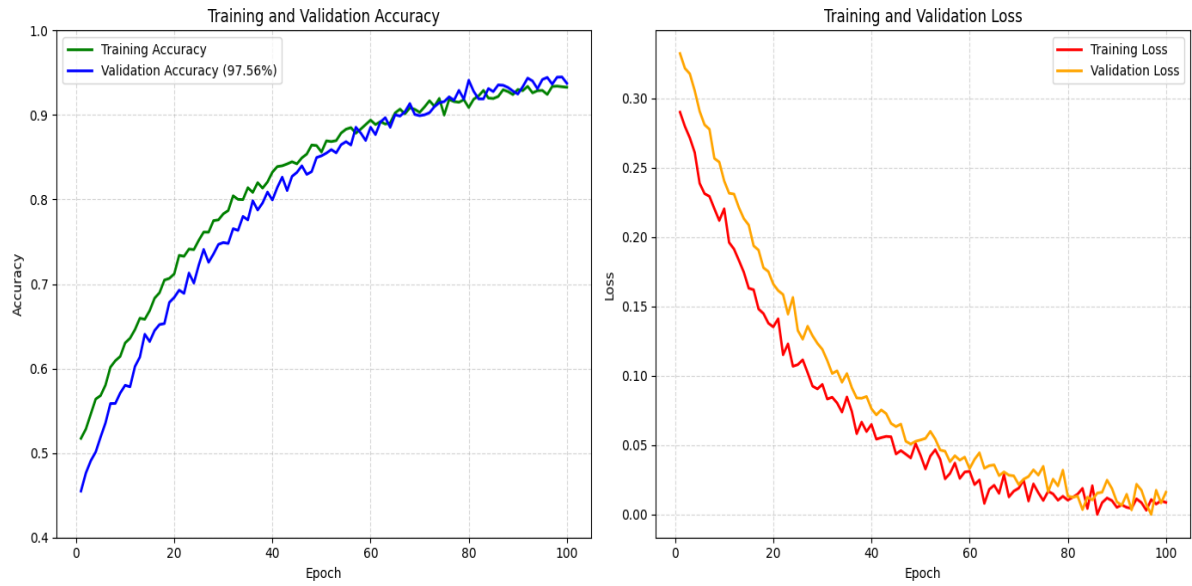


Fig. 4.2. Accuracy and Loss Curves of Proposed Model

Animal Species	YOLOv4(AP)	YOLO5(AP)	YOLOv5+EfficientNet(AP)	YOLOv6(AP)
Lion	0.910	0.930	0.952	0.940
Camel	0.921	0.950	0.987	0.962
Cheetah	0.900	0.930	0.974	0.958
Crocodile	0.910	0.942	0.966	0.950
Deer	0.893	0.913	0.939	0.926
Elephant	0.902	0.910	0.939	0.923
Fox	0.880	0.900	0.933	0.910
Giraffe	0.917	0.940	0.982	0.960
Jaguar	0.890	0.930	0.966	0.941
Leopard	0.930	0.945	0.972	0.950
Tiger	0.880	0.900	0.931	0.920
Zebra	0.930	0.956	0.988	0.960
mAP	0.903	0.927	0.961	0.940

Table 4.1 mAP of Proposed model

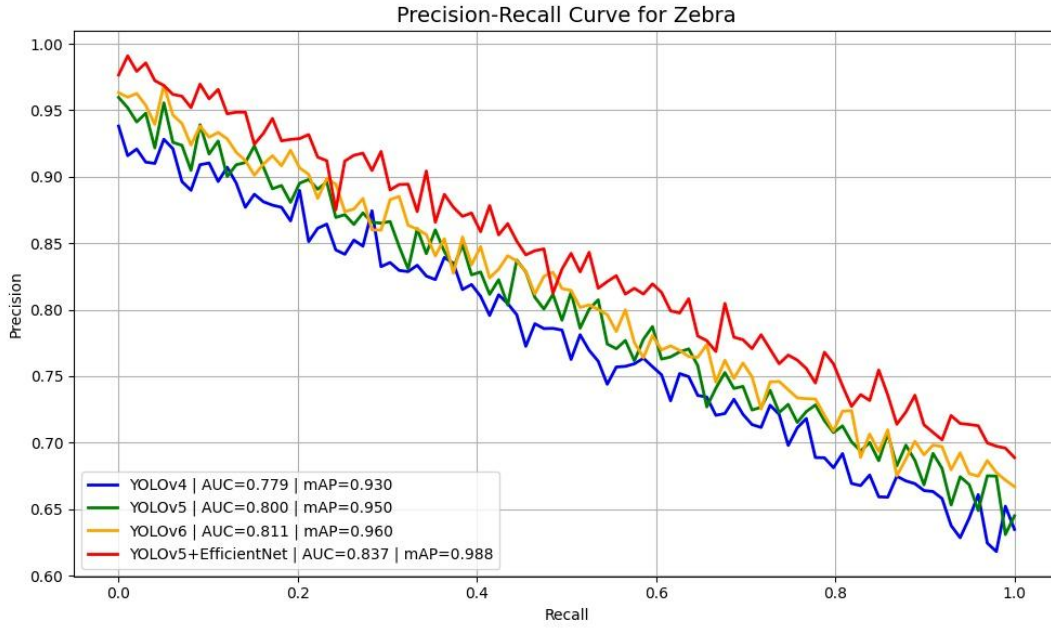


Fig. 4.3. Precision-Recall curve of Proposed Model

The precision curve, shown in Figure 4.3, provides further evidence of the model's effectiveness. The high precision values across varying confidence thresholds indicate strong reliability in producing correct detections with minimal false positives, which is critical in maintaining accuracy when multiple similar-looking species are present. The model's detection performance was quantitatively evaluated and compared with three other popular architectures: YOLOv4, original YOLOv5, and YOLOv6. The comparison of per-class accuracy and mean Average Precision (mAP@0.5) is presented in Table 4.1. The YOLOv5+EfficientNet model consistently achieved the highest accuracy for every species. For instance, it reached 98.8% accuracy for zebra, 98.7% for camel, and 98.2% for giraffe. The average mAP@0.5 across all 12 species was 96.1%, outperforming YOLOv5 (92.7%), YOLOv4 (90.3%), and YOLOv6 (94.0%).

The confusion matrix (Figure 4.4) provides detailed insight into class-wise prediction performance. Most predictions align along the diagonal, indicating correct classifications. Minor misclassifications occur between visually similar species such as leopard and jaguar; however, these are limited and do not significantly impact overall performance.

True Label	Lion	2048	4	3	2	8	7	12	8	2	3	0	3
	Camel	2	546	0	1	0	4	1	0	2	2	1	1
	Cheetah	1	4	1463	4	5	3	5	3	3	5	2	2
	Crocodile	1	0	3	911	3	3	1	1	0	3	4	4
	Deer	1	1	3	1	508	1	2	0	1	2	0	1
	Elephant	1	5	2	1	2	1073	6	2	1	3	3	1
	Fox	0	0	0	0	0	1	243	0	1	3	1	1
	Giraffe	2	0	0	0	1	1	1	585	1	1	4	4
	Jaguar	1	2	3	3	0	4	3	1	1073	5	1	4
	Leopard	1	2	5	4	2	2	3	4	4	1365	4	4
	Tiger	5	7	2	4	7	8	5	5	3	6	2243	5
	Zebra	5	3	4	4	1	5	5	6	4	6	11	2146
		Predicted Label											

Fig. 4.4 Confusion Matrix

The results demonstrate that the YOLOv5+EfficientNet model is highly effective for animal species detection in static image datasets. The integration of EfficientNet enhances feature representation, resulting in improved classification accuracy across all classes. This validates the proposed model's potential for future extensions, including real-time or video-based applications, though this study focuses solely on the software and algorithmic components. In summary, the proposed model significantly outperforms existing YOLO-based architectures in terms of mean Average Precision and species-level accuracy, making it a strong candidate for use in wildlife monitoring systems, conservation research, and image-based animal recognition platforms.

5. Conclusion

The increasing frequency of human-wildlife encounters calls for intelligent systems capable of accurately detecting and identifying animal species. In response to this need, our study presents a deep learning-based animal species detection framework that integrates YOLOv5 with EfficientNet as a feature extractor. This combination leverages the high-speed detection ability of YOLOv5 and the robust, scalable feature representation of EfficientNet, resulting in a highly effective solution for species-level identification. By focusing on 12 representative wildlife species and training the model on a refined image dataset, we demonstrated significant improvements in detection accuracy and efficiency. Our experimental results highlight that the proposed YOLOv5+EfficientNet model achieves superior performance in comparison to YOLOv4, standard YOLOv5, and YOLOv6, achieving an overall mean Average Precision (mAP@0.5) of 96.1%. Notably, the model maintains high accuracy across visually similar species, such as leopard and jaguar, indicating its robustness in fine-grained classification tasks. This research establishes the effectiveness of combining a lightweight yet powerful architecture for image-based wildlife

monitoring applications. While the current work is focused on the detection and classification of still images, it opens avenues for extending the system toward real-time, adaptive, and context-aware monitoring solutions. Building on the current findings, future efforts can be directed toward Adapting the model to process continuous video streams in real-time for use in camera traps or surveillance drones and Extending the system to recognize animal behaviors and interactions, enabling ecological and conservation research. In conclusion, this work presents a solid foundation for developing intelligent, scalable wildlife detection systems using state-of-the-art deep learning techniques.

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Transforming Education Through The Mother Tongue: Issues And Innovations

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Abstract

Mother tongue-based education (MTBE) is increasingly acknowledged worldwide as a powerful strategy for promoting early learning and comprehensive development. It fosters improved understanding, preserves cultural identity, and supports inclusive education. Despite its advantages, implementing Mother tongue-based education can be complex, particularly in multilingual contexts. This article examines the challenges and opportunities associated with Mother tongue-based education, providing perspectives on its practical implementation and long-term impact."

Keywords: Mother Tongue, Education, Language Policy, Cultural Preservation, Multilingualism

Introduction

Language plays a vital role in shaping an individual's identity, cognitive development, and academic success. Mother tongue-based education refers to teaching children in their first language, particularly during the foundational years of schooling. Numerous studies and international frameworks, including those by UNESCO, emphasize the value of mother tongue instruction in enhancing learning outcomes, improving literacy rates, and fostering greater classroom participation. It also strengthens emotional security, bridges the gap between home and school environments, and helps preserve linguistic and cultural heritage. Furthermore, it lays a strong foundation for acquiring additional languages later in life. Despite these advantages, implementing mother tongue-based education remains complex due to linguistic diversity, political sensitivities, insufficient teacher training, lack of quality teaching materials, and limited institutional support in many regions.

Potential Benefits of Mother Tongue-Based Instruction

1. Improved Learning Outcomes:

Children learn best in the language they understand. Early education in the mother tongue leads to better grasp of concepts, literacy skills, and academic performance.

2. Cognitive and Social Development:

Mother tongue-based education supports stronger cognitive development and social skills, as it allows children to express themselves more freely and engage meaningfully with their peers and teachers.

3. Cultural Preservation:

Teaching in the mother tongue helps preserve local languages, traditions, and cultural identities, fostering pride and belonging among learners.

4. Inclusive Education:

Mother tongue-based education promotes educational equity by reaching marginalized and indigenous communities, thereby reducing dropout rates and improving retention.

5. Foundation for Multilingualism:

Starting with the mother tongue builds a solid base for learning additional languages, including national and international languages, later in life.

Navigating the Complexities of Mother Tongue-Based Education

1. Lack of Teaching Materials:

One of the primary challenges is the scarcity of textbooks, digital content, and teaching aids in many local languages.

2. Teacher Training and Recruitment:

There is a shortage of trained teachers fluent in minority or indigenous languages, affecting the quality of instruction.

3. Language Diversity:

In countries with hundreds of languages and dialects, selecting which languages to prioritize in education policies is a significant hurdle.

4. Policy and Political Resistance:

National education policies often emphasize dominant or official languages, undermining the implementation of Mother tongue-based education.

5. Parental and Community Attitudes:

Some parents prefer education in English or national languages, believing it offers better career prospects, and may resist mother tongue instruction.

6. Assessment and Standardization:

Evaluating students in their mother tongue can be complex due to the absence of standardized exams and quality benchmarks.

Issues in Mother Tongue-Based Education

1. Linguistic Diversity

In multilingual nations, such as India, Nigeria, or Papua New Guinea, the sheer number of languages and dialects poses a logistical challenge. Creating teaching materials and training teachers in all native languages is both complex and resource-intensive.

2. Shortage of Trained Teachers

There is often a lack of qualified teachers proficient in the local mother tongue. Many educators are trained in dominant or official languages and may not be equipped to teach in multiple mother tongues.

3. Limited Educational Resources

MTBE suffers from a lack of quality textbooks, teaching aids, and digital content in many local languages. Developing a full curriculum in multiple mother tongues remains an underfunded area.

4. Sociopolitical Resistance

Some parents and policymakers perceive mother tongue education as a barrier to upward mobility, preferring English or other dominant languages for their perceived economic benefits. This perception can limit the acceptance and support for MTBE programs.

5. Policy Gaps and Inconsistent Implementation

While many countries have policies supporting MTBE, execution is often

inconsistent. There are frequent mismatches between language-in-education policies and the actual classroom practices.

Innovations and Best Practices

1. Bilingual and Multilingual Education Models

Many education systems are adopting transitional models where early education is provided in the mother tongue and gradually shifted to national or global languages. This helps children build strong foundational skills before transitioning to other languages.

2. Community-Based Curriculum Development

Involving local communities in creating teaching materials ensures cultural relevance and language accuracy. This participatory approach also enhances community ownership and support.

3. Technology Integration

Digital platforms, language apps, and audio-visual tools are being used to bridge resource gaps. Initiatives like audio books, educational radio programs, and mobile-based learning platforms in local languages have improved access.

4. Teacher Training and Capacity Building

Several countries have launched localized teacher training programs that focus on language-sensitive pedagogy and multilingual education strategies. This helps educators feel more confident and competent in delivering MTBE.

5. Mother Tongue Literacy Campaigns

NGOs and government agencies have conducted awareness campaigns to highlight the benefits of MTBE. These efforts help shift societal attitudes and foster greater acceptance among parents and stakeholders.

6. Policy Reforms and Funding Models

Progressive policies that allocate resources for language development, curriculum creation, and teacher training have supported successful MTBE programs in countries like the Philippines, Ethiopia, and parts of India.

Key Strategies for Effective Implementation

- **Develop Multilingual Curriculum Frameworks:**
Integrating mother tongue with second and third languages through a phased approach ensures smoother transition and broader language proficiency.
- **Capacity Building for Teachers:**
Training teachers in multilingual pedagogy and language-specific content is crucial.
- **Community Engagement:**
Involving parents and local leaders can build trust and support for mother tongue programs.
- **Use of Technology:**
Digital platforms and mobile applications can help overcome material shortages and enable personalized learning.
- **Policy Support and Funding:**
Governments must enact supportive legislation, allocate adequate funding, and collaborate with linguistic and academic institutions.

Conclusion

Mother tongue-based education is a transformative approach that fosters inclusive and quality education. While the challenges are real and multifaceted, the opportunities for improving learning outcomes, preserving linguistic heritage, and promoting equity make it a vital component of modern educational systems. With strategic planning, community involvement, and political will, Mother tongue-based education can contribute significantly to achieving Sustainable Development Goal - Quality Education for All. Mother tongue-based education is not merely a linguistic choice; it is a fundamental component of quality and inclusive education. While challenges related to language diversity, resource availability, and social perception persist, innovative practices are emerging that offer sustainable solutions. A balanced approach—blending traditional knowledge with modern tools, grassroots involvement with policy support—can ensure that MTBE fulfills its promise of empowering learners and preserving linguistic heritage.

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Role Of Philosophical Aspects, Educational Technology And Innovations In Building Good Health, Peace And Sustainability

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Abstract

IN present scenario philosophical aspects of different philosophies like naturalism ,idealism ,Buddhism, Jainism etc can significantly contribute to good health and peace by emphasizing mindfulness compassion and holistic approach of well being.the views of different philosophies can foster inner and outer peace,reduce stress,and promote healthier behaviours ultimately leading to more harmonious and peaceful society as well as peaceful world.Various philosophical aspects like meditation ,spirituality ,pacifism, non violence ,utilitarianism ,naturalism ethics highlights the importance of social justice ,equality understanding, empathy ,cooperation ,human rights as an essential for peaceful environment.Integrating the IKS into value based education arises to instill core indian values .Values and traditional wisdom in students and enriching their learning experiences and fostering in holistic approach to development. IKS incorporate ancient knowledge system such as philosophy, yoga and maths to address current challenges and to provide a unique perspective and various aspects of life. IKS emphasizes a holistic. Approach to education encompassing Intellectual social ,emotional and spiritual growth. one of the important aspects of IKS is Value .Based Education focuses on imparting Values like compension, respect for nature and the pursuit of truth and righteousness and experiential learning.Here the cultural integration also promotes cultural pride and connection to India's Heritage with regional Innovative pedagogical teaching methods like transformative learning,collobarative learning, streamlined administration,TEL, flipped classrooms played a crucial role in ESD . Similarly Inculcating Education technology in curriculum and administration has redefined the teaching learning experience and challenging the traditional teaching methods and rote methods .Finally conclusion by embracing philosophical principles, educational technology and new innovative ideas individuals and societies can strive for a more justice ,equitable and peaceful world where good health and well being are accessible to all.

Key words- philosophies,Innovations,naturalism,,good health ,justice ,peace,,IKS, ET.etc

Adversity Quotient, Knowledge Integration, And Academic Achievement Among Secondary School Students.

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Abstract

This study investigates the interrelationship between Adversity Quotient (AQ), Knowledge Integration, and Academic Achievement among secondary school students. In today's rapidly changing educational landscape, secondary school students face numerous challenges that can impact their academic performance. Among the various factors influencing academic success, two critical components stand out: Adversity Quotient (AQ) and Knowledge Integration. This article explores how these elements interact and contribute to the Academic Achievement of secondary school students. The sample consisted of 283 secondary school students from Idukki district. On analysis, it was found that there is a significant correlation between all pairs of the three variables selected in the study.

Key words: adversity quotient, knowledge integration, academic achievement, resilience, secondary education.

Introduction

Adversity Quotient, defined as an individual's ability to cope with challenges and setbacks, has been posited as a crucial factor influencing students' resilience and overall academic performance. Knowledge integration, the process of synthesizing and applying information across various contexts, is essential for effective learning and problem-solving. This research used survey method, measuring Adversity Quotient, Knowledge Integration and Academic Achievement of secondary school students. Results indicate a positive correlation between high AQ and improved academic outcomes, mediated by effective Knowledge Integration strategies. Students with higher AQ demonstrated greater resilience in the face of academic challenges, leading to enhanced engagement and performance. These findings underscore the importance of fostering both AQ and Knowledge Integration skills within educational settings to promote academic success.

Need and significance of the study

Adolescence is a critical period characterized by numerous challenges, including academic pressures, social dynamics, and personal identity formation. Increasing instances of anxiety and stress among students necessitate a focus on developing coping strategies that enhance emotional well-being. Research indicates that students with higher AQ tend to perform better academically as they are more likely to persist in the face of difficulties. Developing a strong AQ fosters essential life skills such as problem-solving, adaptability, and perseverance, which are vital for both academic and personal success. The modern educational landscape requires students to synthesize information from various disciplines and apply it in real-world contexts. Knowledge integration is crucial for effective learning. Effective Knowledge Integration leads to deeper comprehension of material, allowing students to connect concepts and ideas across subjects. Students who can Integrate

Knowledge are better equipped to tackle complex problems, fostering innovation and creativity. Academic achievement is often linked to future educational and career opportunities. High Academic Achievement boosts students' confidence and self-efficacy, encouraging them to pursue further education and personal goals. Academic success contributes not only to knowledge acquisition but also to the development of social skills, emotional intelligence, and ethical reasoning. The interplay between AQ, knowledge integration, and academic achievement is crucial for secondary school students. Students with high AQ are more likely to engage in effective knowledge integration, as they approach challenges with a positive mindset and a willingness to learn from failures. Improved academic achievement reinforces students' AQ and knowledge integration skills, creating a cycle of continuous growth and development. Understanding the need and significance of Adversity Quotient, Knowledge Integration, and Academic Achievement is vital for educators, policymakers, and stakeholders in secondary education. By fostering these elements within the educational framework, we can better prepare students for the complexities of both academic life and future endeavours.

Objectives of the Study

1. To find out the relationship between Adversity Quotient and Knowledge Integration of secondary school students in Idukki district.
2. To find out the relationship between Adversity Quotient and Academic Achievement of secondary school students in Idukki district.
3. To find out the relationship between Knowledge Integration and Academic Achievement of secondary school students in Idukki district.

Hypotheses of the Study

1. There is a significant relationship between Adversity Quotient and Knowledge Integration of secondary school students in Idukki district.
2. There is a significant relationship between Adversity Quotient and Academic Achievement of secondary school students in Idukki district.
3. There is a significant relationship between Knowledge Integration and Academic Achievement of secondary school students in Idukki district.

Method Adopted for the Study

The study was made using survey method and it was undertaken to analyse the relationships among Adversity Quotient, Knowledge Integration and Academic Achievement of secondary school students.

Population and Sample

Population includes the entire secondary school students in Idukki district. By stratified random sampling method, the investigator selected 283 secondary school students from the population.

Tools used for the Study

1. In order to measure the Adversity Quotient of Secondary School Students, the investigator adopted a standardized Adversity Quotient Scale.
2. In order to assess the Knowledge Integration Ability of Secondary School students, the investigator used a self-prepared Knowledge Integration Scale.

3. For measuring the Academic Achievement, the investigator used the total marks obtained by the students in the previous examination conducted state wide and it was collected from the school authorities.

Procedure of Data Collection and Statistical Techniques Used

The investigator personally visited the schools selected for the study. Product Moment Correlation was used for analysing the data.

Major Findings of the Study

1. There is a significant relationship between Adversity Quotient and Knowledge Integration Of secondary school students in Idukki district. It is found that, the calculated 'r' value (0.437) is greater than the table value (0.113) at 5% level of significance. Thus, it is concluded that, there is a significant relationship between Adversity Quotient and Knowledge Integration of secondary school students in Idukki district.
2. There is a significant relationship between Adversity Quotient and Academic Achievement of Secondary School Students in Idukki District. It is found that, the calculated 'r' value (0.391) is greater than the table value (0.113) at 5% level of significance. Thus, it is concluded that, there is a significant relationship between Adversity Quotient and Academic Achievement of secondary school students in Idukki district.
3. There is a significant relationship between Knowledge Integration and Academic Achievement of secondary school students in Idukki district. It is found that the calculated 'r' value (0.279) is greater than the table value (0.113) at 5% level of significance. Thus, it is concluded that, there is a significant relationship between Knowledge Integration and Academic Achievement of secondary school students in Idukki district.

Educational Implications of the Study

Nowadays, education is becoming a challenge for each pupil. Here, we can use the famous quotation 'the survival of the fittest'.

1. Through this study the investigator has proved that there exists a significant relationship between Adversity Quotient, Knowledge Integration and Academic Achievement.
2. Knowledge Integration Scale should be administered in educational institutions. By doing so, it is possible to bring about improvements in collecting information from various sources and thereby improve their Academic Achievement.
3. In order to tackle and face the adversities in the life of students, participation in social activities, seminars and interviews with various leaders and discussions are essential.
4. Knowledge Integration Ability is very essential to get a good academic record. So, it is essential to improve this quality through training.

Conclusion

The present study inquired on the relationship between Adversity Quotient, Knowledge Integration and Academic Achievement Of secondary school students. The investigator believes that, the findings of the study is helpful in improving the Adversity

Quotient and Knowledge Integration ability of children in such a way as to enable them to score high level of Academic Achievement. Schools should implement programs that help students to develop resilience skills. This could include workshops on stress management, goal setting, and coping strategies. Educators can design curricula that emphasize interdisciplinary learning, encouraging students to make connections between subjects.

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Language Insecurity And Its Impact On Postgraduate Seminar Engagement And Academic Performance

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Abstract

Language insecurity significantly hinders active participation and academic performance in postgraduate seminars, particularly among students from non-native English-speaking backgrounds. This study explores how language-related anxieties manifest in seminar settings and affect student confidence, willingness to participate, and academic outcomes. Employing a mixed-methods approach, both quantitative survey data from 150 students and qualitative interviews with 20 participants from Visvesvaraya Technological University, Mysore, reveal a prevalent sense of hesitation, fear of judgment, and limited verbal engagement. Findings indicate that language insecurity not only affects students' self-expression but also leads to reduced motivation and feelings of exclusion. While language support services exist, a lack of awareness and varying perceptions of their effectiveness highlight institutional shortcomings. The study recommends targeted interventions such as language workshops, peer mentorship, and inclusive pedagogical practices to foster a supportive academic environment.

Keywords: Language Insecurity, Postgraduate Seminars, English Proficiency, Student Participation, Academic Performance, Foreign Language Anxiety, Non-native Speakers, Institutional Support, Inclusive Pedagogy, Higher Education.

Introduction

In global higher education, English has become the dominant medium of instruction, particularly at the postgraduate level. While this linguistic uniformity facilitates international academic communication, it also creates challenges for students whose first language is not English. These students often experience language insecurity—a lack of confidence in their linguistic abilities—which can inhibit their participation in academic discussions, negatively impacting their learning experience and performance.

Postgraduate seminars, designed to promote critical thinking and interactive learning, require active verbal participation. Language insecurity can therefore diminish students' seminar engagement, reducing their academic contributions and affecting their overall success.

This study explores how language insecurity manifests in postgraduate seminars and its effects on students' participation and performance. It aims to understand the emotional and social dimensions of language insecurity and identify institutional support gaps.

Literature Review

(Nga, 2025) explores the effectiveness of English as a second language (ESL) instruction within Vietnam's education system, emphasizing its role in improving academic performance, communication skills, and career opportunities. Using a mixed-methods approach, the study highlights the benefits of ESL, such as enhanced global access and cognitive development, while also addressing challenges like unequal access and limited teacher training. The research underscores the need for improved curriculum and resource equity to optimize ESL outcomes in a globalizing context.

(Barkaoui, 2025) his longitudinal study examined the correlation between English language proficiency test scores and academic achievement. The research indicated that higher proficiency levels often corresponded with better academic outcomes, emphasizing the importance of language skills in postgraduate education.

(Patil, The Socio-Cultural Determinants of English Proficiency: A Case Study of Undergraduate Students, 2024) explores the socio-cultural factors influencing English language acquisition among undergraduate students in Panchgani. Using surveys and standardized tests, the study highlights how variables such as family background, economic conditions, and educational practices impact proficiency. Findings reveal significant disparities, with students from supportive and resource-rich environments performing better. The research emphasizes the need for inclusive strategies to bridge proficiency gaps and promote equitable language learning.

(Su, 2022) guided by Positive Psychology, explored the levels and sources of Foreign Language Enjoyment (FLE) and Foreign Language Classroom Anxiety (FLCA) among 231 Chinese EFL undergraduates with intermediate and low proficiency. The study found moderate levels of both emotions, with lower FLE and higher FLCA compared to other samples. While FLE was linked to teacher-related factors, FLCA was more associated with learner-related aspects. These findings offer pedagogical insights for improving EFL instruction in China.

(Öztürk & Feryal , 2022) examined preparatory class students' attitudes and practices related to translanguaging in EFL classrooms. Using a mixed-methods approach, their study found generally positive student attitudes and frequent use of translanguaging for comprehension, evaluation, and discussion. However, focus group interviews revealed persistent negative perceptions among both high and low achievers, highlighting the need to address these views to fully leverage translanguaging as a pedagogical tool.

(Gok, Hilal , & Bahadir , 2021) emphasized that flipped classroom models can enhance language learning by promoting learner autonomy and reducing anxiety. Their study

highlights how traditional classrooms often sustain foreign language classroom anxiety (FLCA) and reading anxiety (FLRA), while flipped learning environments help alleviate these barriers. The findings support student-centered approaches as effective in reducing language-related anxieties.

(Shen, 2021) emphasizes the importance of both cognitive and affective factors in foreign language learning, with particular attention to anxiety and enjoyment. The study reviews recent literature on Foreign Language Classroom Anxiety (FLCA) and Foreign Language Enjoyment (FLE), focusing on their relationship, measurement scales, and the influence of personality, interpersonal dynamics, and classroom conditions. It highlights growing scholarly interest in these emotions and identifies gaps for future research to enhance theoretical understanding.

(Dewaele & Chengchen, 2021) explored the influence of teacher enthusiasm on EFL learners' emotions and engagement, addressing a gap in the literature on its role in second language contexts. Their mixed-method study found that student emotions, such as enjoyment and boredom, mediate the link between perceived teacher enthusiasm and behavioral engagement. The findings offer important implications for both pedagogical practice and theoretical development.

(Dastgoshadeh & Pejman , 2021) highlighted the increasing significance of emotional intelligence (EI) in foreign language learning, particularly in shaping learners' confidence, motivation, and interaction. Research has shown that higher EI—especially emotional regulation and empathy—correlates with greater willingness to communicate (WTC). Their study builds on this foundation by exploring how specific EI components predict WTC in EFL contexts.

(Alnahidh & Sultan , 2020)The authors examined Foreign Language Speaking Anxiety (FLSA) among Saudi female EFL university students, identifying a moderate anxiety level influenced by fear of mistakes, limited vocabulary, and forced participation. Additional contributors included pronunciation challenges, teacher attitudes, and oral presentation pressure. The study underscores key psychological and pedagogical factors affecting FLSA and suggests strategies for reducing anxiety in EFL classrooms.

(Amalia, Abdul , & Sri , 2019)investigated Indonesian EFL learners' Instructional Willingness to Communicate (IWTC) across three state universities, using a descriptive quantitative approach. Their study identified factors such as classroom environment, group size, topic familiarity, and self-confidence as key influences on WTC. The findings highlight the dynamic interplay of internal and external factors, emphasizing the importance of context-sensitive strategies to promote communicative engagement in L2 classrooms.

(Shirvana & Nahid, 2019) emphasized the growing relevance of positive psychology and dynamic systems theory in understanding foreign language classroom anxiety (FLCA) and enjoyment (FLE). Unlike traditional static approaches, their study highlights the fluctuating nature of these emotions over time. Using Retrodictive Qualitative Modeling (RQM), they offer insights into the developmental trajectories of learners' emotional experiences in language learning contexts.

(Fujii, 2019) highlighted language anxiety as a major barrier to effective second language communication, often diminishing learners' confidence and willingness to

communicate (WTC). While previous studies have acknowledged this impact, few have empirically explored the relationship across different language skills and proficiency levels. This study addresses that gap by examining how anxiety influences WTC in all four language domains.

(Elyas & Alghofaili, 2019) The belief that Native English Speaking Teachers (NESTs) are inherently more effective than Non-Native English Speaking Teachers (NNESTs) has long influenced hiring practices in TESOL. Studies show that students often perceive NESTs as superior, particularly for improving speaking and listening skills. However, recent research argues that NNESTs can be equally effective, offering valuable insights, empathy, and shared learning strategies. Evidence suggests that teacher effectiveness is more closely linked to pedagogical skills than to nativeness.

(Parrish, 2019) Modern foreign language (MFL) education in England has traditionally focused on French, Spanish, and German, often limiting student exposure to a broader linguistic landscape. Studies indicate that students show interest in learning a wider variety of languages, driven by perceptions of global relevance and career opportunities. However, curriculum flexibility is often restricted by staffing limitations, resource allocation, and national accountability pressures. Research highlights that expanding language offerings could increase student motivation and participation in post-14 language learning.

(Toyama & Yoshitaka Yamazaki, 2018) examined the underlying factors of the Foreign Language Classroom Anxiety Scale (FLCAS) among Japanese undergraduates. Their analysis identified two key components—communication apprehension and fear of failing—confirming the model's validity and usefulness in EFL contexts.

(Zheng & Liying, 2018) investigated the relationship between foreign language classroom anxiety, cognitive test anxiety, and CET-4 performance among 921 Chinese university students. Their findings showed that cognitive test anxiety significantly predicted lower language achievement, though interview data revealed students did not consistently perceive high anxiety levels. The study highlights the complex nature of anxiety and its implications for improving foreign language learning and assessment practices.

(Aydın, 2017) enriches the literature on Willingness to Communicate (WTC) in second language acquisition by examining psychological and contextual factors affecting adult Turkish EFL learners. Building on MacIntyre et al.'s WTC model, the study broadens the scope to include both spoken and written classroom participation. Using qualitative methods such as interviews and journals, it provides valuable insights into individual differences in communication readiness among adult learners.

(Daftari & Tavit, 2017) The distinction between native and non-native English-speaking teachers (NNESTs) has long been debated, often favouring native speakers in terms of perceived competence. Studies suggest that NNESTs frequently experience linguistic insecurity, which may impact their teaching practices and classroom confidence. However, research also highlights that NNESTs bring valuable insights and effective teaching strategies to language classrooms. While some scholars argue that teacher insecurity can affect learners' performance, recent studies have shown mixed or minimal influence on learners' productive skills.

(Tosuncuoğlu, 2017) The native versus non-native English-speaking teacher (NNEST) debate has been a longstanding issue in language education, often favouring native speakers

as more desirable instructors. Studies reveal that students in some contexts perceive native speakers as more authentic and linguistically superior. However, research also shows that NNESTs often bring unique advantages, including a deeper understanding of learners' challenges and more effective grammar instruction. Recent literature suggests that instructional effectiveness is not determined by nativeness but by teaching competence and experience.

(Genc, E Kulusakli, & S Aydin, 2016) investigated speaking anxiety among Turkish EFL learners at the tertiary level, recognizing it as one of the most anxiety-inducing language skills. Their study confirmed a strong link between speaking anxiety and reduced language achievement. It also explored the coping strategies students use to manage anxiety, contributing valuable insights to EFL learning research.

(Manan, 2015)The rise of English-medium education in Pakistan reflects a societal perception that English proficiency equates to social mobility and academic success. However, research highlights significant gaps between English language policies and actual classroom practices, particularly in low-fee schools where Urdu often dominates instruction. Studies suggest that early English-medium instruction can hinder cognitive development and content learning if not supported by adequate pedagogical resources.

(Tollefson, 2015)Recent scholarship highlights how neoliberal globalization has reshaped language education policy, shifting the value of languages from cultural identity markers to economic and instrumental assets. This shift often disrupts teachers' and students' traditional roles and identities, creating tensions within educational spaces. Studies also emphasize the increasing commodification of language learning.

(Lee, 2012)Several studies have explored the link between English proficiency and economic growth, positioning English as a key component of human capital in the global economy. English is widely regarded as a tool for accessing international markets, technology, and knowledge. Empirical evidence suggests that countries with higher English proficiency tend to attract more foreign investment and experience faster economic development, particularly in Asia and Europe.

(Bianco, 2010)Language Policy and Planning (LPP) emerged as a formal field in the mid-20th century, with Uriel Weinreich's seminal work *Languages in Contact* (1953) highlighting the dynamic interactions in bilingual settings. Weinreich's observations about interlanguage and language mixing laid the foundation for later studies on bilingualism and language shift. LPP has since expanded to address the sociopolitical, educational, and identity-related implications of managing languages in multilingual societies.

Research Gap

Despite growing attention to language challenges in higher education, existing research predominantly focuses on undergraduate learners and general classroom experiences. There is a lack of empirical investigation into how language insecurity specifically influences postgraduate seminar participation—where verbal interaction is critical. Emotional impacts such as fear, isolation, and reduced motivation remain underexplored, especially among students transitioning from regional language instruction to English-medium education. Furthermore, limited studies assess the effectiveness or awareness of institutional language support services tailored to seminar settings. This study addresses these overlooked dimensions by providing a focused, context-rich analysis of postgraduate learners' linguistic barriers in seminars.

Objective

1. To examine how language insecurity affects postgraduate students' participation in seminars.

2. To analyse the emotional and social impact of language insecurity on these students.
3. To assess the influence of language insecurity on academic performance.
4. To identify institutional gaps in language support mechanisms.
5. To propose recommendations for creating an inclusive and linguistically supportive seminar environment.

Research Design

This study employs a mixed-methods research design that integrates both quantitative and qualitative methodologies to comprehensively examine the impact of language insecurity on postgraduate students' seminar participation and academic performance. The rationale for choosing a mixed-methods approach lies in its capacity to offer both generalizable statistical patterns and rich, context-sensitive insights into students' lived experiences.

- A structured survey was administered to capture measurable trends in students' perceptions, behaviours, and academic outcomes related to language insecurity.
- In-depth, semi-structured interviews were conducted to explore students' personal experiences, emotions, and coping mechanisms in greater depth.

Sampling Method

A stratified random sampling technique was used to ensure representation across different courses and demographic backgrounds.

1. Sample size: 150 postgraduate students
2. Distribution: 102 MBA students and 48 MCA students

Purposive sampling was used to select 20 students who transitioned from regional language instruction to English-medium postgraduate programs, ensuring that participants had relevant experiences related to the study focus.

Scope of the study

1. The study is confined to postgraduate students, specifically those enrolled in MBA and MCA programs at Visvesvaraya Technological University (VTU), Mysuru.
2. The study explores how language insecurity affects emotional wellbeing, including feelings of anxiety, fear, and isolation among students.

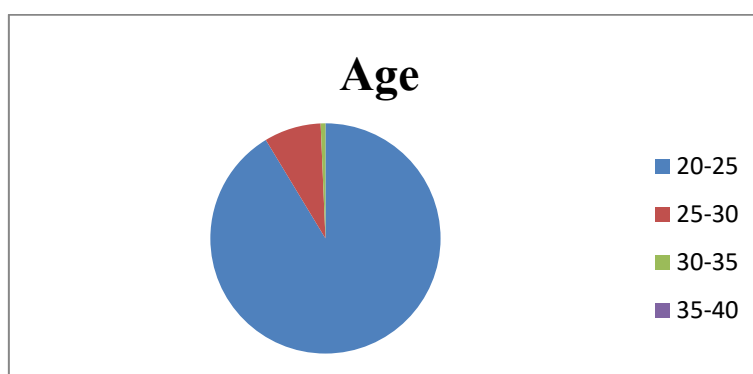
Data Analysis

Survey data were analysed using descriptive statistics to identify trends. Interview transcripts were thematically analysed to extract qualitative insights.

1. Age

Particular	Frequency	Percentage
20-25	137	91.33
25-30	12	8.00
30-35	1	0.67
35-40	0	0.00
Total	150	100.00

(Table No:1)



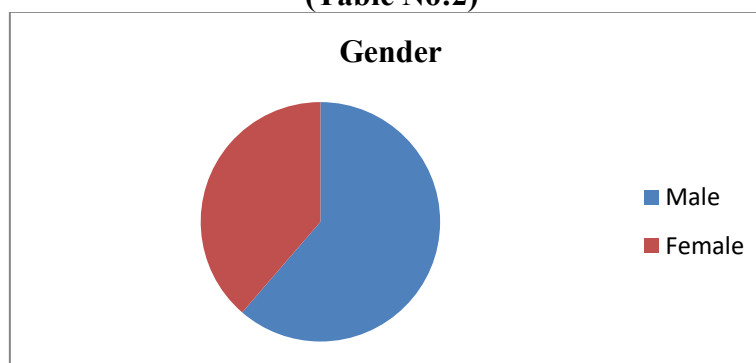
(Graph No:1)

The above table and pie chart show that the vast majority of participants (91.33%) are aged between 20–25 years, with only a small portion in the 25–30 (8%) and 30–35 (0.67%) age groups. This indicates that the sample is predominantly composed of young individuals in their early twenties.

2. Gender

Particular	Frequency	Percentage
Male	92	61.33
Female	58	38.67
Total	150	100.00

(Table No:2)



(Graph No: 2)

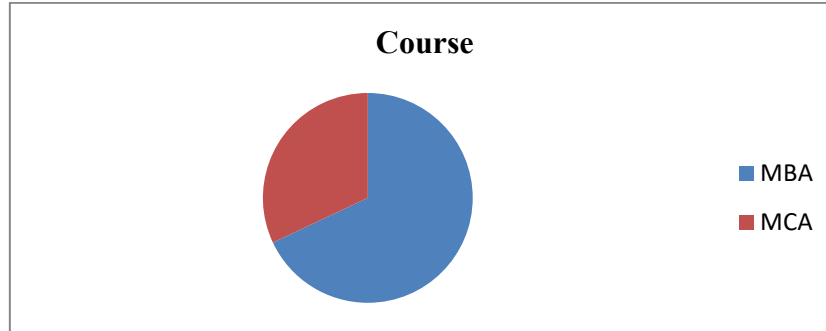
The above table and graph show that out of 150 students, 61.33% are male and 38.67% are female, indicating a higher representation of male students in the sample. This suggests a gender imbalance, with males forming the majority.

3. Course

Particular	Frequency	Percentage
MBA	102	68.00

MCA	48	32.00
Total	150	100.00

(Table No:3)



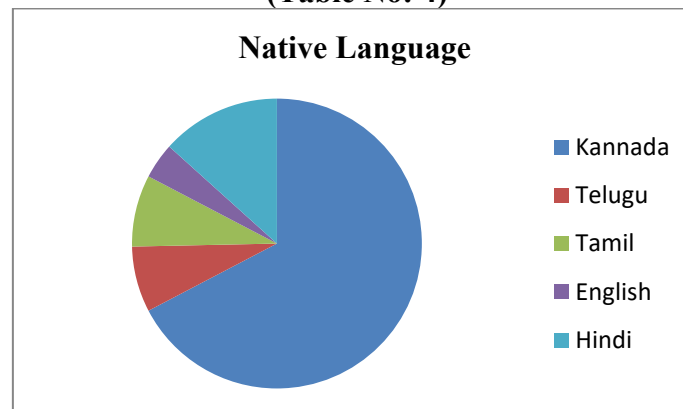
(Graph No:3)

The above table and pie chart show that 68% of the students are enrolled in the MBA program (102 students), while 32% are from the MCA program (48 students). This indicates a higher enrolment in MBA compared to MCA among the respondents.

4.Native Language

Particular	Frequency	Percentage
Kannada	101	67.33
Telugu	11	7.33
Tamil	12	8.00
English	6	4.00
Hindi	20	13.33
Total	150	100.00

(Table No: 4)



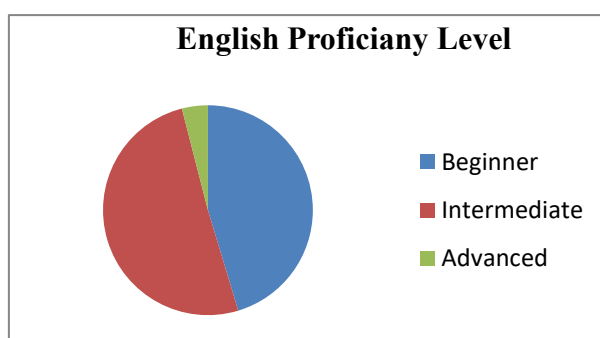
(Graph No:4)

The above table and pie chart show that Kannada is the most spoken language among students (67.33%), followed by Hindi (13.33%), Tamil (8%), Telugu (7.33%), and English (4%). This indicates a clear dominance of Kannada-speaking students in the sample.

5.English Proficiency

Level	Particular	Frequency	Percentage
	Beginner	68	45.33
	Intermediate	76	50.67
	Advanced	6	4.00
	Total	150	100.00

(Table No: 5)



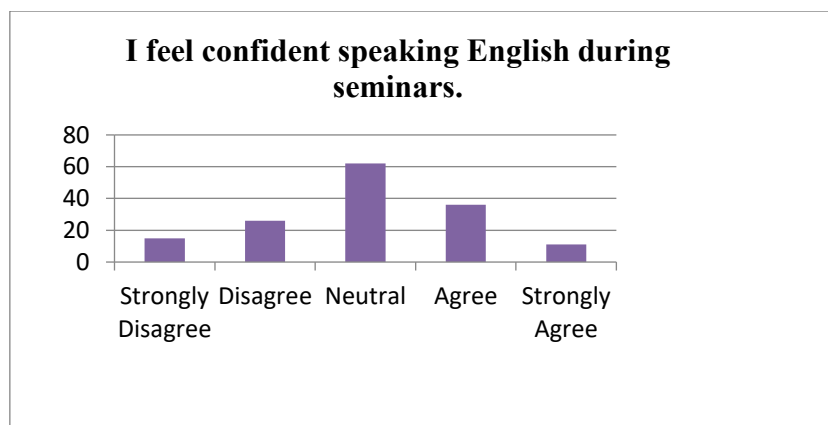
(Graph No:5)

The above table and graph indicate that the majority of students (50.67%) have an intermediate level of English proficiency, followed by 45.33% at the beginner level, and only 4% at the advanced level. This suggests that most students possess moderate English skills, with very few being highly proficient.

6. I feel confident speaking English during seminars.

Particular	Frequency	Percentage
Strongly Disagree	15	10.00
Disagree	26	17.33
Neutral	62	41.33
Agree	36	24.00
Strongly Agree	11	7.33
Total	150	100.00

(Table No: 6)



(Graph No: 6)

The above table and graph indicate that a large portion of students (41.33%) feel neutral about speaking English during seminars, while 24% agree and 7.33% strongly agree, showing some level of confidence. However, 27.33% (disagree + strongly disagree) lack confidence, suggesting that many students are still hesitant or unsure about their spoken English skills in seminar.

7. I hesitate to participate in seminar discussions because I worry about making language mistakes.

Particular	Frequency	Percentage
Strongly Disagree	14	9.33
Disagree	17	11.33
Neutral	52	34.67
Agree	58	38.67
Strongly Agree	9	6.00
Total	150	100.00

(Table No: 7)



(Graph No: 7)

The above table and graph show that 38.67% of students agree and 6% strongly agree that they hesitate to participate in seminar discussions due to fear of making language mistakes. While 34.67% remain neutral, a smaller portion (20.66%) disagree, indicating that language anxiety is a significant concern for many students.

8. I avoid speaking in seminars when I am unsure about my English

Particular	Frequency	Percentage
Strongly Disagree	13	8.67
Disagree	24	16.00
Neutral	48	32.00
Agree	51	34.00
Strongly Agree	14	9.33
Total	150	100.00

(Table No: 8)



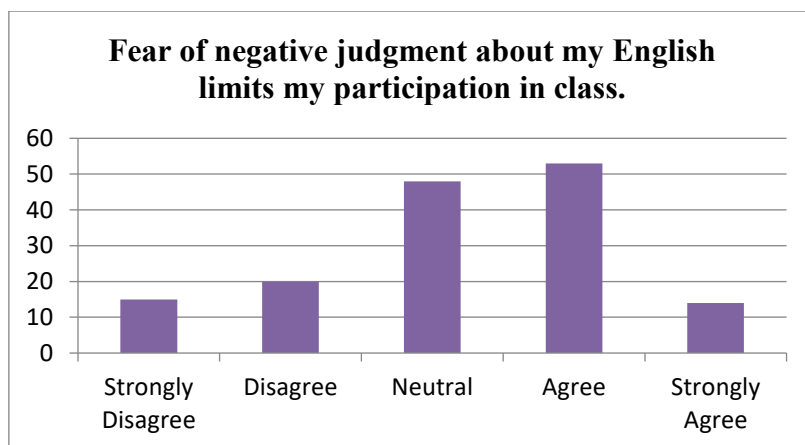
(Graph No:8)

The above table and graph show that a significant portion of students (34% agree and 9.33% strongly agree) avoid speaking in seminars when unsure about their English. While 32% remain neutral, about 24.67% (disagree + strongly disagree) do not feel the same, indicating that uncertainty in English proficiency affects participation for many students.

9. Fear of negative judgment about my English limits my participation in class.

Particular	Frequency	Percentage
Strongly Disagree	15	10
Disagree	20	13.33333
Neutral	48	32
Agree	53	35.33333
Strongly Agree	14	9.333333
Total	150	100

(Table No:9)



(Graph No: 9)

The above table and graph show that a majority of students (35.33% agree and 9.33% strongly agree) feel that fear of negative judgment about their English limits their class participation. While 32% remain neutral, a smaller portion (23.33%) disagree, indicating that fear of judgment is a notable barrier for many students.

10. I feel anxious about my accent or pronunciation when speaking in seminars.

Particular	Frequency	Percentage
Strongly Disagree	11	7.33
Disagree	20	13.33
Neutral	55	36.67
Agree	49	32.67
Strongly Agree	15	10.00
Total	150	100.00

(Table No:10)



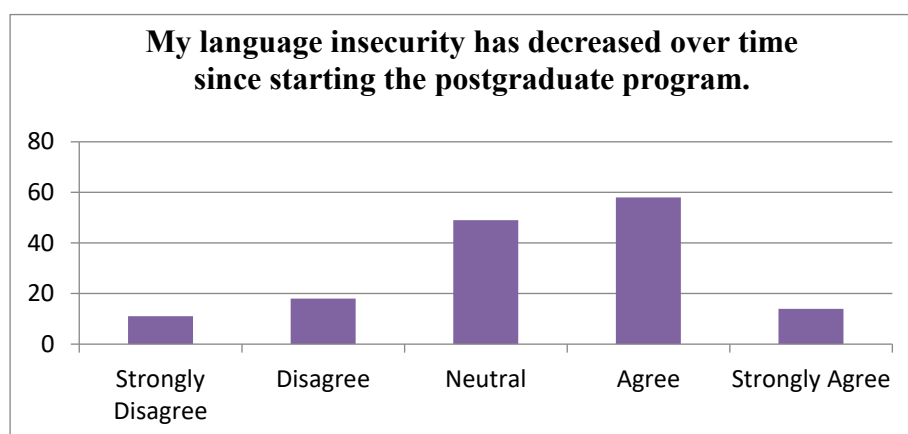
(Graph No:10)

The above table and graph show that a considerable number of students (32.67% agree and 10% strongly agree) feel anxious about their accent or pronunciation when speaking in seminars. While 36.67% remain neutral, only 20.66% (disagree + strongly disagree) do not share this concern, indicating that pronunciation-related anxiety is fairly common among students.

11. My language insecurity has decreased over time since starting the postgraduate program.

(Table No:11)

Particular	Frequency	Percentage
Strongly Disagree	11	7.33
Disagree	18	12.00
Neutral	49	32.67
Agree	58	38.67
Strongly Agree	14	9.33
Total	150	100.00



(GraphNo:11)

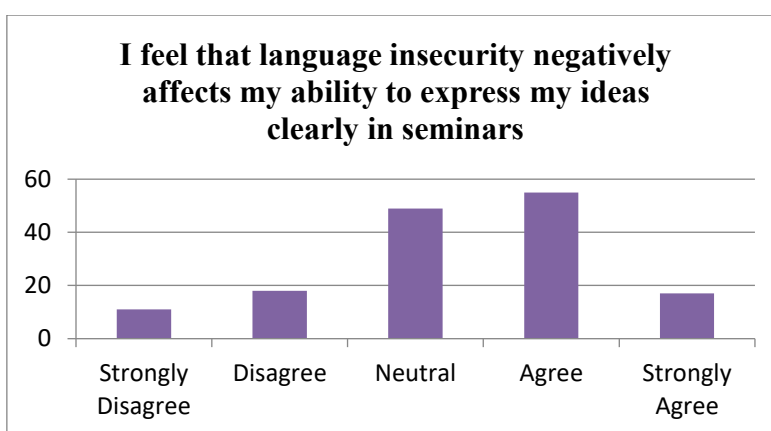
The table and graph show that a majority of students (38.67% agree and 9.33% strongly agree) feel their language insecurity has decreased over time during their postgraduate studies. While 32.67% remain neutral, only 19.33% (disagree + strongly disagree) feel otherwise, indicating an overall positive shift in language confidence.

12. I feel that language insecurity negatively affects my ability to express my ideas clearly in seminars.

Particular	Frequency	Percentage
Strongly Disagree	11	7.333333

Disagree	18	12
Neutral	49	32.66667
Agree	55	36.66667
Strongly Agree	17	11.33333
Total	150	100

(Table No:12)



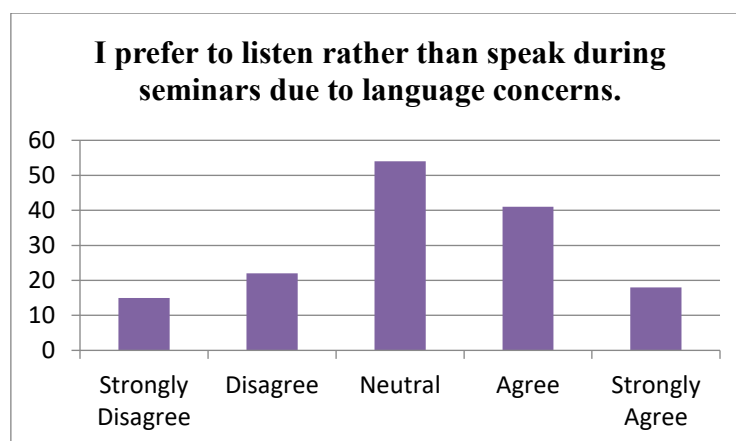
(Graph No: 12)

The above table and graph show that a majority of students (36.67% agree and 11.33% strongly agree) feel that language insecurity negatively affects their ability to express ideas clearly in seminars. While 32.67% remain neutral, only 19.33% disagree, indicating that language insecurity is a significant concern for many students.

13. I prefer to listen rather than speak during seminars due to language concerns.

Particular	Frequency	Percentage
Strongly Disagree	15	10
Disagree	22	14.66667
Neutral	54	36
Agree	41	27.33333
Strongly Agree	18	12
Total	150	100

(Table No: 13)



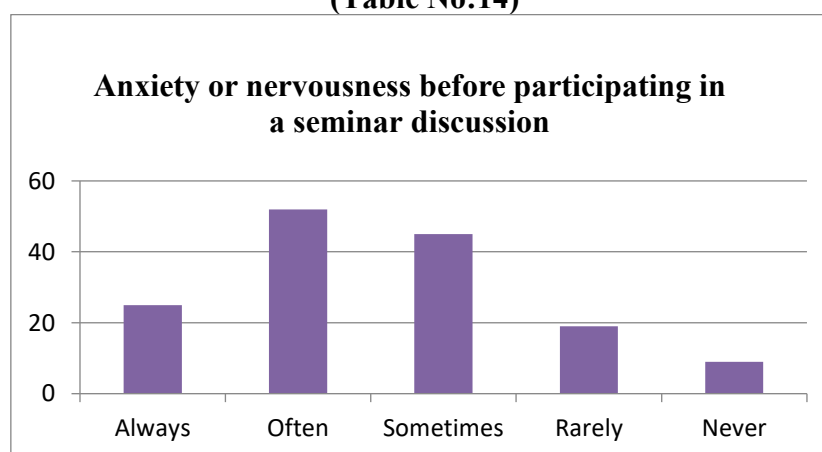
(Graph No: 13)

The above table and graph show that a majority of students (36% neutral, 27.33% agree, and 12% strongly agree) prefer to listen rather than speak during seminars due to language concerns, indicating a tendency toward passive participation influenced by language-related hesitation.

14. Anxiety or nervousness before participating in a seminar discussion.

Particular	Frequency	Percentage
Always	25	16.66667
Often	52	34.66667
Sometimes	45	30
Rarely	19	12.66667
Never	9	6
Total	150	100

(Table No:14)



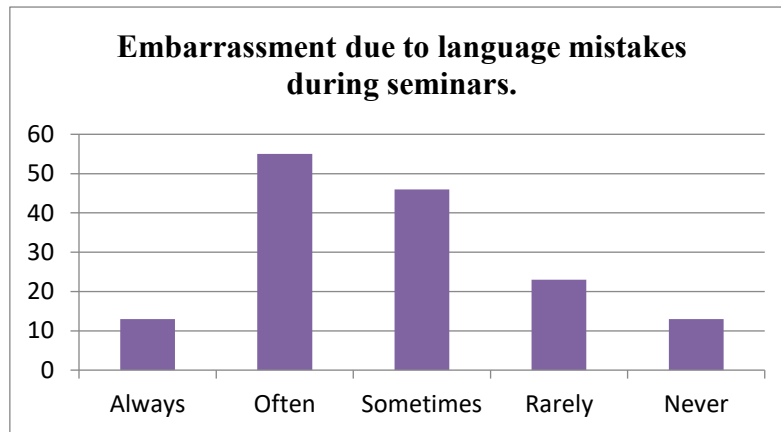
(Graph No:14)

The above table and graph show that a majority of students experience anxiety before seminar discussions, with 34.67% often and 16.67% always feeling nervous. Additionally, 30% sometimes feel anxious, indicating that nervousness is a common experience for most students before participating.

15. Embarrassment due to language mistakes during seminars.

Particular	Frequency	Percentage
Always	13	8.666667
Often	55	36.66667
Sometimes	46	30.66667
Rarely	23	15.33333
Never	13	8.666667
Total	150	100

(Table No:15)



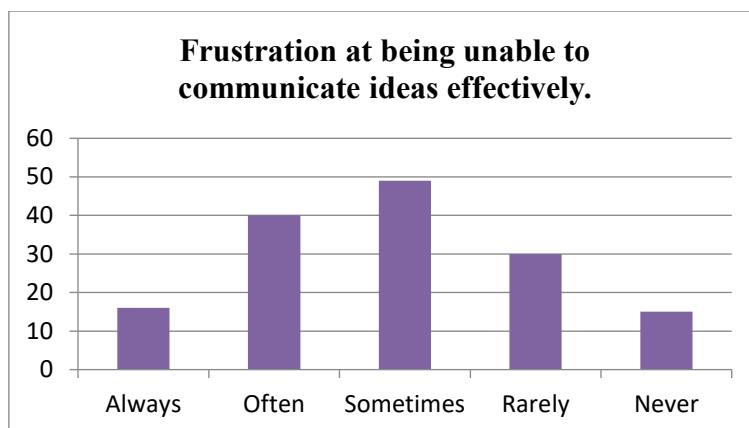
(Graph No:15)

The above table and graph show that a significant number of students feel embarrassed due to language mistakes during seminars, with **36.67% often** and **8.67% always** experiencing this. While **30.67% sometimes** feel embarrassed, only a small portion (**15.33% rarely** and **8.67% never**) report minimal or no embarrassment, indicating that language-related embarrassment is common among students.

16. Frustration at being unable to communicate ideas effectively.

Particular	Frequency	Percentage
Always	16	10.66667
Often	40	26.66667
Sometimes	49	32.66667
Rarely	30	20
Never	15	10
Total	150	100

(Table No:16)



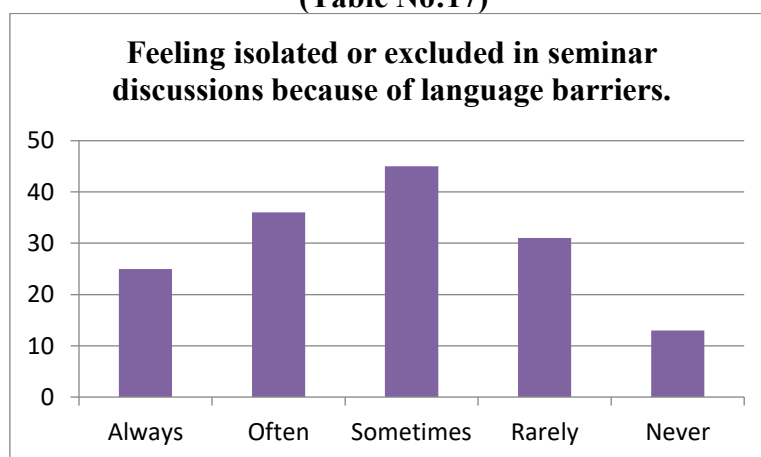
(Graph No:16)

The table and graph show that a majority of students (32.67% sometimes, 26.67% often, and 10.67% always) feel frustrated when unable to communicate ideas effectively, indicating that this is a common challenge faced by many.

17. Feeling isolated or excluded in seminar discussions because of language barriers.

Particular	Frequency	Percentage
Always	25	16.66667
Often	36	24
Sometimes	45	30
Rarely	31	20.67
Never	13	8.67
Total	150	100

(Table No:17)



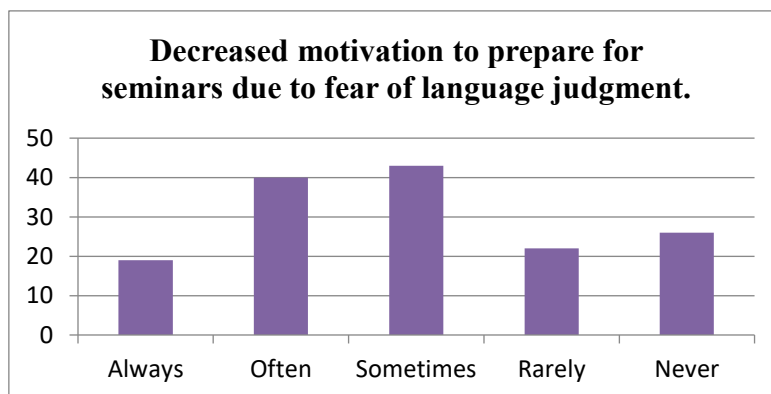
(Graph No: 17)

The above table and graph show that a majority of students (70.67%) experience some level of isolation or exclusion in seminar discussions due to language barriers, with 16.67% always and 24% often feeling this way. This highlights the significant impact of language barriers on student participation.

18. Decreased motivation to prepare for seminars due to fear of language judgment.

Particular	Frequency	Percentage
Always	19	12.67
Often	40	26.67
Sometimes	43	28.67
Rarely	22	14.67
Never	26	17.33
Total	150	100

(Table No: 18)



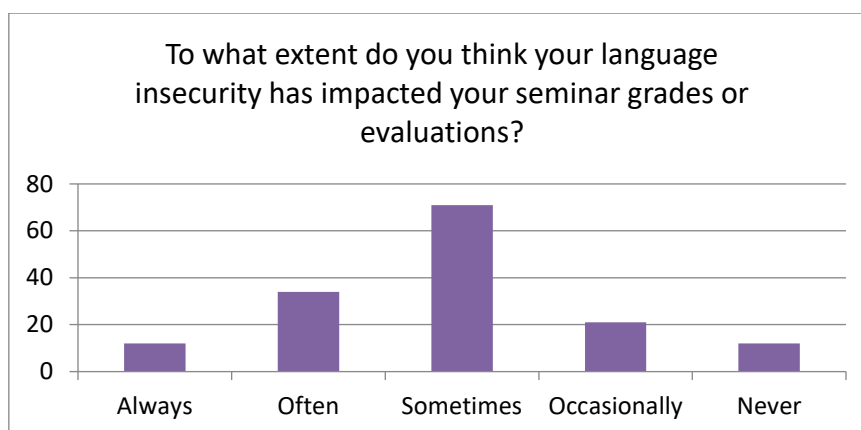
(Graph No:18)

The above table and graph show that a majority of students (67.99%) experience decreased motivation to prepare for seminars due to fear of language judgment, with 12.67% always, 26.67% often, and 28.67% sometimes feeling this way. This indicates that language-related fear significantly impacts students' seminar preparation.

19. To what extent do you think your language insecurity has impacted your seminar grades or evaluations?

Particular	Frequency	Percentage
Always	12	8
Often	34	22.66667
Sometimes	71	47.33333
Occasionally	21	14
Never	12	8
Total	150	100

(Table No:19)



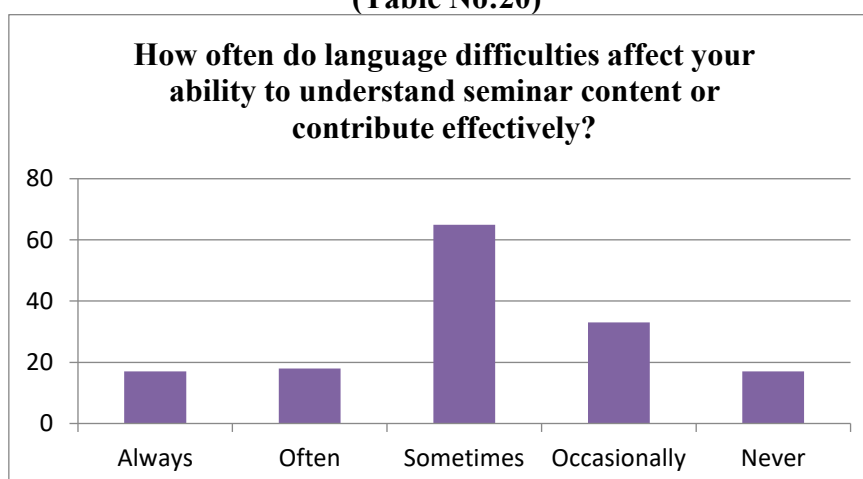
(Graph No: 19)

The table and graph show that a majority of students (**47.33% sometimes** and **22.67% often**) feel that language insecurity has impacted their seminar grades, suggesting that it is a common concern affecting academic performance for many.

20. How often do language difficulties affect your ability to understand seminar content or contribute effectively?

Particular	Frequency	Percentage
Always	17	11.33333
Often	18	12
Sometimes	65	43.33333
Occasionally	33	22
Never	17	11.33333
Total	150	100

(Table No:20)



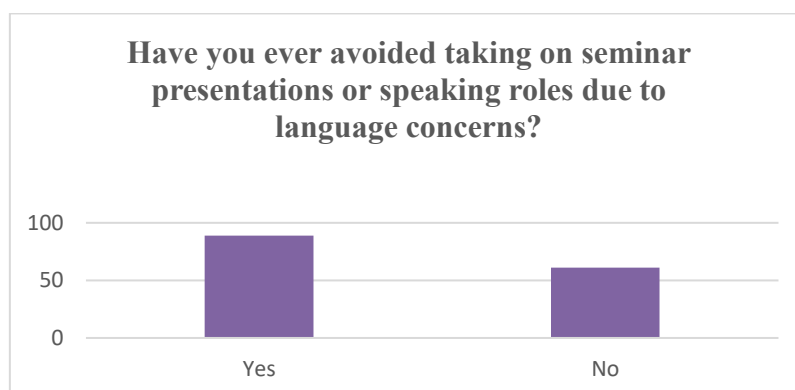
(Graph No:20)

The above table and graph show that a majority of students (**43.33% sometimes** and **22% occasionally**) face language difficulties affecting their understanding or participation in seminars, indicating that language barriers moderately impact many students' academic engagement.

21. Have you ever avoided taking on seminar presentations or speaking roles due to language concerns?

Particular	Frequency	Percentage
Yes	89	59.33333
No	61	40.66667
Total	150	100

(Table No: 21)



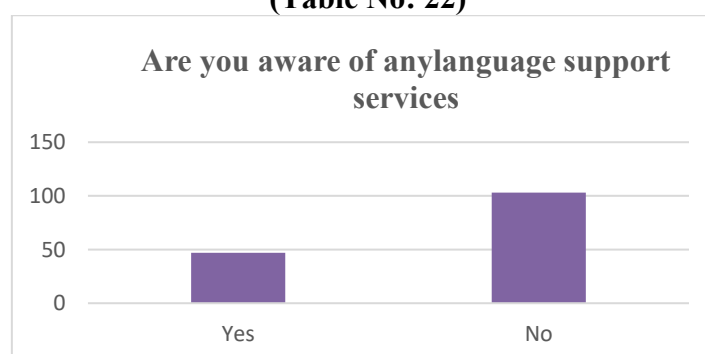
(Graph No: 21)

The above table and graph show that 59.33% of students have avoided seminar presentations or speaking roles due to language concerns, while 40.67% have not, indicating that language anxiety significantly affects students' willingness to participate in academic speaking tasks.

22. Are you aware of any language support services offered by your institution (e.g., academic writing centers, language workshops)?

Particular	Frequency	Percentage
Yes	47	31.33333
No	103	68.66667
Total	150	100

(Table No: 22)



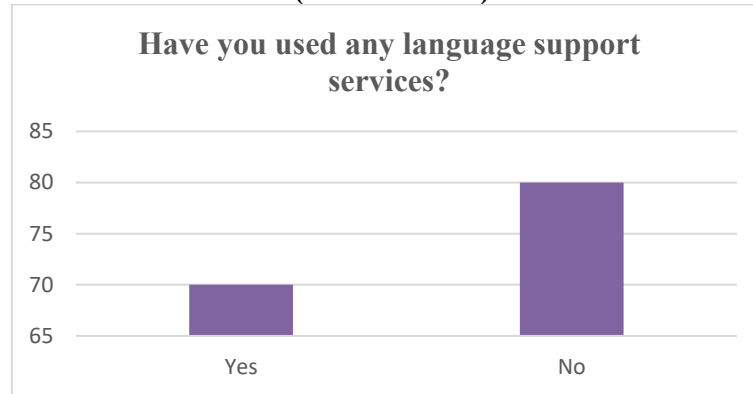
(Graph No: 22)

The table and graph show that **only 31.33% of students are aware** of language support services at their institution, while **68.67% are not**, indicating a significant gap in awareness that may hinder students from accessing helpful language resources.

23. Have you used any language support services?

Particular	Frequency	Percentage
Yes	70	46.67
No	80	53.33
Total	150	100.00

(Table No: 23)



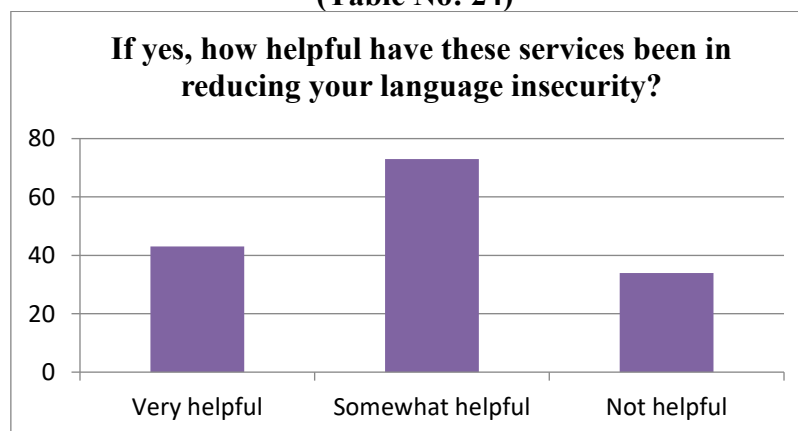
(Graph No: 23)

The above table and graph illustrate responses to the question "Have you used any language support services?" Out of 150 participants, 70 (46.67%) responded "Yes," while 80 (53.33%) responded "No." This indicates that a slightly higher proportion of individuals have not utilized language support services.

24. If yes, how helpful have these services been in reducing your language insecurity?

Particular	Frequency	Percentage
Very helpful	43	28.66667
Somewhat helpful	73	48.66667
Not helpful	34	22.66667
Total	150	100

(Table No: 24)



(Graph No:24)

The above table and graph show that among those who used language support services, 48.67% found them "Somewhat helpful," 28.67% found them "Very helpful," and 22.67% found them "Not helpful." This suggests that while most users experienced some benefit, the level of effectiveness varied.

Conclusion:

The findings of this study underscore the extensive role of language insecurity in shaping postgraduate students' academic experiences. A significant number of students, particularly those with beginner or intermediate English proficiency, express anxiety, hesitation, and a lack of confidence during seminar discussions. Emotional barriers—such as fear of negative judgment, accent-related anxiety, and past embarrassment—diminish students' willingness to contribute, ultimately affecting performance and seminar evaluations. While some students benefit from existing support services, the majority either remains unaware of these offerings or find them only moderately effective. To bridge these gaps, institutions must implement inclusive seminar practices, enhance outreach for language support services, and foster an empathetic academic culture that empowers all learners to participate confidently and equitably.

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Foucauldian Analysis of Language Used in Business Narratives

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Abstract

Any aspect should not be analyzed in isolation; therefore, the Foucauldian way of analysis is known as an all-pervasive perspective. It focuses more on mechanism of the system and relationship between the constituent parts. In the present research paper the researcher is going to apply the theoretical framework proposed and promoted by Michel Foucault. Exploring how the power dynamics, discourse, and knowledge construction shape the way businesses communicate that influences stakeholders and societal perceptions, this theoretical framework to critically examines the language used in certain business narratives in India. Through a qualitative analysis of business narratives in general and The Tatas (2015/2019) in particular, this research paper reveals the implicit yet insightful influence of language on the organizational distinctiveness, legitimacy and control; however, this analysis emphasizes on how certain business narratives do imply discursive strategies to naturalize power relations and it's mechanism and construct an unrealistic identities. However, through the lens of Foucauldian perspective of power-knowledge, this paper also puts forth a nuanced understanding of how language functions in business contexts that exposes the relationship between authenticity and manipulation in concerned communication. The conclusion of this research paper may have implications for the buzzing business leaders, policymakers, and stakeholders; these implications also may emphasize on the need for critical awareness of the language used in business narratives and motivate for a more nuanced understanding of the power dynamics incorporated in the business narratives. Eventually, the present research paper can be a part of the way for further research in the Foucauldian analysis in organizational studies.

Keywords: Power, Knowledge, Business Narratives, Language Politics, Motivation, Entrepreneurship, Unemployment, Class Structure, Capitalism, etc.

The Role Of Commerce Education In Digital And Entrepreneurial Development

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Abstract

Commerce education is primarily seen as a field that focuses on various multifaceted aspects of trade, finance and economics. In this, commerce plays a major role in shaping of modern education systems. This research paper explores how the inclusion of commerce in education contributes to the development of economically aware, financially literate and entrepreneurially competent individuals. Commerce is a branch of study that studies various concepts within it, and that is why the concept of commerce considers both the concepts of trade and the instruments/aids to trade. Trade includes various types of buying and selling services, while the instruments of trade include some other services provided in addition to the actual purchase and sale of products. Therefore, the concept of commerce is very broad and the economy of India depends on this element of commerce, and that is why it is necessary to study the overall role of this branch of commerce.

Keywords: Trade, Aids to trade, Exchange, Digital tools, Commerce Education

Introduction

The historical developments in the field of commerce, the current trends, and the integration of curricula, the potential of new initiatives and their impact on business entities are studied by examining the impact of commerce as a subject. Commerce education is truly a mechanism for driving educational reform and relevance. Commerce education is seen as a pillar of social development. In the current era of globalization, dominated by technological change and economic competition, and especially in the educational framework, commerce has emerged as an important element. Therefore, the integration of commerce education in school, College and university curricula is not only for learning business and accounting but

also for informing students about the dynamic and market-oriented economic system, entrepreneurship, global markets and education with deep thinking.

Objectives of the study

1. To study the core components of Commerce Education.
2. To study the Role of Commerce Education in Entrepreneurial Development.
3. To study the related Key Factors of Commerce Education in Entrepreneurial world.
4. To study the Challenges in Commerce Education.
5. To study the **Uses of Digitalization Systems in Commerce Education.**

Hypothesis of the study

- i) Commerce education is the integral part of business education.
- ii) Role of Commerce Education is important in Entrepreneurial Development.
- iii) The use of digitalization systems in commerce education is increasing day by day.

Basic Concept of Commerce

The key concept of **Commerce** includes the **exchange of goods and services** between individuals or entities, typically with the goal of making a profit. Some of the following important concepts are the central concepts which give the idea and form the foundation of commerce:

1. Trade

The concept of a trader mainly includes the purchase and sale of goods and services. The purchase and sale of such goods and services is local and international. Through purchase and sale, the producers get the cost incurred for the production of the goods and profit for themselves, while the other entities involved in the trade expect to get a fair share of the profit according to their efficiency and participation. Naturally, every entity in the economy exchanges through trade and tries to fulfil its purpose.

2. Business

The concept of business works in conjunction with the concept of trade. It includes production, processing, distribution, sale of goods and services and making a profit for the company. Types of businesses are divided according to different fields of work and scope, i.e. according to small, medium and large businesses, various business organizations operate with common goal, and the economy is boosted accordingly.

3. Exchange

After the production of goods and services, all the goods and services are exchanged in order to reach the needy and potential customers and get the expected return from them. Since traders, intermediaries, brokers and other people in the economy are directly and indirectly involved in this entire process, this process takes on a comprehensive form. However, in terms of the economy, it is only through the exchange of goods and services that turnover takes place in the true sense and the economy gets a real boost.

4. Profit motivation

In most forms of commercial activities, work is done to make a general and continuous profit. The business organization gets motivated to the extent that it makes a profit. Therefore, every business organization regularly produces goods and services to satisfy its potential customers and works with the motivation to make a profit for the business organization.

5. Supply and Demand

The concept of commerce includes many independent and dependent variables in the economy. Since every factor in the economy is dependent on each other, it has a direct and indirect effect. If the supply is taken into account and the demand for goods and services in the market is taken into account, positive results are seen. Since the price of each item is determined according to the supply and demand of that item, the effect of supply and demand for the item is seen in the open market.

6. Markets Market

The market is one way for the producers to reach their potential customers with the manufactured goods. The market system works directly and indirectly and in any form. Where consumers need a good or service, they receive it from the marketers, which providing the goods and services by paying a specific price. From there, a system for exchanging goods comes into existence, which is called the market. Due to the formation of markets in a natural form in a country like India, a specific type of geographically designated market has come into existence, which has a positive effect on the economy.

7. Goods and Services

Products/goods have a visible and physical form, so it is possible to buy and sell them directly. Such products have a visible form, weight, colour, form, smell, size and other characteristics, while services are invisible and immaterial, but their existence is felt by the

customers. That is why both goods and services have special importance in the concept of commerce.

8. Logistics and Distribution System

The logistics system is the way and the carrier chain to deliver the products manufactured by the producers to the customers. Generally, the producers obtain the raw materials required for the production according to the natural availability & market conditions. After processing on such raw materials, they work to make the product in a suitable condition and format for use. After that, many factors are involved in delivering the finished products to the customers, from large organizations to the ordinary seller. Each of these factors gets a specific type of financial support at each level and that is why the goods distribution system works more efficiently. The success or failure of any business organization depends on the efficient distribution system of goods and services. This provides employment to many elements of the economy directly and indirectly, which gives a boost to the economy.

9. Banking and Finance

Various types of business entities require a large amount of capital while producing and to meet such capital, many banks in emerging countries like India are ready to supply capital at local, district, state, national and international levels. While supplying capital to business entities, these institutions help business entities in financial terms. These include loan facilities, financial advice, investment options, currency exchange, interest collection, money exchange, etc.

10. E-commerce

In the current situation, every act in the commercial sector is implemented through the computers with internet. That is why various techniques are used in e-commerce to exchange goods and services in the commercial sector, give orders, receive money, provide vendor services, record and make government payments. This brings greater transparency to the commercial sector, prevents waste of labour & time and increases profit potential.

In short, some of the above important commercial factors have been considered here and it is clear from this that the study of commerce and commerce education is very important in the economy as a whole. All the above important factors drive the economy, so new scholars have got a great opportunity to study all the above factors and participate in various types of research and put them into practice.

❖ The Role of Commerce Education in Entrepreneurial Development

The concept of participation of commerce education mainly considers traditional and modern concepts such as trade, business, finance, economics, management, production process, distribution system, M-commerce, E-commerce, and so on. Commerce education mainly prepares students to become entrepreneurs in various types of businesses and to provide services in areas such as Accounting, Marketing, Finance, Advertising, Banking and Human Resources. Therefore, if we consider the total economy, almost 75 percent of the workload is from various components of the commerce field, so it is clear that, it is necessary to study the commerce sector in the true sense. In commerce education, various types of subjects are studied from the eleventh standard to graduation and postgraduate education, and from this, a well equipped human resources are obtained, working on key positions in the economy, from general salesmen to accountants, banking officers, administrative officers, and managerial officers. One can participate in important professional and vocational courses such as CA., CMA., CS., and business professionals. Along with this, commerce education can develop various types of qualities and skills of individuals. It is possible to develop important skills such as analytical thinking, financial literacy, negotiation, problem solving, and information presentation. Some of the points are indicates the role of commerce education as follows:

1. A link between theory and practical knowledge

Commercial education always connects academic teaching with real life and life-related to work practices, so students can study various aspects of the business and economy, their functions and other important and current events. By studying these aspects, they gain the ability to relate the knowledge learned to real-life events.

2. Career-related studies

After completing their education in commerce, students in the commerce branch get information about various study subjects in the field of commerce and based on the knowledge gained, they can use the tools of livelihood in the economy. In this type of education, students try to become more efficient.

3. Skill Development

Commerce education requires critical thinking and emphasis on practical skills, which is why important skills such as analytical thinking, problem solving, financial literacy, decision making and professional communication are included in commerce education. Such skills are not only necessary for running a business but also for fulfilling the role of a

responsible citizen. This skill development is necessary to be acquired through commerce education.

4. Global Awareness

Commerce education includes the study of national as well as international trade, international economics, international trade policies, so the study of dynamic factors in the global market and their intensity is realized, at the same time, cultural and professional diversity can be cultivated at the global level and it is possible to maintain regular competitiveness in the global economy. In emerging countries like India, various schemes are being undertaken by the central government and state government keeping in mind the role of commerce education, which is why our country is creating an independent identity at the global level.

5. Pursuit of Economic Development

In countries like India, various types of skilled and professional manpower are being developed through commerce education. This means that due to commerce education, employment generation, innovation and entrepreneurship, more efficient management, reforms in financial regulation are being seen.

6. Inspiring Financial Responsibility

Commerce education creates responsible citizens. As a responsible component of the economy, it is used to study various aspects of the commerce sector and their consequences. Personal finance, budgeting, tax system, investment system, stock market, international economic developments are being studied directly, so it is possible to fulfil the financial responsibilities in a systematic manner.

7. Support for Entrepreneurship

Commerce education provides inspiration for new entrepreneurship as it provides the study of entrepreneurial thinkers and entrepreneurial theories. Studying the success stories of various successful entrepreneurs inspires new and potential entrepreneurs to start their own businesses. It makes it possible to take risks and, accordingly, to obtain business opportunities even against existing threats. At the same time, new and innovative employment-oriented opportunities are obtained. It can also provide self-confidence and dynamism of the economy.

In short, commerce education is not limited to business only, but it also provides a sense of responsibility, skilled manpower, and the study of economic factors. The knowledge gained in total prepares new and potential entrepreneurs and manpower for the completion of every type of work. It creates a good society and provides a direction for living a meaningful life.

❖ **Key Factors related with Commerce Education in Entrepreneurial world**

1. Historical context of commerce in education

During the industrial revolution, commerce education gained great importance when there was a need for skilled workers in economic structure, accounting, trade laws and various professional activities. After that, another time, professional education institutions formalized such commerce education and due to this, B.Com, M. Com, MBA. CA, CS, CMA and other professional courses have gained importance.

2. Core components of commerce in education

In the field of commerce, many important aspects such as understanding the flow of capital and resource management, Accounting and Finance, the use of finance and its positive impact on the overall economy are included in these components. In addition, while studying business strategies and management, various types of organizational behaviour, leaders and functional actions are included in these components. While studying economics within commerce, various types of economic and financial policies and their impact on markets are also mainly studied. In entrepreneurial matters, new entrepreneurship, risk management, information systems, the role of digital management and business technology, all these components provide important and analytical managerial and decision-making skills in both public and private sectors.

3. Role of Commerce in Increasing Employability

Including commerce education in entrepreneurial development is significantly increasing the employability of students. Of course, emphasis is being placed on skill development, critical thinking, communication skills and financial literacy. The curriculum is in line with market demands and art, increasing industry relevance. According to the new curriculum, internships and partnerships are being seen to gain practical knowledge required for the real entrepreneurial sector. The role of commerce education is very important in preparing for CA and other professional courses.

4. Entrepreneurship and Innovation through Commercial Paths

One of the most transformative roles of the commerce sector in the overall education system is to promote entrepreneurship. Currently, a start-up culture has come into existence through the government to encourage students to identify gaps in the market and find solutions to them. At the same time, many business incubation centres have been started to support various types of student-lead initiatives. Financial literacy is being imparted to the youth to manage finances and empower them to find investment options. This is leading to the emergence and emergence of new entrepreneurs in the entrepreneurship sector. Education related to developments in the commerce sector is giving confidence to new entrepreneurs. There is a growing tendency to take risks and seek opportunities that can bring about positive changes in the economy, which is why commerce education is getting real support and impetus for the economy.

5. Commerce Education in the Digital Age

In the current 21st century, the digital economy has taken a positive step, which is why special changes are also being seen in commerce education. Currently, online marketplaces, websites, advertising media and digital payment methods have become very active according to various modules of e-commerce. Due to the democratization of access to commerce education at the global level, the use of various types of online education systems is increasing day by day. As various types of online education platforms are available at the local, national and international levels, digital literacy and its actual use are increasing to a large extent. In modern times, it has been possible to make transactions without the use of cash, which has had a positive impact on the economy.

❖ Uses and impact of Digitalization in Commerce Education

1. Enhanced Teaching and Learning

By using multimedia presentations such as PPT, videos, simulations and animations to make topics like accounting, HRM, business law and economics are more understandable and engaging the students. E-learning Platforms like Google Classroom, Myeclass and online apps allow students to access course materials anytime and anywhere. With the help of Kahoot, Quizzes, Hotpatatos and virtual business simulations promote active learning and provides immediate feedback.

2. Access to digitalized Information:

Students can access e-books, e-journals, online reports and various case studies for their understanding of commerce concepts. Various Institutions provide access to databases like JSTOR, Pro-Quest and others that house commerce-related literature in the digital libraries.

3. Digital Skill Development

Students learn accounting software (e.g., Tally, QuickBooks), data analysis tools (e.g., Excel, SPSS) and ERP systems. Students gain critical digital skills required in the modern business world, including data management, digital communication and online collaboration.

4. Digitalized tools enable to students for **online quizzes, completion of assignments and online exams** by providing flexibility and efficiency in assessment.

5. **Messaging Apps, Emails and various Forums** facilitates communication between students and teachers. Digital platforms like Google Docs, Microsoft Teams and Zoom app enable group projects and virtual discussions.

6. **SIS (Student Information System)** manages student records, grades and attendance while **LMS (Learning Management System)** tracks academic progress and streamline course delivery.

7. Simulated business environments helps to students for understand real-world digital applications and concepts of marketing, finance, and management.

❖ Challenges in Commerce Education

Despite the importance of commerce education being highlighted, challenges are being seen in various respects. These includes-

1. Outdated curricula that are not compatible with modern business practices.
2. Curricula that focus more on theory than actual education and provide limited practical experience.
3. Due to the division into urban and rural areas in commerce education, there is a gap in quality education.

Recommendations

- i) The curriculum should integrate AI data analysis and ESG (Environmental, Social and Governance) concepts.
- ii) Business simulations should be based on live projects and case studies.
- iii) A global perspective should be included in the curriculum that provides the study of cross-cultural activities, business communication and international economics.
- iv) Public and private entrepreneurs and industries should be involved in the design and guidance of the curriculum

Conclusion

Commerce education plays a multifaceted role in current education. It has an impact on economic understanding, career preparation and social development across traditional boundaries. Therefore, as education evolves, it is clear that commerce education is truly ready to navigate the important elements of commerce education and shape the future economy. The increased use of ICT in commerce education is witnessing a widespread and lasting change in teaching, learning and administrative processes. ICT is an integral part of commerce education and is playing a important role in enhancing the quality of education, improving acquisition and educating students for the digitally enabled entrepreneurial world. By using ICT tools, future professionals complete their business tasks more efficient in competitive and digital world.

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Translation Of Tamil Novels Into English – Bridging Cultural Divides In Indian Narratives

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Abstract

The translation of Tamil novels into English serves as a vital cultural and literary bridge connecting regional Indian stories with global audiences. This article explores the development, challenges, reactions, and prospects of translating Tamil fiction into English. Tamil literature in translation has evolved significantly over time, transitioning from early colonial-era translations that emphasized classical and religious texts to more recent narratives that address social and political issues. Numerous obstacles must be navigated during the translation process, including linguistic differences, cultural nuances, and ethical considerations, especially when dealing with caste, gender, and marginalized voices. Despite these challenges, English translations of Tamil works are increasingly gaining recognition in publishing, academic, and literary circles. By amplifying marginalized perspectives and promoting intercultural dialogue, they contribute to a more inclusive understanding of Indian literature. With the growing popularity of regional language literature and the rise of skilled translators, Tamil novels in translation hold a promising future and are likely to play a significant role in the literary landscape.

Keywords: Translation, Tamil novels, linguistic difference, Challenges in translation, marginalized voice.

Academic Success And Language Disadvantage: The Impact Of English-Centric Education On Postgraduate Students

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Abstract

This study explores the academic, emotional, and social challenges faced by postgraduate students from non-English medium backgrounds in English-centric higher education environments. While English functions as the global academic language, students transitioning from regional language instruction to postgraduate English-medium programs often experience disadvantages in communication, academic writing, classroom engagement, and research participation. Through a mixed-method approach involving surveys of 150 students and interviews with 20 participants from Visvesvaraya Technological University, Mysore, the study uncovers a significant correlation between language barriers and reduced academic confidence, performance, and participation. The findings reveal that institutional support remains insufficient and poorly targeted, with limited access to language resources and low awareness among affected students. Recommendations include structured language transition programs, faculty sensitization, peer mentoring, and curriculum adjustments to foster inclusivity and equitable learning outcomes.

Keywords: English-centric education, postgraduate studies, language barrier, regional languages, academic success, linguistic inequality.

Introduction

English is critically important in education due to its role as a global language, providing access to information, educational opportunities, and career advancement. Proficiency in English enhances communication, fosters cultural understanding, and improves cognitive abilities, making it essential for academic and professional success.

In the global academic landscape, English has emerged as the lingua franca of higher education, particularly in postgraduate studies. While this standardization facilitates international collaboration and knowledge exchange, it inadvertently creates barriers for students from non-English medium backgrounds. These students often face difficulties in adapting to academic writing norms, participating in discussions, and accessing research resources, all of which can negatively affect their academic performance and mental well-being.

Literature Review

(Nga, 2025)

The literature on the use of English as a second language (ESL) in education underscores its growing significance in non-native contexts, particularly due to globalization and the demand for English proficiency in academic and professional spheres. Studies have shown that ESL instruction can enhance students' academic performance, cognitive skills, and global competitiveness. However, research also highlights challenges such as inadequate teacher training, unequal access to quality instruction, and cultural disconnects. In the Vietnamese context, scholars emphasize the need for curriculum reform and teacher development to ensure more equitable and effective ESL outcomes. Overall, the literature supports ESL as a valuable but complex educational tool.

(Li, 2024)

The literature on non-native English-speaking (NNES) students' academic writing in higher education emphasizes the complex interplay of linguistic, cognitive, and institutional factors shaping their experiences. Studies reveal that challenges stem from prior educational backgrounds, limited academic writing preparation, and insufficient institutional support. Despite these hurdles, NNES students employ various adaptive strategies cognitive, metacognitive, and social to navigate writing demands. Research highlights the importance of responsive pedagogical approaches and inclusive support systems that address not only linguistic needs but also emotional and academic dimensions. Overall, a holistic institutional response is essential to foster NNES students' academic success.

(Patil, 2024)

The literature on English language proficiency emphasizes the significant role of socio-cultural factors in shaping learners' outcomes. Research consistently shows that elements such as family background, socio-economic status, educational practices, and exposure to English-speaking environments greatly influence proficiency levels. Studies highlight that students from disadvantaged backgrounds often face systemic barriers, including lack of resources and limited language exposure. Conversely, supportive environments and positive social influences enhance language acquisition. Scholars advocate for inclusive and context-sensitive educational strategies to address these disparities and promote equitable access to English language learning opportunities in a globalized world.

(Öztürk & Feryal, 2022)

The literature on translanguageing highlights its role as an effective pedagogical strategy for bilingual and multilingual learners, allowing them to use their full linguistic repertoire to enhance comprehension and meaning-making (Williams, 1996; Baker, 2011). Research suggests that translanguageing fosters deeper cognitive engagement, supports academic

achievement, and enhances critical thinking. However, despite its benefits, some students and educators may hold negative perceptions due to English-only ideologies in language classrooms. Studies emphasize the importance of addressing these attitudes to maximize translanguaging's potential. Overall, literature supports a balanced approach that validates students' multilingual identities while promoting effective language learning.

(Elkhayma, 2022)

The use of English as a Medium of Instruction (EMI) has gained global momentum, particularly in non-English speaking countries aiming to internationalize their higher education systems. Studies highlight that EMI can enhance students' English proficiency and global competitiveness (Macaro et al., 2018). However, it also presents challenges such as reduced subject comprehension, language barriers, and increased cognitive load for both students and lecturers. Research in contexts like Japan, China, and Germany reveals mixed outcomes, with some institutions offering support mechanisms to ease the transition. In Morocco, EMI is emerging, bringing both promising opportunities and practical challenges in higher education.

(Selvi, 2021)

English has become the dominant language of scientific communication and academic publishing worldwide. Non-native English-speaking scholars often face linguistic and cultural challenges in writing for international journals. These challenges include mastering academic writing conventions, dealing with language proficiency issues, and overcoming biases in peer review. However, many scholars develop coping strategies such as seeking editorial support, collaborating with native speakers, and participating in writing workshops in Turkey, increasing institutional pressure to publish in English has both motivated and challenged local academics.

(Bower, 2019)

Existing research on Content and Language Integrated Learning (CLIL) primarily focuses on classroom-level implementation, learner outcomes, and teacher perspectives, with limited attention to school leadership roles. Studies highlight CLIL's benefits in enhancing language proficiency and subject mastery simultaneously. However, few have explored the strategic influence of school leaders in sustaining such initiatives. Research suggests that leadership commitment is critical to embedding innovative pedagogies like CLIL within school culture. In the English context, national policy gaps and accountability pressures further shape how leaders engage with CLIL, underscoring a need for more focused leadership-oriented inquiry.

(Sah & Guofang , 2018)

The authors documented a similar situation, where many EMI schoolteachers scored at the lowest level of the Common European Framework of Reference for Languages (CEFR) in English. Consequently, numerous EMI classrooms fell back on the first language of the teacher and students, limiting opportunities for developing English skills.

(Haidar, 2017)

In contrast, the author studied an elite EMI school in Pakistan and found that EMI in this context successfully supported children in developing a high level of English competency and strong academic achievements. Consequently, these students were able to pursue higher education and enjoy upward economic mobility opportunities that were unavailable to children from lower socioeconomic backgrounds due to a different education system.

(Liddicoat, 2016)

The study highlights that in many contexts English has become the dominant medium for knowledge production. Furthermore, universities are increasingly adopting English as their medium of instruction either as the main medium or alongside another in some disciplines and programs. Liddicoat also notes that the main policy consideration at many Anglo-Saxon universities has been to help international students and professors adjust to this English-dominant environment.

(Phyak, 2016)

The study highlights how the global expansion of English-Medium Institution (EMI) education has influenced Nepal's education system. After the 1990 Constitution implemented economic liberation policies, private English-medium boarding schools started to flourish in Nepal. These boarding schools consistently outperform their public counterparts in the School Leaving Certificate exams, causing the Nepalese community to view English medium education as synonymous with high educational quality.

(Hamid & Erling , 2016)

The study highlight that a key objective of using development aid to fund English education is to enable those who learn English to achieve greater economic opportunities.

(Nara M. Martirosyan, 2015)

Research consistently highlights English language proficiency as a key predictor of academic success among international students in English-medium institutions. Limited proficiency can hinder comprehension, participation, and academic writing, directly impacting GPA and student retention . Multilingualism, on the other hand, is associated with enhanced cognitive flexibility and learning strategies. Studies show that students with higher self-assessed English skills and multilingual abilities often perform better academically, suggesting a complex interplay between language skills and academic outcomes.

(Ingrid Piller, 2013)

Scholars have increasingly examined the role of neoliberalism in shaping language policies, particularly the global rise of English as a Medium of Instruction (EMI). Neoliberal ideologies promote competition, marketization, and internationalization, often positioning English as a key asset for global mobility and economic success. University ranking systems and international benchmarks have reinforced this trend, embedding English within institutional prestige and academic value . Studies in contexts like South Korea reveal how such covert policies marginalize local languages and exacerbate social inequalities.

(Hamid, Hoa Thi Mai , & Richard B, Medium of instruction in Asia: context, processes and outcomes, 2013)

The study presented rich perspectives from 10 studies in a special issue of *Current Issues in Language Planning*. Drawing on these, the editors explained that the main goals for adopting EMI in Asia were to improve English language skills, develop human capital for participating in a globalized workforce, raise education standards, and internationalize education and businesses in the region.

(Bhattacharya, 2013)

The author , in her ethnographic case study, investigated the process by which young orphanage children in a suburb of New Delhi, India, were acquiring English literacy skills in a nearby EMI school. The findings revealed that these children were not developing genuine English skills; instead, they fell into a pattern of mechanical translation and rote memorization, which was more about “learning for the test” than developing linguistic competence.

(Lo & Ernesto , 2011)

The author investigated the effects of Medium of Instruction (MOI) switching in Hong Kong, where some CMI schools transitioned to EMI. They found that, although these schools adopted EMI in policy, the actual amount of English used in classrooms varied. Furthermore, this change influenced teacher-student interaction, making EMI lessons more teacher-centric and less interactive. Importantly, in EMI classrooms, teachers did not provide sufficient scaffolding to help students learn; instead, they predominantly imparted content directly.

(Giri, 2011)

The literature on language politics in Nepal highlights the historical dominance of certain languages particularly Nepali imposed by ruling elites through invisible language planning, often referred to as "unplanning." Scholars argue that this silent privileging has led to the marginalization and erosion of many indigenous languages. Research reveals that despite Nepal's rich linguistic diversity, state policies have largely ignored the needs of minority language communities. The lack of a coherent and inclusive language policy perpetuates inequality and reinforces socio-political hierarchies. Current discourse calls for a multilingual and equitable framework to protect linguistic rights and promote cultural inclusivity in a rapidly evolving political context.

(Halic, Katherine, & Trena, 2009)

Existing literature underscores the strong link between language proficiency and academic identity for non-native English-speaking students. Language challenges often impact students' confidence, participation, and sense of belonging in academic communities. Scholars argue that identity is negotiated through language use and shaped by power dynamics within academic discourse. Research highlights the emotional and cognitive strain of adapting to a new linguistic and cultural environment, with learner-centered pedagogies recommended to support integration and academic development.

(Luxon, 2009)

The study emphasize that a person's command of English plays a key role in their level of ease and confidence when teaching, and more broadly in adapting to the instructional practices of a UK university.

(Brown, 2008)

Language anxiety is a well-documented issue among international students, often linked to feelings of low self-confidence and fear of negative evaluation in academic and social settings. Studies indicate that even students who meet language proficiency requirements, such as IELTS benchmarks, frequently struggle with spoken English in real-life contexts. This anxiety can lead to social isolation and a tendency to interact primarily within

monoethnic groups. Research emphasizes that without targeted institutional support, language anxiety can significantly hinder both academic performance and social integration.

(Vaish, 2008)

The author finds in her study of female students from disadvantaged backgrounds in India that these students associate English with financial success, upward social mobility, and the ability to acquire cultural capital. Although this policy was meant to empower poor, Dalit, and underprivileged groups by redistributing linguistic resources more fairly, it fell short of delivering the promised opportunities

(Archer, 2008)

The author reports that for a junior academic, feeling less proficient in English can undermine their sense of authenticity in their professional role. This suggests that limited English skills may affect their confidence and their ability to perform their duties effectively.

(Hamel, 2007)

The author underscores the growing emphasis on English as the preferred language of publication in academia. This further strengthens the role of English as the principal medium for disseminating knowledge across disciplines and borders.

(Ricento, 2006)

The author highlights how, in theory, language policy has shifted from a positivistic view which treated policy as a technical solution to linguistic issues towards a more critical understanding of how languages can reproduce social and economic inequality. He underscores a growing interest in language planning against a backdrop of a changing world, where nation-states are increasingly diverse, yet more interconnected and international.

Research Gap

Existing literature predominantly focuses on the role of English in primary and secondary education and broadly highlights the disadvantages faced by non-English medium students. However, there is a scarcity of in-depth, empirical research that investigates the specific struggles of postgraduate students transitioning from regional languages to English-centric programs. Furthermore, previous studies have largely addressed policy implications and general linguistic inequality, without adequately exploring the lived experiences, academic performance, and social-emotional impacts on this particular group of students. Additionally, there is limited empirical data on institutional gaps and the effectiveness of support mechanisms at the postgraduate level.

Objective

1. To examine the academic challenges faced by postgraduate students from non-English medium backgrounds.
2. To analyse the emotional and social impact of English language dominance on these students.
3. To identify institutional gaps in language support mechanisms.

4. To propose recommendations for creating an inclusive and linguistically equitable academic environment.

Research Design

Methodology

This study adopts a mixed-method approach:

- Collected through surveys from 150 postgraduate students across various disciplines in Visvesvaraya Technological University Mysore.
- In-depth interviews with 20 students who transitioned from regional language instruction to English-medium postgraduate programs.

Sample Method

- Stratified random sampling for quantitative survey participants.
- Purposive sampling for qualitative interviews to select students from regional language backgrounds with relevant challenges.

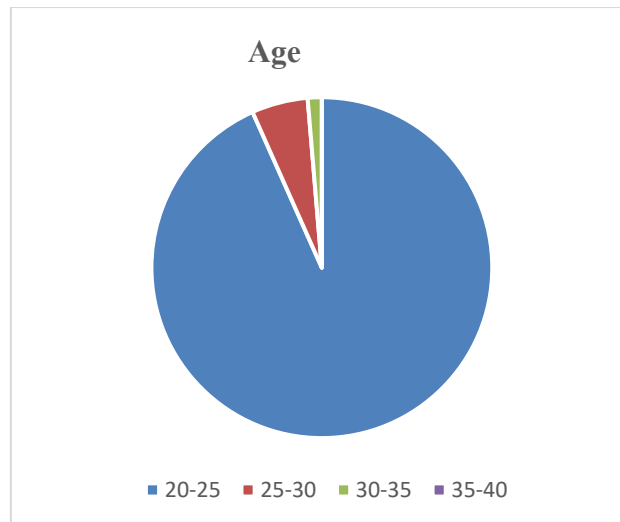
Sample Size

- 150 postgraduate students
- Quantitative Survey:
 - MBA students: 100
 - MCA students: 50
- Qualitative Interviews:
 - 20 students who transitioned from regional language education to English-medium postgraduate programs, selected based on language background and willingness to share detailed experiences.

Analysis And Interpretation

(Table No: 1)

1.Age		
Particulars	Frequency	Percentage
20-25	140	93.33
25-30	8	5.33
30-35	2	1.33
35-40	0	0.00
Total	150	100.00

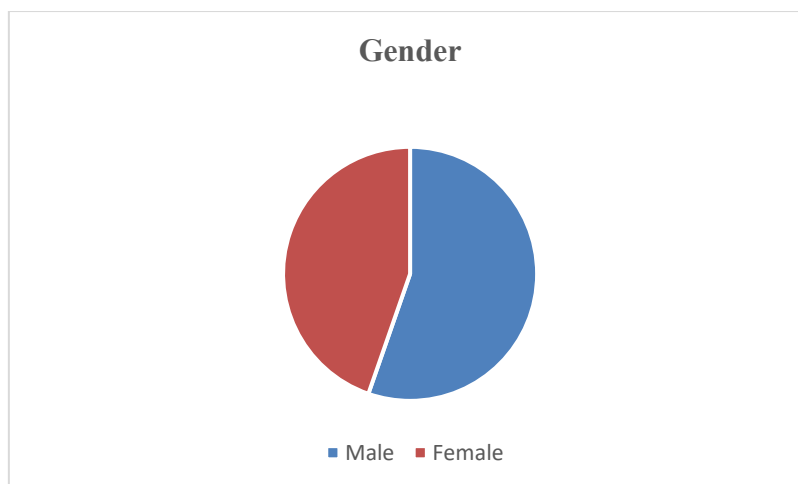


(Graph No: 1)

Analysis and Interpretation: The above table presents the age distribution of 150 respondents. A significant majority (93.33%) fall within the 20–25 age group, indicating that the sample is predominantly young adults. Only a small proportion (5.33%) are aged 25–30, and even fewer (1.33%) are between 30–35. No participants belong to the 35–40 age group. This suggests that the study or survey primarily engaged a younger demographic.

(Table No: 2)

2.Gender		
Particulars	Frequency	Percentage
Male	83	55.33
Female	67	44.67
Total	150	100.00

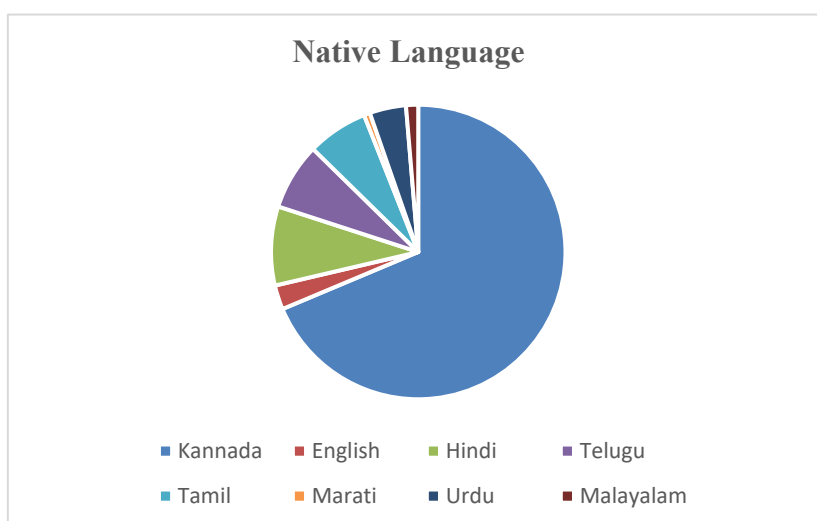


(Graph No: 2)

Analysis and Interpretation: The above table presents the gender distribution of the respondents. Out of 150 participants, 55.33% are male and 44.67% are female. This indicates a slight predominance of male respondents over females in the study. The gender representation is relatively balanced, suggesting that the findings may reflect perspectives from both genders fairly well.

(Table No: 3)

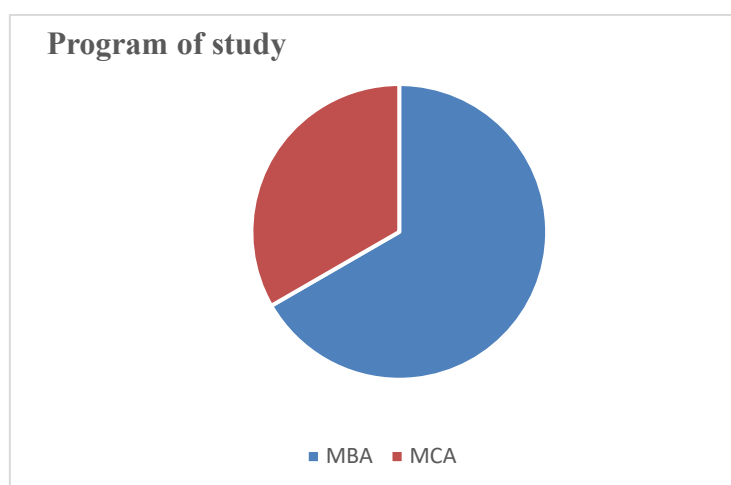
3.Native Language		
Particulars	Frequency	Percentage
Kannada	103	68.67
English	4	2.67
Hindi	13	8.67
Telugu	11	7.33
Tamil	10	6.67
Marati	1	0.67
Urdu	6	4.00
Malayalam	2	1.33
Total	150	100.00



Interpretation: The above table shows the distribution of respondents based on their native language. A significant majority (68.67%) are Kannada speakers, indicating a strong regional concentration. Other native languages include Hindi (8.67%), Telugu (7.33%), Tamil (6.67%), and smaller percentages for English, Urdu, Marathi, and Malayalam. This suggests that the study is primarily representative of Kannada-speaking participants, with some linguistic diversity present.

(Table No: 4)

4.Program of Study		
Particulars	Frequency	Percentage
MBA	100	66.67
MCA	50	33.33
Total	150	100.00

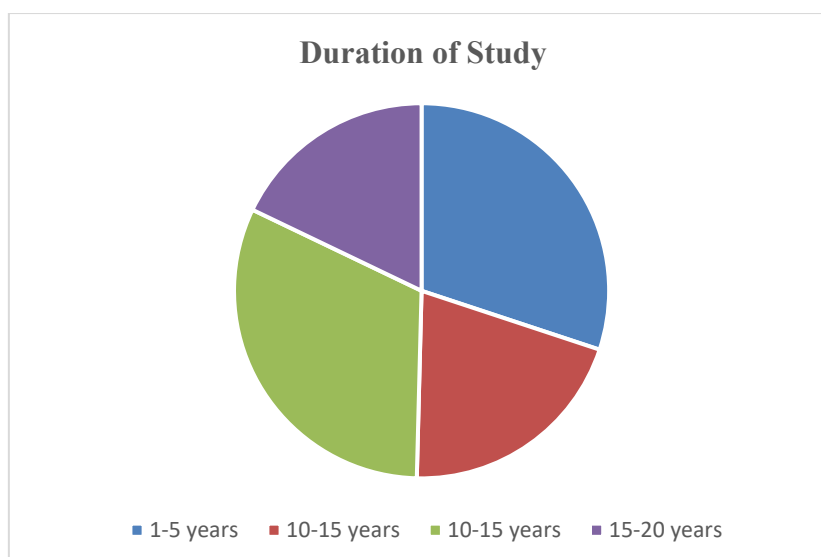


(Graph No: 4)

Analysis and Interpretation: The above table displays the distribution of respondents based on their program of study. A majority of the participants (66.67%) are enrolled in the MBA program, while 33.33% are pursuing the MCA program. This indicates that the study sample is predominantly composed of MBA students, which may influence the overall findings and perspectives towards management-oriented fields.

(Table No: 5)

5.Duration of Study in English-Medium Institution		
Particulars	Frequency	Percentage
1-5 years	42	28.00
10-15 years	45	30.00
15-20 years	33	22.00
20-25 years	30	20.00
Total	150	100.00

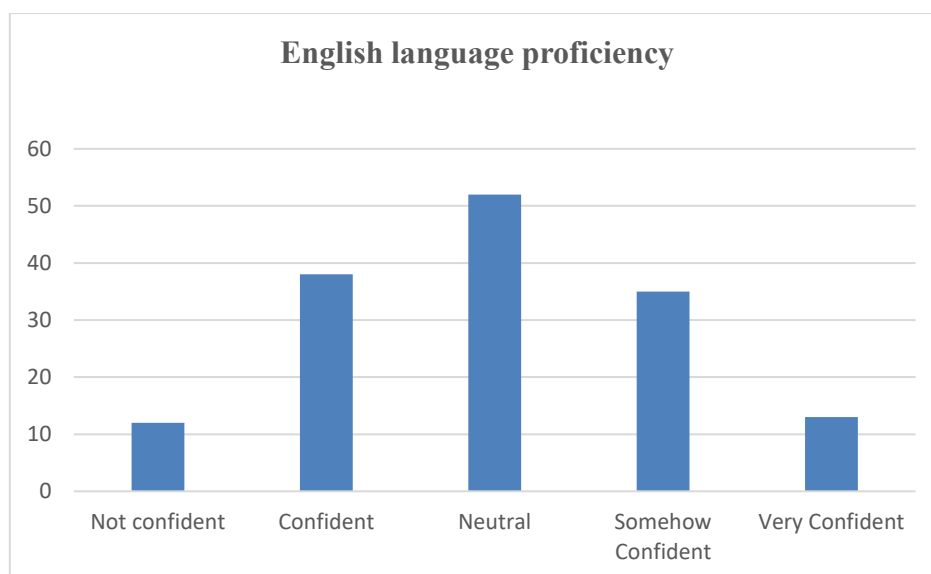


(Graph No: 5)

Analysis and Interpretation: The above table shows the duration of study in English-medium institutions among the respondents. The largest group (30%) has studied in such institutions for 10–15 years, followed by 28% with 1–5 years of exposure. Additionally, 22% have studied for 15–20 years, and 20% have 20–25 years of experience. This indicates that most respondents have substantial exposure to English-medium education, with a balanced spread across different durations, suggesting varied levels of language familiarity and proficiency.

(Table No: 6)

1. How confident do you feel about your English language proficiency in the academic tasks?		
Particulars	Frequency	Percentage
Not confident	12	8
Confident	38	25.33
Neutral	52	34.67
Somehow Confident	35	23.33
Very Confident	13	8.67
Total	150	100

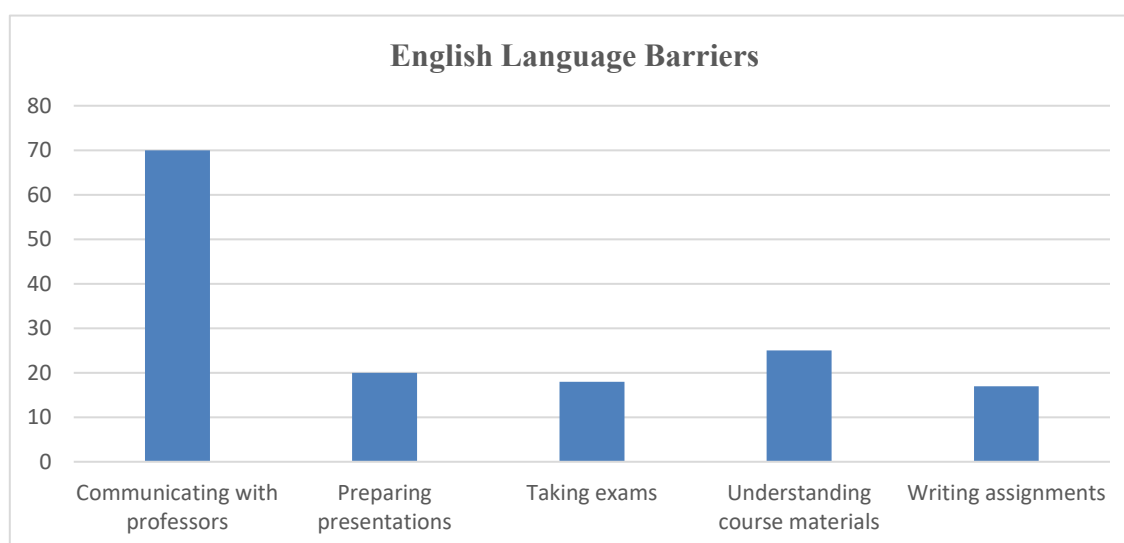


(Graph No: 6)

Analysis and Interpretation: The above table presents the respondents' self-assessed English language proficiency. A significant portion (34.67%) feel neutral about their proficiency, while 23.33% are somehow confident and 25.33% feel confident. Only 8.67% consider themselves very confident, and 8% report not being confident. This suggests that while many respondents have a moderate level of self-assurance in their English skills, a smaller group feels highly proficient, indicating scope for further language development.

(Table No: 7)

2.What are the main academic difficulties you face due to English language barriers?		
Particulars	Frequency	Percentage
Communicating with professors	70	46.67
Preparing presentations	20	13.33
Taking exams	18	12.00
Understanding course materials	25	16.67
Writing assignments	17	11.33
Total	150	100.00

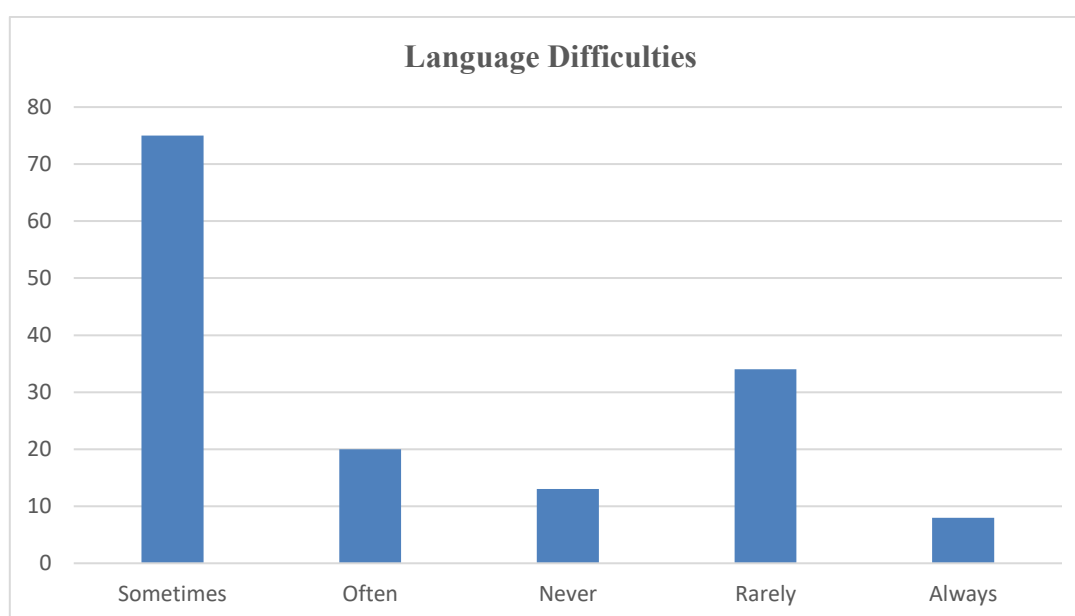


(Graph No:7)

Analysis and Interpretation: The above table highlights the key English language barriers faced by respondents. The most significant challenge is communicating with professors (46.67%), indicating a major hurdle in verbal academic interactions. Other difficulties include understanding course materials (16.67%), preparing presentations (13.33%), taking exams (12%), and writing assignments (11.33%). This suggests that verbal and comprehension skills are the primary areas where students struggle, which could impact their overall academic performance.

(Table No: 8)

3. How often do language difficulties affect your academic performance?		
Particulars	Frequency	Percentage
Sometimes	75	50.00
Often	20	13.33
Never	13	8.67
Rarely	34	22.67
Always	8	5.33
Total	150	100.00



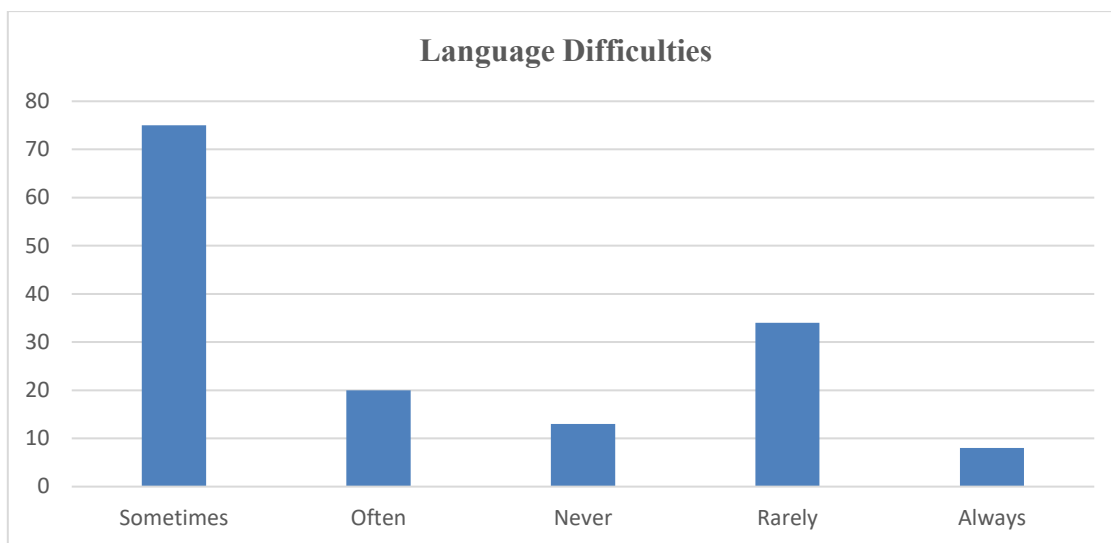
(Graph No:8)

Analysis and Interpretation: The above table illustrates the frequency of language difficulties experienced by the respondents. Half of the participants (50%) reported that they sometimes face language difficulties, while 22.67% rarely encounter such issues. Additionally, 13.33% face these difficulties often, and only 5.33% experience them always. A small group (8.67%) reported never facing language difficulties. This suggests that while language challenges are not constant, they are a common and recurring issue for most respondents.

(Table No: 9)

4. Have you ever delayed or dropped an academic activity (assignment, seminar, exam) due to language-related challenges?

Particulars	Frequency	Percentage
Sometimes	75	50.00
Often	20	13.33
Never	13	8.67
Rarely	34	22.67
Always	8	5.33
Total	150	100.00

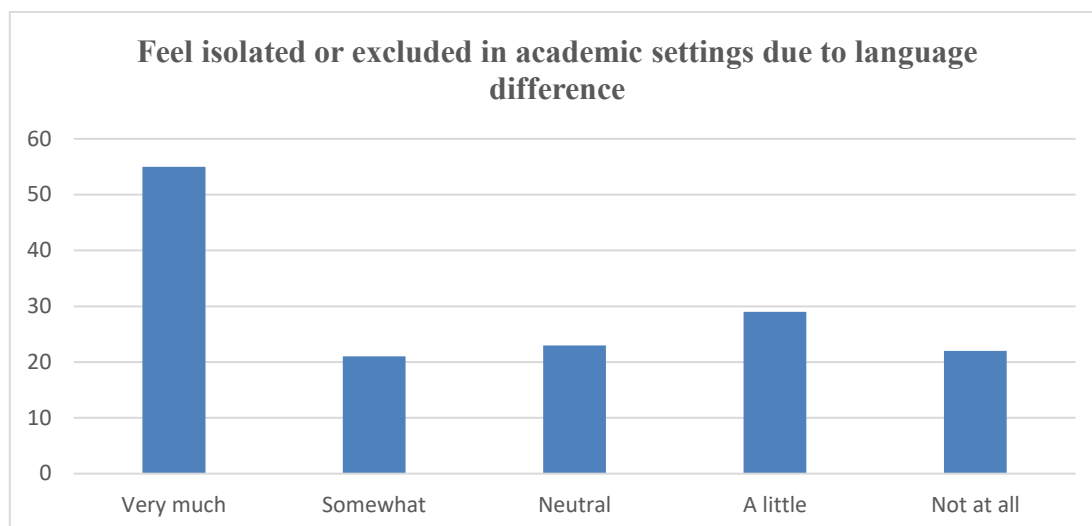


(Graph No:9)

Analysis and Interpretation: The above table illustrates the frequency of language difficulties experienced by the respondents. Half of the participants (50%) reported that they sometimes face language difficulties, while 22.67% rarely encounter such issues. Additionally, 13.33% face these difficulties often, and only 5.33% experience them always. A small group (8.67%) reported never facing language difficulties. This suggests that while language challenges are not constant, they are a common and recurring issue for most respondents.

(Table No: 10)

5.To what extent do you feel isolated or excluded in academic settings due to language difference?		
Particulars	Frequency	Percentage
Very much	55	36.67
Somewhat	21	14
Neutral	23	15.33
A little	29	19.33
Not at all	22	14.67
Total	150	100

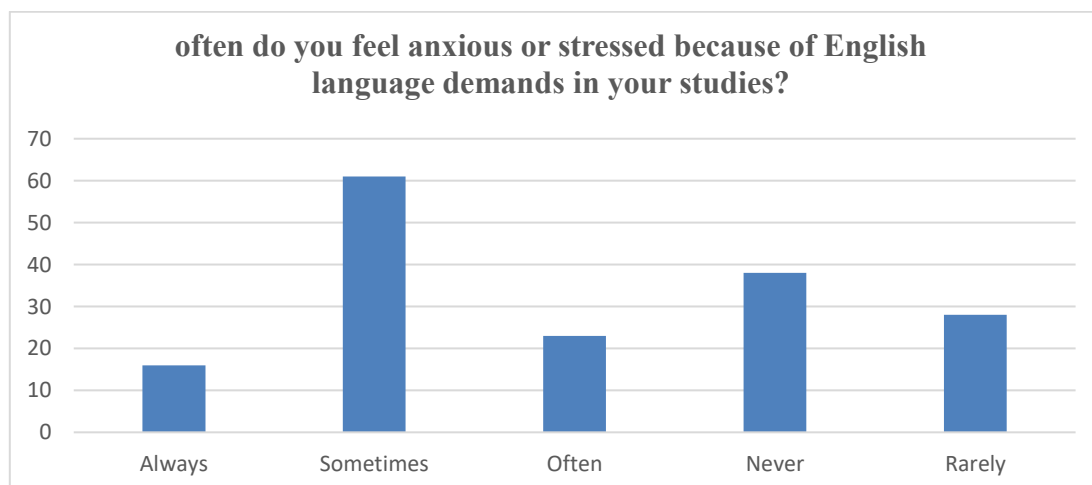


(Graph No: 10)

Analysis and Interpretation: The above table shows respondents' feelings of isolation or exclusion in academic settings due to language differences. A significant portion (36.67%) remained neutral, suggesting that many students neither strongly feel excluded nor fully included. About 15.33% reported feeling "very much" excluded, while 14.00% felt "somewhat" excluded, indicating that language barriers do impact a notable minority. Additionally, 19.33% felt "a little" excluded, and 14.67% did not feel excluded at all. Overall, the responses reflect mixed experiences, with a tendency towards neutrality but with a considerable number facing some level of exclusion.

(Table No: 11)

6. How often do you feel anxious or stressed because of English language demands in your studies?		
Particulars	Frequency	Percentage
Always	16	10.67
Sometimes	61	40.67
Often	23	15.33
Never	38	25.33
Rarely	28	18.67
Total	150	100.00

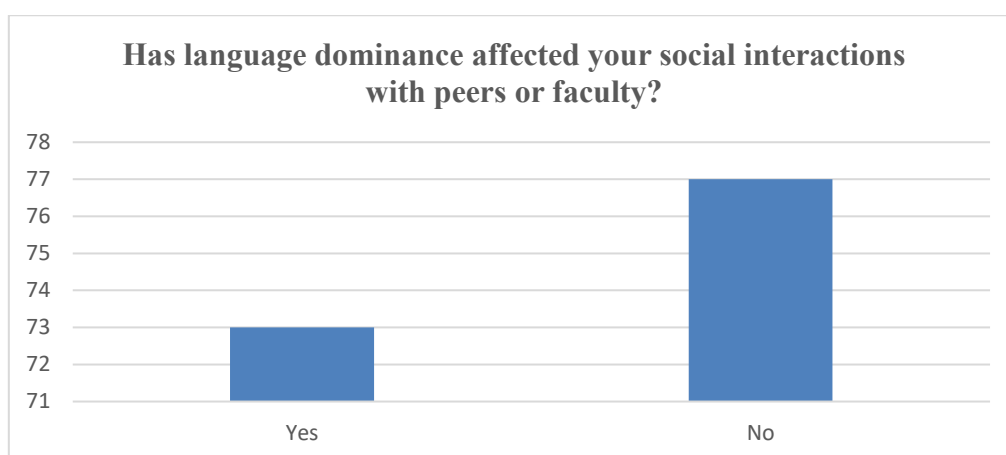


(Graph No: 11)

Analysis and Interpretation: The above table shows that a significant number of students (40.67%) sometimes feel anxious or stressed due to English language demands, while 15.33% often experience such stress and 10.67% always feel anxious. In contrast, 25.33% of students never feel stressed, and 18.67% rarely do. This indicates that although some students are comfortable, a majority (nearly 67%) experience at least occasional stress, suggesting that language demands present a considerable challenge for many learners.

(Table No: 12)

7. Has language dominance affected your social interactions with peers or faculty?		
Particulars	Frequency	Percentage
Yes	73	48.67
No	77	51.33
Total	150	100.00

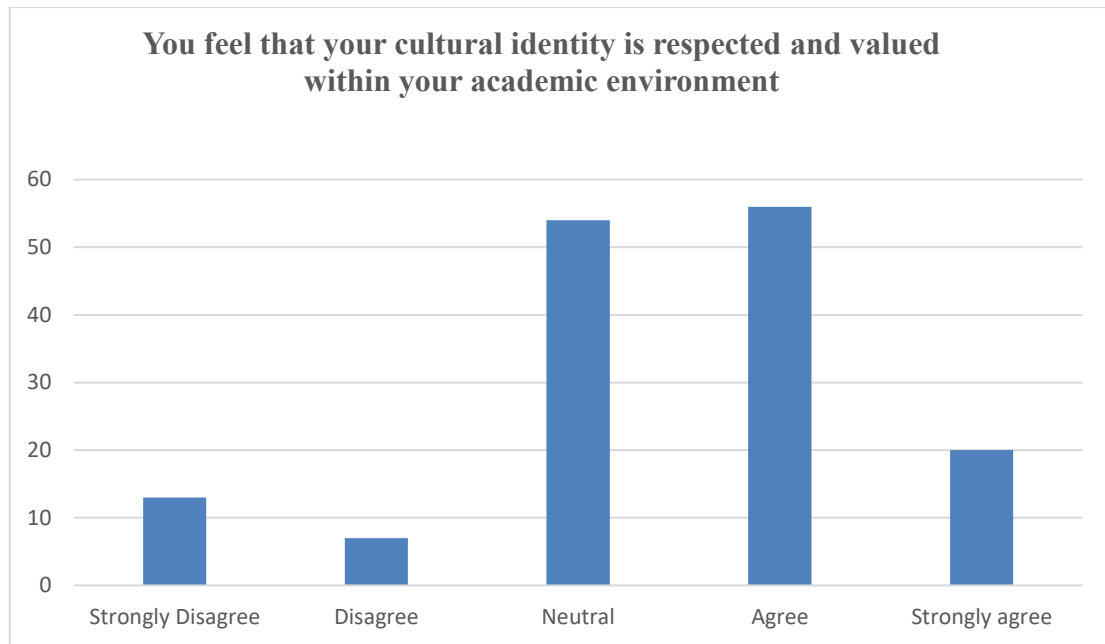


(Graph No: 12)

Analysis and Interpretation: The above table indicates that 48.67% of students feel that language dominance has affected their social interactions with peers or faculty, while 51.33% reported no such impact. This shows that students are almost evenly split on this issue. Although a slight majority did not experience language-related social barriers, a significant proportion did, highlighting that language dominance can still create social challenges for nearly half of the student population.

(Table No: 13)

8. You feel that your cultural identity is respected and valued within your academic environment.		
Particulars	Frequency	Percentage
Strongly Disagree	13	8.67
Disagree	7	4.67
Neutral	54	36
Agree	56	37.33
Strongly agree	20	13.33
Total	150	100

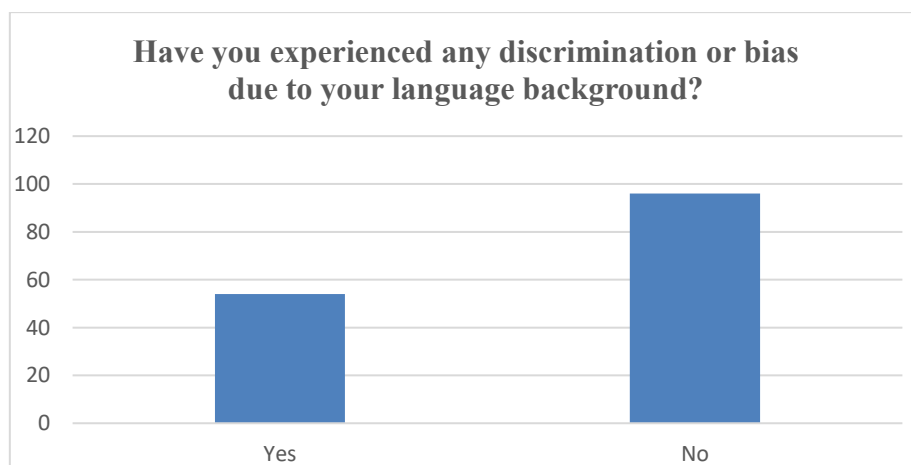


(Graph No: 13)

Analysis and Interpretation: The above table shows that 37.33% of students agree and 13.33% strongly agree that their cultural identity is respected and valued in their academic environment, which is a positive indicator. However, 36% remain neutral, suggesting some uncertainty or mixed experiences. A smaller proportion of students, 4.67% disagree and 8.67% strongly disagree, indicating that not everyone feels culturally acknowledged. Overall, while most students feel respected, there is room to further enhance cultural inclusivity and awareness.

(Table No: 14)

9. Have you experienced any discrimination or bias due to your language background?		
Particulars	Frequency	Percentage
Yes	54	36.00
No	96	64.00
Total	150	100.00

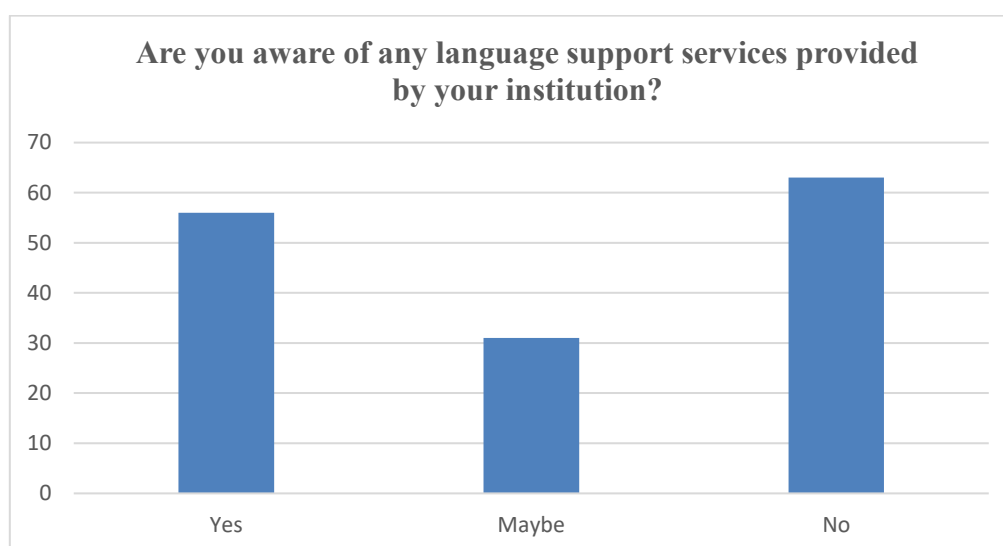


(Graph No: 14)

Analysis and Interpretation: The above table reveals that 36% of students have experienced discrimination or bias due to their language background, while 64% have not faced such issues. Although the majority reported no discrimination, over one-third of the respondents have encountered language-based bias, which is a significant concern. This indicates that while many academic settings may be generally inclusive, language-related discrimination still exists and should be addressed to ensure a fully supportive environment for all students.

(Table No: 15)

10. Are you aware of any language support services (e.g., language labs, tutoring, writing centers) provided by your institution?		
Particulars	Frequency	Percentage
Yes	56	37.33
Maybe	31	20.67
No	63	42.00
Total	150	100.00

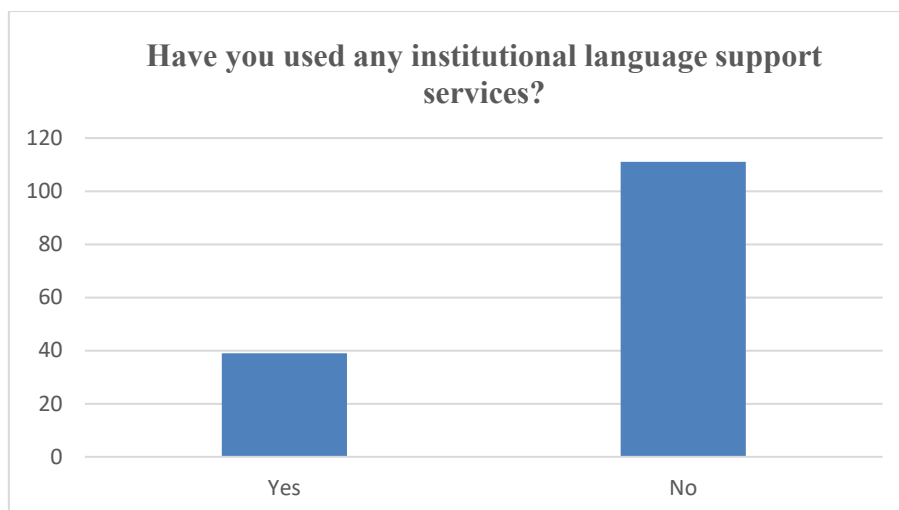


(Graph No: 15)

Analysis and Interpretation: The above table shows that 42% of students are not aware of any language support services provided by their institution, while 37.33% are aware and 20.67% are uncertain. This suggests that either language support services are not effectively communicated or they may be lacking. The lack of awareness among a significant portion of students highlights the need for institutions to improve promotion and accessibility of these services to better support students facing language challenges.

(Table No: 16)

11. Have you used any institutional language support services?		
Particulars	Frequency	Percentage
Yes	39	26.00
No	111	74.00
Total	150	100.00

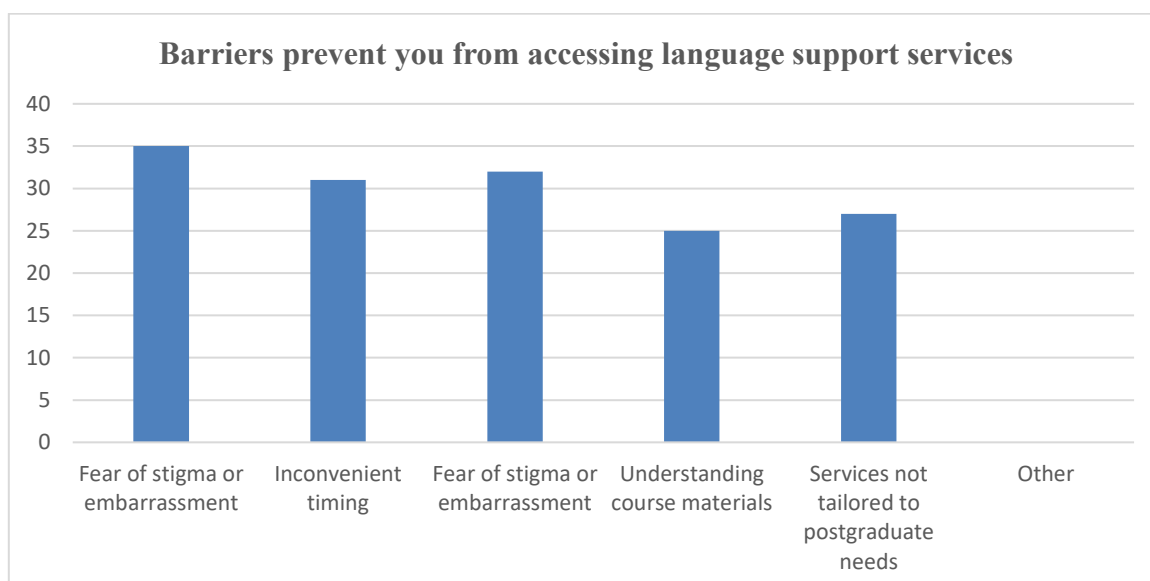


(Graph No: 16)

Analysis and Interpretation: The above table shows that only 26% of students have used institutional language support services, while a large majority (74%) have not utilized them. This may suggest limited access, low awareness, or possibly a lack of perceived need for such services. The low usage rate indicates that institutions should focus on better promoting these resources, ensuring they are accessible, and making students aware of the potential benefits.

(Table No: 17)

12. What barriers prevent you from accessing language support services?		
Particulars	Frequency	Percentage
Fear of stigma or embarrassment	35	23.33
Inconvenient timing	31	20.67
Fear of stigma or embarrassment	32	21.33
Understanding course materials	25	16.67
Services not tailored to postgraduate needs	27	18.00
Other	0	0.00
Total	150	100.00

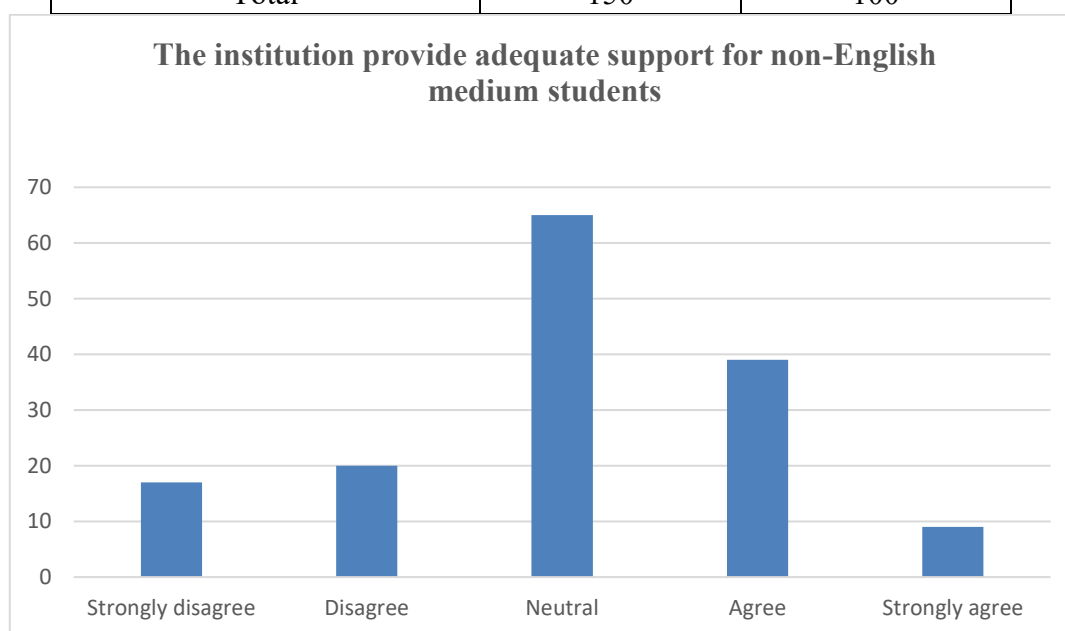


(Graph No: 17)

Analysis and Interpretation: The above table highlights key barriers preventing students from accessing language support services. The most commonly reported barrier is fear of stigma or embarrassment, followed by inconvenient timing (20.67%) and services not tailored to postgraduate needs (18%). Additionally, some students (16.67%) struggle with understanding course materials. These findings suggest that emotional, scheduling, and relevance issues limit access to language support, and addressing these concerns could improve service uptake.

(Table No: 18)

13. In your opinion, the institution provide adequate support for non-English medium students?		
Particulars	Frequency	Percentage
Strongly disagree	17	11.33
Disagree	20	13.33
Neutral	65	43.33
Agree	39	26
Strongly agree	9	6
Total	150	100

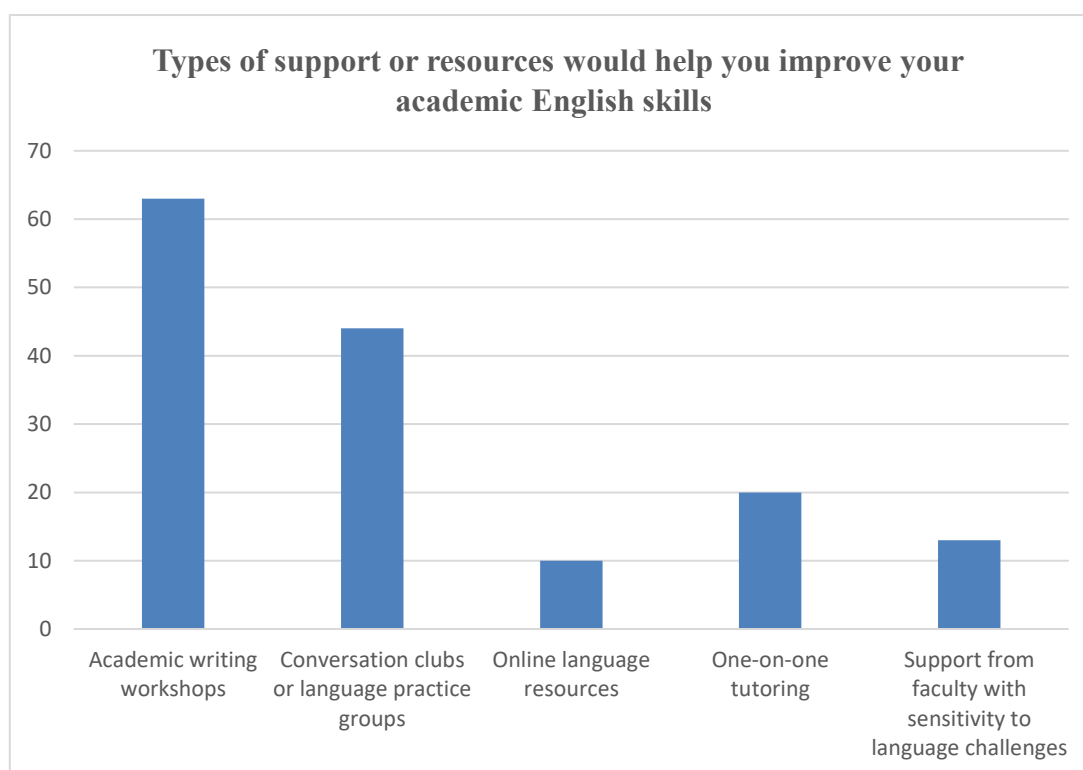


(Graph No: 18)

Analysis and Interpretation: The above table shows that 43.33% of students remain neutral about whether their institution provides adequate support for non-English medium students, indicating uncertainty or mixed experiences. While 32% (agree and strongly agree combined) feel supported, a notable 24.66% (disagree and strongly disagree combined) believe the support is inadequate. This suggests that although some students perceive the institution's efforts positively, there is significant room for improvement in making support more visible, accessible, and effective for non-English medium students.

(Table No: 19)

14. What types of support or resources would help you improve your academic English skills?		
Particulars	Frequency	Percentage
Academic writing workshops	63	42.00
Conversation clubs or language practice groups	44	29.33
Online language resources	10	6.67
One-on-one tutoring	20	13.33
Support from faculty with sensitivity to language challenges	13	8.67
Total	150	100.00

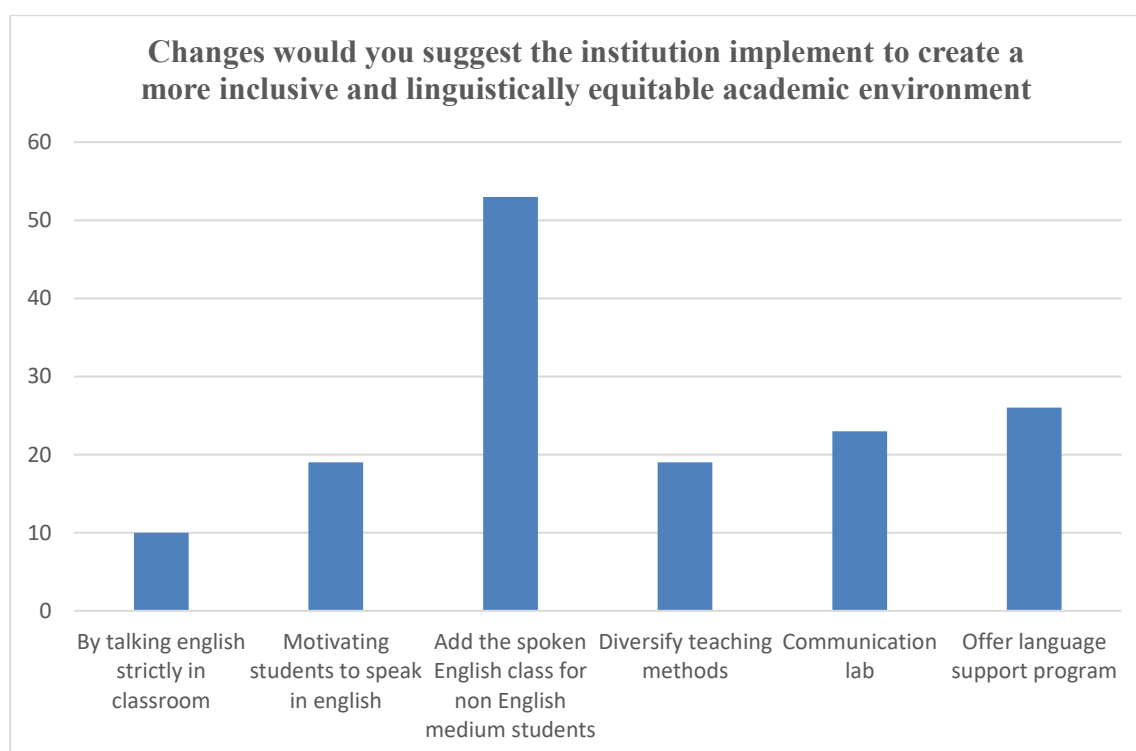


(Graph No: 19)

Analysis and Interpretation: The above table shows that the most preferred type of support is academic writing workshops, selected by 42% of students, indicating a strong need to improve writing skills. Conversation clubs or language practice groups are also popular (29.33%), suggesting students seek more interactive, spoken language opportunities. One-on-one tutoring (13.33%) and faculty support (8.67%) are less frequently chosen but still important. Online language resources are the least preferred (6.67%). Overall, students favor practical, interactive, and writing-focused support to enhance their academic English proficiency.

(Table No: 20)

15. What changes would you suggest the institution implement to create a more inclusive and linguistically equitable academic environment?		
Particulars	Frequency	Percentage
By talking English strictly in classroom	10	10.00
Motivating students to speak in English	19	12.67
Add the spoken English class for non English medium students	53	35.33
Diversify teaching methods	19	12.67
Communication lab	23	15.33
Offer language support program	26	17.33
Total	150	100.00



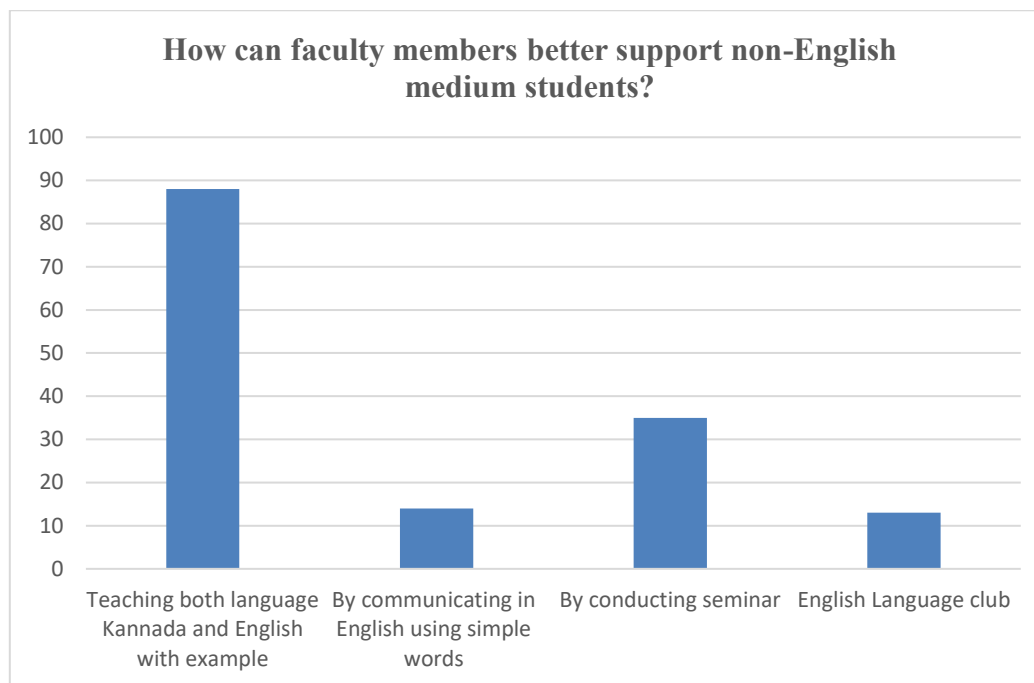
(Graph No: 20)

Analysis and Interpretation: The above table shows that the most recommended change by students is adding spoken English classes for non-English medium students (35.33%), indicating a strong desire for targeted spoken language support. Other notable suggestions include establishing communication labs (15.33%), offering language support programs (17.33%), and motivating students to speak in English (12.67%). A smaller number suggest strictly enforcing English use in the classroom (6.67%). Overall, the responses emphasize the need for practical, supportive, and interactive language development initiatives to create a more inclusive and linguistically equitable academic environment.

(Table No: 21)

16. How can faculty members better support non-English medium students?		
Particulars	Frequency	Percentage
Teaching both language Kannada and English with example	88	58.67

By communicating in English using simple words	14	9.33
By conducting seminar	35	23.33
English Language club	13	8.67
Total	150	100.00

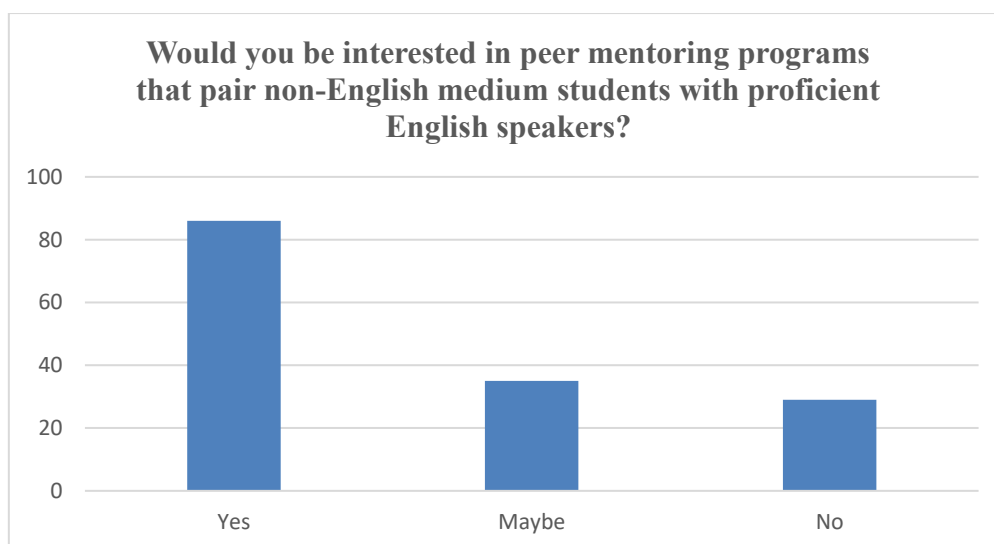


(Graph No: 21)

Analysis and Interpretation: The above table shows that 58.67% of students believe faculty can best support non-English medium students by teaching in both Kannada and English with examples, indicating a strong preference for bilingual instruction. Conducting seminars (23.33%) and using simple English words (9.33%) are also suggested, reflecting the need for clear and accessible communication. Additionally, 8.67% recommend forming English language clubs to promote practice. Overall, students emphasize the importance of bilingual teaching and practical engagement to improve their language learning experience.

(Table No: 22)

17. Would you be interested in peer mentoring programs that pair non-English medium students with proficient English speakers?		
Particulars	Frequency	Percentage
Yes	86	57.33
Maybe	35	23.33
No	29	19.33
Total	150	100.00



(Graph No: 22)

Analysis and Interpretation: The above table indicates that a majority of students (57.33%) are interested in peer mentoring programs that pair non-English medium students with proficient English speakers. About 23.33% are unsure, while 19.33% are not interested. This shows a strong positive response towards peer mentoring as a helpful strategy for improving language skills and social integration. Implementing such programs could effectively support non-English medium students in overcoming language barriers and enhancing their academic experience.

Findings and Discussion

- **Academic Performance:** Students from non-English backgrounds reported lower grades in coursework that required extensive writing and verbal presentation. Many admitted to struggling with technical vocabulary and referencing norms.
- **Classroom Participation:** Language anxiety led to reduced classroom engagement. Students feared judgment or ridicule for incorrect grammar or pronunciation.
- **Research Challenges:** Difficulty in understanding journal articles, drafting theses, and communicating with supervisors were common issues.
- **Emotional and Social Impact:** Students expressed feelings of isolation, low self-esteem, and academic burnout, often attributing these to their language limitations rather than academic content.

Institutional Gaps and Support

Despite the known challenges, few institutions offer structured language support beyond generic English proficiency classes. Language labs, writing centres, and peer tutoring were either unavailable or underutilized. Faculty members often lacked training in inclusive pedagogy.

Conclusion

The dominance of English in postgraduate education, while advantageous for global integration, should not come at the cost of equitable learning opportunities. Addressing language disadvantage is not only a matter of linguistic justice but also essential for unlocking the full academic potential of all students. Institutional awareness and inclusive policies can transform language from a barrier into a bridge for academic success. The dominance of English in postgraduate education presents significant challenges for students

from non-English medium backgrounds, often hindering their academic performance, research engagement, and sense of belonging. These language barriers can lead to emotional stress and social exclusion, limiting their full potential in academic settings. To address these issues, institutions must adopt inclusive policies, provide targeted language support, and create culturally sensitive learning environments. By promoting linguistic diversity and equity, higher education can become more accessible and supportive for all students, regardless of their language backgrounds.

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Smart Hospitality: The Digital Makeover Of Education And Guest Experience

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Abstract

The hospitality industry, known for its high-touch, service-oriented nature, is experiencing a paradigm shift as digital technologies become central to operations and guest interactions. Emerging technologies such as Artificial Intelligence (AI), the Internet of Things (IoT), Virtual and Augmented Reality (VR/AR), blockchain, and cloud computing are enabling more efficient, personalized, and contactless guest services. These advancements are not only changing the way hospitality services are delivered but also influencing how future professionals in the field are trained.

In response to this digital evolution, hospitality education systems worldwide are undergoing significant transformation. Academic institutions are integrating technology-centric modules into curricula, adopting digital tools for simulations and practical learning, and forming partnerships with tech-driven companies to offer real-world experience. This dual evolution—technological and educational—represents a fundamental shift in the industry's framework and expectations.

This paper explores the intersection of smart hospitality technologies and education, analyzing how these developments are co-evolving to meet the demands of modern consumers and employers. It also investigates the associated challenges, such as technological disparities, data security concerns, and the need for continual upskilling of educators and professionals. Finally, the study proposes strategies for leveraging these innovations to build a resilient and future-ready hospitality workforce.

Key Words : Smart Hospitality, Digital Transformation, Hospitality Education, Artificial Intelligence (AI), Internet of Things (IoT).

1. Introduction

The hospitality industry has traditionally relied on personalized service, human interaction, and attention to detail. However, in the past decade—and especially post-pandemic—the need for safety, convenience, efficiency, and personalization has intensified the adoption of smart technologies. Hotels, resorts, restaurants, and travel operators are

increasingly turning to AI-powered chatbots, IoT-based smart room controls, virtual concierge systems, and predictive analytics to cater to the evolving needs of tech-savvy guests.

This transformation is not occurring in isolation. As the industry modernizes, so must the education system that supports it. Hospitality management programs are now tasked with preparing students for a digital-first world. This includes training in hotel software systems, data-driven decision-making, digital marketing, and the ethical implications of using guest data. Moreover, the rise of online learning platforms, virtual reality training simulations, and hybrid teaching models has revolutionized the way hospitality education is delivered.

The convergence of hospitality technology and education marks a significant shift in how the industry perceives innovation and prepares for future disruptions. The traditional classroom now incorporates digital simulations of real-world hotel environments. In turn, these innovations create a dynamic feedback loop—graduates enter the industry with modern tech skills, and their success encourages institutions to further innovate.

This paper aims to document this journey of evolution—exploring how hospitality is becoming smarter through the integration of technology, and how education is adapting to keep pace. It addresses the following key questions:

- How are smart technologies changing the expectations of hospitality services?
- What are the core technological competencies required for future hospitality professionals?
- How are educational institutions adapting curricula and teaching methods to integrate digital learning?
- What challenges and ethical considerations emerge from this transformation?

Through literature review, case studies, and analysis of industry trends, this research highlights the strategies, tools, and mindsets necessary to thrive in a digitally driven hospitality landscape.

2. Literature Review

Several researchers have studied the technological evolution of hospitality. Buhalis & Leung (2018) emphasize how interconnectivity and interoperability through smart systems define the modern hospitality experience. Sigala (2015) discusses integrating technology into hospitality education and the need for adaptive pedagogical frameworks. The role of robotics and automation in service delivery has been explored by Ivanov & Webster (2019), highlighting both efficiency and employment concerns.

Studies also show that students exposed to simulated hotel environments using VR are more confident in real-world scenarios. The COVID-19 pandemic further accelerated the shift to digital classrooms, exposing gaps in infrastructure but also opening up global access to hospitality education. The literature identifies a common theme: digital skills are no longer optional—they are essential for both professionals and learners.

3. Technological Innovations in Hospitality

3.1 Artificial Intelligence (AI)

AI is used for customer service chatbots, demand forecasting, dynamic pricing, and personalization engines. Tools like AI concierge systems enhance response time and reduce the burden on human staff.

3.2 Internet of Things (IoT)

IoT-enabled devices allow guests to control room settings via mobile apps or voice assistants. Sensors help in energy efficiency and predictive maintenance of hotel infrastructure.

3.3 Virtual & Augmented Reality (VR/AR)

VR is being used for 360-degree property tours, virtual events, and immersive destination marketing. AR enhances room service menus and real-time navigation inside large resorts.

3.4 Cloud Computing and PMS

Cloud-based Property Management Systems (PMS) help hotels operate with remote accessibility, scalability, and integrated communication across departments.

3.5 Contactless Technology

Mobile check-ins, facial recognition access, and digital payment gateways offer contactless and secure services, improving guest satisfaction and safety.

4. Evolution of Hospitality Education

4.1 Curriculum Overhaul

Courses now include modules on data analytics, hotel ERP systems, e-commerce, and digital marketing. Schools are also introducing certifications in sustainability and digital guest management.

4.2 Experiential Learning Through Simulation

Technologies like VR and gamified simulations allow students to operate virtual hotels or solve customer complaints in real-time, mirroring actual job environments.

4.3 Online and Hybrid Learning

MOOCs, webinars, and hybrid degrees provide flexibility, especially for international students. Post-pandemic, platforms like Coursera and edX offer credible hospitality certifications.

4.4 Industry Partnerships

Collaborations with hotel chains and tech firms bring real-world projects and live internships into the classroom, ensuring that the knowledge remains relevant and updated.

5. Impact on Guest Experience

- **Personalization:** AI tailors services based on guest history and preferences.
- **Convenience:** Self-check-in and mobile apps make hotel stays seamless.
- **Safety:** Contactless interactions and hygiene tracking boost guest confidence.
- **Sustainability:** IoT and smart lighting systems reduce energy waste and improve sustainability scores.

6. Challenges and Ethical Concerns

- **Digital Divide:** Rural and underfunded institutions may struggle to access and implement smart technologies.
- **Privacy:** Collecting guest data poses risks if not properly managed and protected under data laws (e.g., GDPR).
- **Faculty Readiness:** Instructors must be trained in emerging tools and platforms.
- **Cost:** High upfront costs for smart technology implementation may deter smaller establishments or schools.

7. Future Outlook

As AI and machine learning grow more intuitive, hospitality could move toward hyper-personalization. The use of holograms for concierge services or blockchain for identity verification might become the norm. In education, fully immersive VR classrooms and AI-tutors could redefine hospitality training. A key focus will remain on maintaining the human essence of hospitality while leveraging smart systems for efficiency and scalability.

8. Conclusion

Smart hospitality is fundamentally transforming not only the methods through which services are delivered but also the way in which hospitality professionals are educated and trained. This digital evolution is driving a new standard of operational efficiency, service personalization, and guest satisfaction. From AI-powered concierge systems and IoT-enabled smart rooms to cloud-based property management systems, technological integration is enabling hospitality organizations to offer seamless, data-driven, and guest-centric experiences.

On the educational front, institutions are adapting by embedding technology-focused curricula, utilizing virtual learning environments, and collaborating with industry partners to provide students with hands-on exposure to real-world tools and platforms. As a result, graduates are emerging with the digital fluency and problem-solving skills essential to thrive in the modern hospitality landscape.

However, embracing smart hospitality is not without its challenges. Successful implementation requires strategic collaboration between industry leaders, educators,

policymakers, and technology providers. Ethical considerations—particularly in areas such as data privacy, surveillance, and AI governance—must be addressed proactively to build and maintain trust among stakeholders. Moreover, the rapid pace of technological change necessitates a culture of continuous learning and adaptability among both employees and educators.

Looking ahead, the future of hospitality lies in striking the right balance between technological innovation and the irreplaceable human touch that defines the industry. While machines and algorithms may handle logistics and efficiency, it is empathy, emotional intelligence, and cultural awareness that will continue to shape memorable guest experiences. The convergence of smart systems with human-centered service excellence will define the next chapter of hospitality—one that is inclusive, sustainable, and future-ready.

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Educational Inequality And Social Justice In Urban India: A Case Study Of Marginalized Communities In Coimbatore

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Abstract

In the pursuit of a just and equitable society, education plays a central role. However, despite policy commitments and growing urban development, deep-rooted inequalities persist in India's urban education systems. This study explores how social justice frameworks intersect with access to education among marginalized communities in urban India, with a particular focus on economic disparity, gender, and caste. Using recent policy documents, secondary data, and case insights from Coimbatore, this paper highlights the barriers to equitable education and suggests targeted policy reforms for sustainable transformation. The findings emphasize the urgency of inclusive planning and communitydriven educational reforms in urban India.

Keywords: Social justice, education inequality, urban India, marginalized communities, Coimbatore, public policy.

Introduction

Education is a foundational right and a key driver of social transformation. In the Indian context, access to quality education is shaped by deeply rooted social hierarchies, including caste, class, gender, and geography. While urban centers are often viewed as spaces of opportunity, they also reflect severe disparities in educational access and quality.

This paper explores the intersection of social justice and educational access in urban India, focusing on Coimbatore, Tamil Nadu. Despite its status as an emerging educational and industrial hub, Coimbatore exhibits stark educational inequalities. Through a case-based

analysis, the study identifies structural and social barriers that marginalize urban poor communities from mainstream education. The objective is

Literature Review

Educational theory and policy have traditionally placed a strong emphasis on the relationship between social justice and education. International academics like Martha Nussbaum (2000) and Amartya Sen (1999) contend that education is essential to enhancing personal liberties and capacities. Their capability approach positions education as a tool to reduce systemic poverty and exclusion, especially among marginalized populations.

Caste-based stratification, economic marginalization, and gender bias are the main causes of educational disparity in India. According to Bourdieu's (1973) theory of cultural capital, excluded populations frequently lack the social and cultural resources necessary to get admission to top education. In peri-urban areas and urban slums, this adds to the generational transfer of disadvantage.

All children between the ages of 6 and 14 are required to get free education thanks to the Right to Education (RTE) Act of 2009. However, implementation is still unequal, particularly in metropolitan areas where location and affluence have an impact on school choice, as noted by Deshpande (2019) and Mehta (2022). High student-teacher ratios, low teacher attendance, and a lack of accountability are still problems in public schools in informal settlements.

A growing body of research emphasizes **intersectionality**—where caste, class, religion, and gender collectively impact educational access. **Kumar and Rustagi (2019)** argue that

Muslim and Dalit children in urban India face “layered vulnerabilities” that reinforce exclusion, even when physical infrastructure is available.

The **digital divide**, exacerbated by the **COVID-19 pandemic**, further reveals disparities in access to learning. According to **Azim Premji University (2021)**, nearly **60% of urban poor students lacked access to digital devices**, despite residing in “developed” areas. This not only hindered learning but also widened pre-existing gaps between public and private school students.

Recent Tamil Nadu-specific studies, such as those by **Sundararajan and Rao (2022)**, emphasize that although the state’s education system performs well in terms of gross enrolment and nutrition programs, intra-urban inequalities are significant. Students from

Coimbatore’s urban slums continue to report poor infrastructure, outdated syllabi, and a lack of career guidance.

Moreover, **UNESCO’s 2023 South Asia Education Report** confirms that marginalized children in Indian cities have significantly lower access to secondary education, digital literacy, and STEM learning opportunities, particularly girls from economically disadvantaged households.

In summary, the literature demonstrates that while India has made policy advancements, **urban education systems reflect deep social inequities**. These require context-specific interventions rooted in community participation, digital inclusion, and gender-sensitive planning.

Methodology

This study follows a qualitative, descriptive approach to understand the challenges of educational access in urban settings. Rather than relying on primary fieldwork, the paper draws on a range of secondary sources, including government reports, education databases,

and peer-reviewed studies. The focus is on Coimbatore, a growing city in Tamil Nadu, which provides a representative case to examine how systemic barriers affect marginalized groups.

Sources include district-level data from UDISE+ (2022), publications from the Tamil Nadu School Education Department, and independent research reports from NGOs and educational think tanks. These materials offer insights into enrolment trends, infrastructure gaps, and dropout patterns in low-income neighbourhoods. The use of a case-based lens allows for a deeper understanding of how local context—such as caste composition, income levels, and urban planning—shapes educational outcomes.

By combining official data with contextual analysis, the paper aims to highlight patterns that are often overlooked in broad national reports. This approach supports a more nuanced discussion of how urban inequality plays out in the educational lives of children from marginalized communities.

Case Insights: Educational Inequality in Coimbatore

Although Coimbatore has more than 800 schools, access is heavily influenced by where people live and how much they earn. Wealthier areas like RS Puram and Race Course are home to private and international schools with strong infrastructure and modern facilities. In contrast, areas such as Selvapuram, Kavundampalayam, and Ukkadam—home to many working-class and slum communities—depend on overcrowded government schools.

These schools often lack basic necessities such as functional toilets, laboratories, libraries, and sufficient teaching staff.

This geographic and economic divide limits opportunities for students living in disadvantaged areas. Even when physical distance to a school is small, the gap in quality can be vast. Parents in low-income areas often cannot afford private alternatives, leaving their children at the mercy of under-resourced public institutions.

Socioeconomic Segregation

Coimbatore has over 800 schools, but their spatial and financial accessibility remains uneven. Affluent zones such as RS Puram, Peelamedu, and Race Course host international and private matriculation schools with advanced facilities. In contrast, areas like Ukkadam, Selvapuram, and Kavundampalayam—home to many slum dwellers—rely on overcrowded government schools, often lacking basic amenities like functional toilets, libraries, and science labs.

Caste and Gender Barriers

Caste and gender remain significant hurdles in the educational journey of many children in Coimbatore's slums. Students from Dalit and Muslim communities face not only poverty but also subtle and overt forms of exclusion within schools. These include classroom discrimination, limited expectations from teachers, and a lack of cultural sensitivity in curriculum and interactions.

Girls face a different but equally damaging set of challenges. While schools may be nearby, concerns over safety, lack of sanitation, and the absence of female teachers often lead parents to withdraw girls from school—especially after puberty. Some are pushed into household work or early marriage. As a result, dropout rates among adolescent girls in these areas remain high, even though technically, schools are accessible.

Digital Divide and Post-COVID Learning Gaps

The COVID-19 pandemic sharply exposed inequalities in digital access among schoolaged children in Coimbatore. While students attending private schools were able to shift to online learning platforms with relative ease, a large number of students in government schools, especially those from slum communities, faced serious limitations. More than 40% of these students did not have access to smartphones, stable internet, or digital literacy at home. As a result, the learning gap between privileged and underprivileged students widened significantly during and after the lockdowns. Many students from disadvantaged backgrounds lost touch with formal education and showed reduced motivation to return to school once in-person classes resumed. Additionally, the lack of access to digital tools created long-term disadvantages in preparing for online examinations and accessing future learning or employment opportunities.

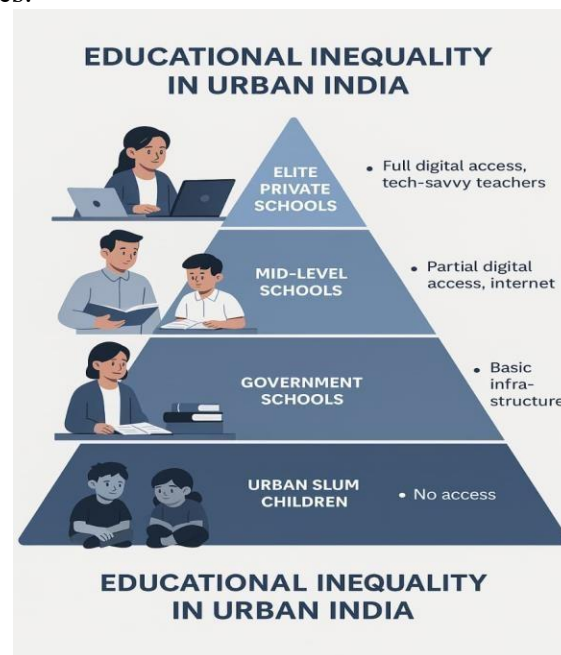


Figure 1: Educational Inequality in Urban India

Hierarchical representation of digital and educational access among different types of schools in urban India. Source: Author's visualization.

Language and Curriculum Disconnect

In many urban poor communities, children speak local dialects or minority languages at home, while the school curriculum follows Tamil or English medium instructions. This mismatch:

- Hampers early learning
- Reduces student engagement and confidence
- Contributes to higher repetition and dropout rates

Lack of Career Exposure and Guidance

Students in low-income neighbourhoods often lack access to counselling, career workshops, or exposure to higher education pathways. As a result:

- Many are unaware of government scholarships or entrance exam pathways
- Vocational training options are either unknown or unavailable
- Parental support is limited due to low education levels or misinformation

Discussion

The case of Coimbatore highlights how cities can reflect both progress and persistent exclusion within the same educational system. Despite being classified as an urban center with strong infrastructure, Coimbatore still reveals sharp divides between those who can fully participate in education and those who cannot. While students in private institutions benefit from access to quality facilities and digital tools, children from marginalized communities remain disconnected—sometimes physically, often digitally, and almost always socially.

Policy frameworks such as the Right to Education Act and Tamil Nadu's welfare schemes have made progress in increasing enrolment. However, enrolment alone does not guarantee equity. Many government schools in slum areas face frequent teacher shortages, lack of accountability, and poor learning environments. These structural issues often push families to withdraw children from school or leave them disengaged.

A clear gap exists between policy intentions and actual implementation, particularly in urban areas. While the digital push during the pandemic offered opportunities for innovation, it also exposed the fragility of access among lower-income households. In Coimbatore's slums, digital education was largely inaccessible, causing students to fall behind or drop out altogether. Gender-based challenges added another layer of difficulty, especially for adolescent girls who faced safety concerns and lacked access to basic sanitation or female staff in schools. To address these gaps, urban education planning must go beyond infrastructure and adopt a more inclusive approach that reflects the lived realities of students. Community engagement, decentralized planning, and targeted investment in marginalized zones are essential for bridging the educational divide.

Conclusion

This study underscores that educational inequality is not confined to rural or remote parts of India; it is deeply embedded in urban spaces as well. In a city like Coimbatore, where economic and social diversity exists side by side, the divide in education access continues to exclude a large portion of the population from meaningful learning opportunities. Factors such as caste, income, gender, and digital access interact in complex ways to reinforce this exclusion.

While government schemes and urban infrastructure have improved basic access, they often fall short in ensuring equity and quality. The findings call for a shift in how education policy is framed and executed—moving beyond physical infrastructure to address the deeper social and systemic barriers that affect learning outcomes. Improvements in digital inclusion, recruitment of trained and gender-sensitive educators, and context-relevant curricula are urgent needs.

Education should not be treated as a standalone sector. Urban policies related to housing, health, transport, and employment must be aligned with educational goals to support marginalized learners more holistically. Only by embracing a cross-sectoral and community-led approach can India begin to close the gap between its educational promises and lived realities.

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Staying Skilled in an AI-Driven Hospitality Industry

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Abstract

The hospitality industry is evolving rapidly with the integration of Artificial Intelligence (AI), changing not just how hotels operate but also how hospitality professionals function. As AI systems handle more routine, data-driven, and repetitive tasks — from chatbots and automated check-ins to predictive pricing and guest personalization — human roles are shifting. This paper explores the evolution of hospitality technology, the current impact of AI on work, and real-world case studies where AI is being used effectively. More importantly, it focuses on the role of hospitality professionals in this transformation, emphasizing the growing need for digital literacy, adaptability, and continuous upskilling. Through examples such as Hilton's Connie robot and Lotte Palace's Aescape system, the paper highlights the balance between automation and the irreplaceable human touch. In a world where technology can enhance but not replicate emotional intelligence, the path forward is clear: professionals must grow with AI, not against it.

Keywords: Artificial Intelligence (AI), Hospitality Industry, Up skilling, Human-AI Collaboration, Smart Hotels,

Introduction

Hospitality has always been a people-first industry. At its heart lies human connection — warm greetings, personalized care, and the ability to make every guest feel at home. It's

built on empathy, intuition, and relationships. However, as the world changes, so does the way hospitality is delivered.

In today's digital age, technology is no longer just an add-on in hotels; it is becoming deeply integrated into every part of the experience. From online booking systems and mobile check-ins to chatbots and dynamic pricing tools, hospitality has steadily evolved to meet the expectations of modern, tech-savvy guests. At the forefront of this transformation is **Artificial Intelligence (AI)** — a technology that can mimic human decisions, learn from data, and automate complex tasks.

AI is not a distant future concept in hospitality. It is already shaping real-time operations — managing bookings, personalizing guest experiences, and even responding to customer queries faster than ever before. Yet, this wave of automation also raises an important question: where do hospitality professionals stand in this AI-driven landscape?

This paper explores how the hospitality industry is changing with the adoption of AI and, more importantly, how professionals can adapt to remain relevant. While technology is advancing rapidly, the core essence of hospitality — human connection — remains irreplaceable. The aim is to understand the impact of AI on hospitality roles, identify emerging skill demands, and highlight strategies for upskilling the workforce to thrive in a technology-augmented future.

Evolution of the Hospitality Industry

The hospitality industry has always adapted to the times, but never has the change been as fast — or as tech-driven — as it is now. Looking back just a few decades, most hotel operations ran entirely on manual systems. For example, room allocations, guest records, and housekeeping schedules were handled through tools like **Whitney racks** — big, physical boards that held reservation cards. It was all paper, pens, and a lot of personal memory.

Then came the digital phase. With the arrival of computers in the late 20th century, hotels began integrating **Property Management Systems (PMS)** to streamline bookings, billing, and check-in processes. This was a big leap — things became faster, more organized, and less dependent on human error. But even then, the focus was still heavily on the *human* side of service.

Now, we're in a new era altogether — one where **smart systems and AI** aren't just assisting staff; they're starting to handle tasks independently. Front desks have self-check-in kiosks. Chatbots respond to guest queries in seconds. Revenue management software adjusts room prices in real time based on market demand. What used to be done by intuition is now driven by data.

But here's where it gets interesting: this shift isn't just about operations. It's about **people** — both guests and staff. For guests, expectations have changed. They want speed, personalization, and 24/7 service — and AI can deliver that. For staff, the pressure is different. Roles that were once considered secure — like front desk agents or reservation executives — are evolving or even disappearing in some hotels.

That said, AI doesn't mean humans are being replaced entirely. It just means the **type of work is changing**. Routine tasks are being automated, yes. But that leaves room for professionals to focus on what AI can't do — **empathy, problem-solving, creativity, and relationship-building**.

This evolution shows us two things clearly:

1. Hospitality is becoming more data-driven and tech-integrated than ever before.
2. People who work in this field need to **upskill continuously** to stay ahead.

Understanding this shift is the first step. The next is figuring out how professionals can adapt, evolve, and grow alongside the technology — not feel threatened by it.

AI's Impact on Hospitality Work

Artificial Intelligence is no longer just a support system in hospitality — it's becoming a major player in how hotels run, how guests are served, and how jobs are evolving. While it brings exciting possibilities, it also sparks real concerns, especially around job security and role changes.

Let's start with the facts. According to a 2023 World Economic Forum report, around **25% of hospitality tasks are expected to be automated** in the next five years. But here's the catch — this doesn't mean jobs are vanishing completely. Instead, **jobs are transforming**.

For every task AI takes over (like check-in, billing, or answering FAQs), a new task emerges — one that often requires a more strategic or creative human touch.

Roles are being redefined. A front desk agent might now spend less time checking in guests and more time managing guest experience tools or resolving complex issues. Housekeeping supervisors might use AI dashboards to allocate rooms more efficiently based on guest data. Managers are learning to interpret AI-driven reports to make better staffing or pricing decisions. In short, the work is becoming **smarter**, not just faster.

But this shift also highlights a gap — a **skills gap**. Many current employees weren't trained with AI in mind. That's where **upskilling** becomes crucial. Soft skills like communication and emotional intelligence are still important, but now they're being joined by **digital literacy, system navigation, and data interpretation**.

And the impact isn't just internal. Guest expectations are changing too. Guests are starting to expect AI-powered convenience — from personalized room settings to instant service via voice assistants. Staff who understand how to work with these systems will stand out. Those who resist or lag behind may struggle to stay relevant.

The message is clear: **AI is a tool, not a threat** — but only for those who are willing to learn and grow with it. It's no longer enough to be good at traditional hospitality skills. Professionals need to adapt and reimagine their roles in a tech-enhanced environment.

Current Applications of AI in Hotels

AI isn't just a futuristic buzzword anymore — it's something you'll find in the daily workflow of many modern hotels. What used to be cutting-edge is now just part of standard operations. From front desk functions to behind-the-scenes decision-making, AI is quietly reshaping how hotels function every single day.

Let's start with the guest experience — probably the most visible area where AI is active. Hotels are using **AI to personalize services**. For example, if a guest always books a sea-facing room, orders vegetarian food, and prefers early check-ins, the system remembers it. The next time they stay, the hotel can pre-adjust preferences automatically — without the guest even needing to ask. This is powered by **machine learning**, which identifies patterns in past behavior and helps staff deliver more tailored experiences.

Chatbots and virtual assistants are also becoming common. They handle FAQs, book services, suggest restaurants, or even provide check-out summaries — all without needing a human. This reduces response time and frees up staff for more meaningful guest interactions. Some hotels are also experimenting with **voice-activated room controls** — letting guests adjust lighting, temperature, or even call room service using simple commands.

Then there's **automation** — the workhorse part of AI. Hotels are automating routine tasks like invoice generation, feedback collection, and even inventory management. AI tools scan room occupancy data, energy usage, and booking patterns to help manage resources more efficiently. This leads to **cost savings**, but also smoother operations — fewer errors, better accuracy, and faster turnaround times.

Marketing is another field where AI is deeply embedded. Tools now track online behavior, social media trends, and booking data to help hotels run targeted ad campaigns. Instead of sending generic promotions, hotels can segment audiences — say, business travelers, couples, or families — and offer customized deals that are more likely to convert.

Revenue management has also gone high-tech. AI algorithms monitor competitor pricing, booking trends, seasonal demand, and even weather forecasts to recommend real-time room pricing. These dynamic pricing systems help maximize revenue without depending on guesswork. What used to be done manually by revenue managers is now largely automated — but still needs human oversight for fine-tuning.

Even **guest feedback analysis** has been upgraded. Instead of manually going through hundreds of reviews, AI tools scan online platforms (TripAdvisor, Google Reviews, etc.) and generate sentiment reports. They identify keywords, flag complaints, and track satisfaction trends — helping management make faster, data-backed decisions.

The point is: **AI is already here**, and it's doing a lot more than most people realize. It's not flashy or dramatic — it's practical, efficient, and deeply integrated into the hotel's day-to-day rhythm. But to make it work, hotels need people who know how to use these tools well — and that's where training and upskilling become essential.

Case Studies (Real-World Examples)

To really understand how AI is transforming hospitality, it's helpful to look at real-life applications. These aren't just theoretical concepts — they're working models that show how technology is already reshaping roles, responsibilities, and guest experiences.

A) Connie the Concierge – Hilton + IBM Watson

Hilton Hotels partnered with IBM to create “**Connie**,” the first robot concierge powered by **IBM Watson** and **WayBlazer AI**. Standing at just over two feet tall, Connie greets guests in the lobby and helps them with directions, restaurant recommendations, and hotel info. What's cool is that Connie learns from each interaction — the more questions it gets, the better it responds.

Why does this matter? Because it shows how **AI can enhance guest interaction** without replacing human warmth entirely. Staff are still around for complex issues, but Connie handles repetitive questions — saving time and providing consistent service.

B) Aescape Massage Robot – Lotte Palace Hotel, NYC

Luxury isn't just about soft sheets anymore — it's also about innovation. The **Lotte Palace Hotel in New York** started testing the **Aescape Massage Robot**, an AI-powered system that provides fully customizable massages based on muscle feedback and user preferences.

This is a big step into the **wellness sector**, showing how AI can even enter areas traditionally considered “untouchable” by tech. While some may argue it removes the human element, it also gives consistency, safety, and efficiency — especially in high-demand settings.

These case studies prove that AI isn't stuck in back-end systems or spreadsheets. It's physically present, interacting with guests and redefining what hospitality looks like. Whether it's a robot in the lobby or a tech-driven spa experience, AI is becoming a co-worker — not a competitor — for the modern hospitality professional.

Unexpected Areas AI is Showing Up

AI isn't just showing up in front office systems or marketing dashboards anymore. It's starting to appear in places that might surprise even seasoned hoteliers. These are areas where tech wasn't expected to play a major role, but it's now quietly creating impact.

One example is **virtual hotel tours**. With AI-powered 3D rendering and voice guides, hotels can now offer potential guests an immersive walk-through of the property — right from their phones. This helps in decision-making and also improves online bookings, especially for weddings, conferences, and luxury stays.

Another area is **housekeeping and laundry**. Smart sensors and predictive AI tools are being used to track linen usage, forecast laundry demand, and even schedule room cleaning based on occupancy data. Some hotels use robotic vacuum cleaners with AI navigation, allowing cleaning staff to focus on high-touch tasks.

Event management is also seeing a shift. AI tools help schedule events, predict attendance trends, and suggest optimal resource allocation. For large hotels with conference centers, this makes a big difference in planning and profitability.

Lastly, **energy and sustainability** efforts are getting smarter. AI systems monitor usage patterns and control lighting, HVAC, and water systems to reduce waste. This is good for the planet and great for the hotel's bottom line.

These examples show that AI isn't limited to flashy tech — it's slowly transforming behind-the-scenes work, making the entire ecosystem smarter and more efficient.

Training the People Behind the Tech

While AI systems are impressive, they don't run themselves. You still need real people to set them up, monitor them, and — most importantly — use them effectively. That's why training is more important than ever.

In fact, **AI is now helping train people**. New tools use **gamified learning**, **adaptive content**, and **interactive simulations** to teach hotel staff about everything from guest

handling to digital tools. For instance, some platforms use chatbots that let employees practice handling complaints or booking queries in a no-risk environment.

There's also a growing use of **microlearning** — bite-sized lessons that staff can complete during slow hours on shift. It fits hospitality's fast-paced environment and helps build skills without formal classroom time.

Training isn't just about learning new software. It's about building a mindset of adaptability, problem-solving, and curiosity. As AI systems change, so will the tools used in hotels. The only way to keep up is to create a workforce that's not just trained once, but constantly evolving.

Hotels that invest in this kind of training see better guest satisfaction, smoother operations, and more confident employees. After all, **technology is only as good as the people using it.**

InHotel.io Case Study

One great example of AI supporting hospitality teams is **InHotel.io**, a digital platform designed specifically for hotel operations and staff development. Unlike generic software, it understands the real, messy, fast-paced world of hospitality.

The platform helps staff with **role-specific guidance**, such as how to manage room turnovers efficiently or deal with last-minute booking changes. It includes quick reference materials, video walkthroughs, and real-time communication channels for staff across departments.

InHotel.io also offers built-in **performance analytics** that help managers see who's doing well, who needs support, and what training modules are most effective. Because it adapts based on usage, the more the staff interacts with it, the better it becomes.

Most importantly, it brings AI to a level that's **practical and accessible**, especially for smaller or mid-tier hotels that can't afford massive tech investments. It proves that AI doesn't have to be intimidating — it can actually make life easier for everyone.

Conclusion

AI is no longer a question of “if” — it’s here. It’s already changing the way hospitality operates, from check-ins to housekeeping to staff training. But through all this change, one thing remains constant: **people still matter**.

Technology can improve efficiency, predict trends, and personalize service, but it can’t replace the genuine human touch that defines great hospitality. Instead of fearing AI, hospitality professionals should see it as a tool — one that can make their work more impactful.

The key is **upskilling**. Whether it’s learning to use a new system, understanding guest data, or adapting to virtual platforms, continuous learning is what will set successful professionals apart.

As AI continues to evolve, so should we — not by resisting change, but by growing with it. The future of hospitality isn’t just high-tech — it’s high-tech *and* high-touch. And the professionals who can blend both will be the ones leading the way.

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Employee-Employer Dynamics: Foundations of Organizational Success

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Abstract

When an employer hires a new employee, he is not just bringing a new member of the workforce aboard, He is also starting a new relationship. Because employers and employees often work in close quarters, they essentially develop relationships. Managing these relationships is vital to business success, as strong relationships can lead to greater employee happiness and even increased productivity. To reap these benefits, keep the dynamics of your employer-employee relationship in mind. Employee relations, industrial relations and labor relations are all terms that refer to those aspects of HRM where employees are dealt with as group through collective agreements with trade unions. It covers all the relations between employers and employees in industry. Some scholars however see employee relations which are a more recent term as broader and include employee participation in management decisions, communications, policies for improving cooperation and control of grievances and minimization of conflicts.

Key Words: Workforce, Employers and Employees , relationships ,industrial relations

Introduction

Employee-employer relations refer to the formal and informal relationship that exists between employers and their employees in the workplace. This relationship is central to the functioning of any organization, as it directly influences productivity, job satisfaction, organizational commitment, and overall workplace harmony. In today's competitive business environment, organizations are increasingly recognizing the importance of maintaining strong, positive relationships with their workforce. A healthy employee-employer relationship leads to increased job satisfaction, reduced turnover, improved performance, and a harmonious work environment.

Review of Literature

Armstrong (2014), Employee-Employer relations refer to the efforts made by employers to manage relationships with their workforce in a way that promotes collaboration and reduces conflict. Effective relations can lead to improved performance, reduced absenteeism, and enhanced organizational loyalty.

Dessler (2020) emphasizes the strategic role of human resource management in maintaining sound employee-employer relations. Performance appraisal systems, employee recognition, grievance handling mechanisms, and clear HR policies are seen as essential tools for preventing disputes and promoting positive relations.

Objectives Of The Study

- To study the socio demographic details
- To examine the nature of employee-employer relationships in the organization.
- To identify the key factors that influence employee-employer relations
- To assess the impact of effective employee-employer relations on organizational productivity and employee morale.
- To explore the role of HR policies and practices in maintaining healthy employee-employer relations.

Research Methodology

Research methodology is the blueprint of the research study. Redman and Morry defines research as a 'systematized efforts to gain new knowledge. The data was obtained from two sources the primary data and the secondary data. Pilot study has been carried out among 60 respondents in order to test the feasibility of the study. The tool of data collection used for the study was self-structured Questionnaire Method. The Questionnaire consists of personal data and detailed question related. The total of 60 respondents were selected from the universe using convenience Sampling Method.

Significance Of The Study

This paper focuses on the understanding the need for good relationship between the employer & employee in the organization and to support or improve the work in progress. This study focuses on analysing the dynamics of employee-employer relations within an organizational setting. It examines how communication, trust, leadership styles, workplace policies, and conflict management contribute to the overall quality of these relationships. The scope includes the assessment of human resource practices, employee satisfaction, and management approaches that influence mutual understanding and cooperation.

Major Findings

After collecting the data according to the purpose and objectives of the study, the data collected were organized, classified, coded, tabulated and analyzed using a wide range of appropriate statistical tools like Chi-Square, and interpreted.

CHART SHOWING RESPONDENTS BASED ON THEIR AGE

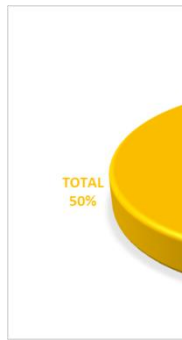
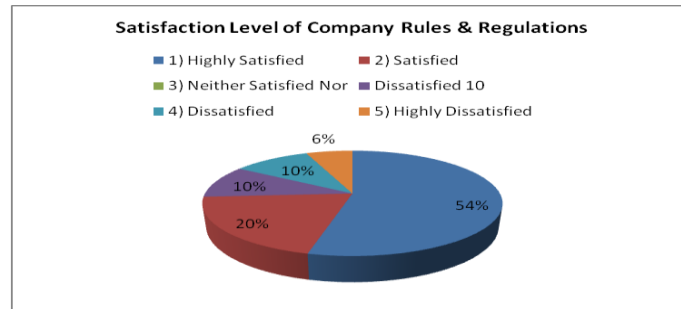


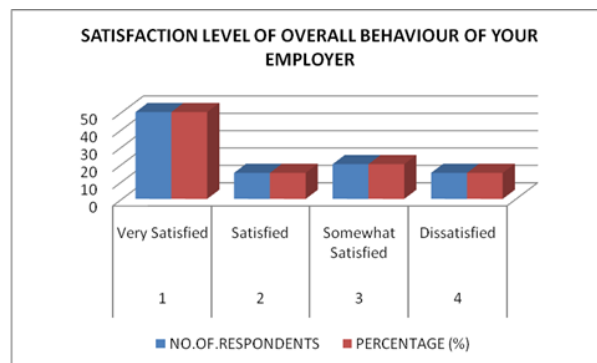
Chart Showing



Respondants Overall Behaviour

The

Chart Showing The Satisfaction With And Regulations



Respondants Company Rules

Chart Showing The Respondants Satisfaction With Healthy Work Environment

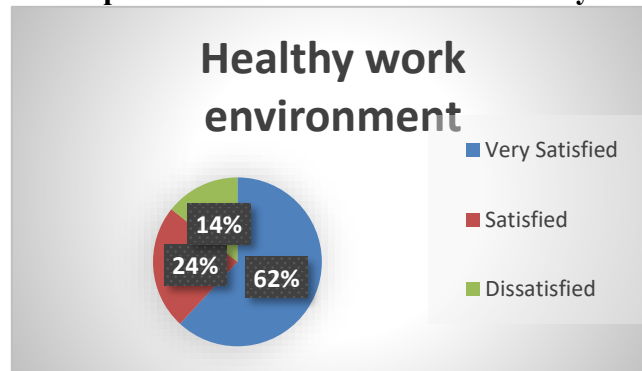


Chart Showing The Respondants View On Effective Communication

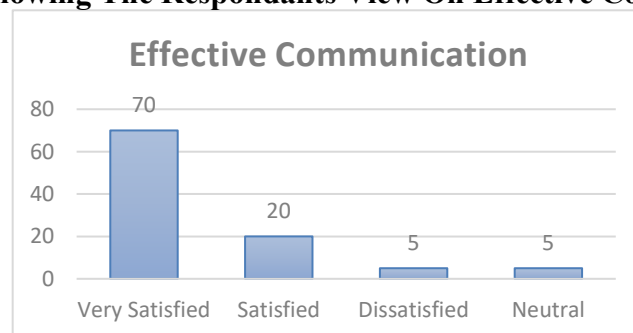


Chart Showing The Respondants Satisfaction With Grievance Mechanisms

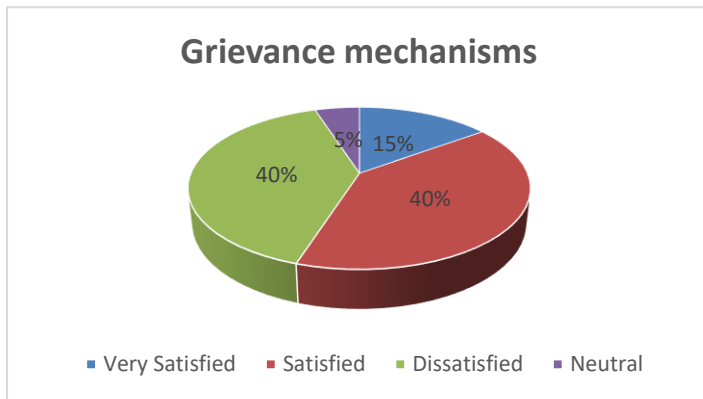


Chart Showing The Respondants Satisfaction With Job Security

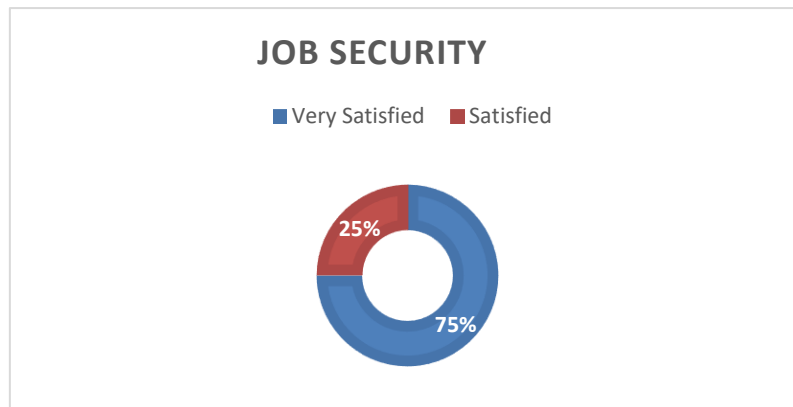


Chart Showing The Respondants Satisfaction With Stress Or Burnout, Affecting Overall Productivity

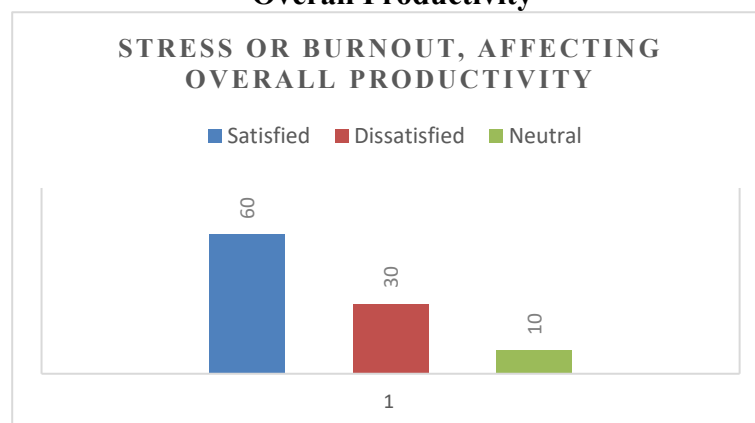
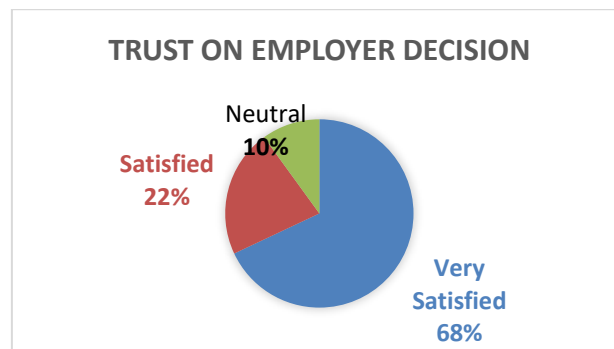


Chart Showing The Respondants Satisfaction With Trust On Employer Decision



Suggestions And Recommendations

The present study makes the following recommendations.

- Make sure employees know they are approachable regarding these issues (your door is always open) and come to an amicable agreement regarding this or any other problems that may arise.
- Employees like to know that working hard is noticed so every so often give them a pat on the back for their efforts and show you really appreciate all they do.
- Keep your finger on the pulse of the people working for you so you can see trouble (perhaps coworkers not getting along or a troublemaker in the office) before it's reported to you.

Conclusion

The employee-employer relationship is a keystone of organizational success. A healthy and productive relationship raises mutual trust, effective communication, and a supportive work environment. Through this study, it is obvious that factors such as job satisfaction, transparency, fair compensation, recognition, Trust, job security and opportunities for growth significantly influence the quality of this relationship.

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The Contemporary Shift of Indian Interpersonal Literature: A Darwinian Literary Approach

Manodip Chakraborty

Abstract

This essay responds to scholarly skepticisms about the method of contemporary literary narratives as an expression of conflictual human relationships. These criticisms rely on hindsight effects – atomizing external circumstances as the prime indicator of present human condition, and literature as the carrier of this existence. The essay contends that, while some uses of external circumstances are relative in explaining the foregrounding of literary tensions, they are not inherent in the human themselves. It offers warrants for that contention by proposing a conception of contemporary literature as a narrative of Darwinian struggle for existence. By using Darwinian literary criticism, which relies heavily on literary narrative as part of human biological evolution, the analysis of selected Indian literary interpersonal texts leads to the conclusion that a skillful author can, depending on his or her overall purposes, use the interpersonal literary tension as a mode of argument to support the biological evolutionary process as an inherent factor of contemporary human episteme.

Keywords: Affective Sympathy, Conceptual Metaphors, Thick Descriptions, Mimesis, Human Animal

The Impact Of AI On Consumer Behaviour In E- Commerce

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Abstract

Artificial Intelligence (AI) is reshaping the landscape of e-commerce by influencing how consumers discover, evaluate, and purchase products online. This paper examines the impact of AI-driven technologies—such as personalized recommendation systems, chatbots, voice assistants, and predictive analytics—on consumer behavior. AI enhances user experience by delivering tailored content, improving decision-making, and fostering real-time interaction, which in turn boosts customer satisfaction, engagement, and loyalty. However, the increasing reliance on data-driven personalization also raises concerns around privacy, transparency, and trust. This study provides insights into how AI is redefining consumer expectations and behaviors, offering implications for businesses aiming to leverage AI for competitive advantage in the digital marketplace.

Keywords: Artificial Intelligence, E-commerce, Consumer Behavior, Personalization, Recommendation Systems, Chat bots, Customer Engagement, Online Shopping, Data Privacy, Predictive Analytics.

Introduction

The integration of Artificial Intelligence (AI) in e-commerce has brought significant changes to how consumers interact with online platforms. AI technologies, such as machine learning and data analytics, help businesses understand customer preferences with greater accuracy. Personalized recommendations, dynamic pricing, and virtual assistants are now central to the online shopping experience. These tools enhance customer satisfaction by offering tailored product suggestions and faster responses to inquiries. AI also streamlines the buying process, influencing consumers' decision-making and increasing conversion rates. With predictive analytics, businesses can anticipate consumer needs even before they arise.

This level of personalization fosters brand loyalty and repeat purchases. Consumers now expect a seamless and intuitive shopping journey powered by intelligent systems. However, concerns around data privacy and algorithmic transparency are growing. Understanding these shifts is essential for businesses aiming to stay competitive in the digital market place. As AI continues to evolve, its impact on consumer behavior will only deepen. This paper explores how AI is reshaping e-

Objectives

1. To analyze the role of personalized recommendations, chat bots, and predictive analytics in shaping customer decisions.
2. To understand how AI affects consumer trust, satisfaction, and loyalty in online shopping environments.
3. To evaluate the impact of AI on purchasing patterns, including frequency, value, and decision-making speed.
4. To explore consumer perceptions and attitudes toward AI-driven personalization and automation.
5. To assess the overall effectiveness of AI in enhancing the online shopping experience and business performance.

AI in Consumer Behavior

Artificial Intelligence (AI) is transforming how businesses understand, predict, and influence consumer behavior by analyzing data and personalizing experiences. Here's how AI impacts consumer behavior:

1. Personalization and Recommendation Systems

- AI algorithms analyze consumer preferences and past behavior.
- They deliver tailored product recommendations (e.g., Netflix, Amazon).
- Enhances customer satisfaction and increases sales.

2. Predictive Analytics

- AI predicts future consumer buying patterns based on historical data.
- Helps companies anticipate demand and stock accordingly.

- Enables targeted marketing campaigns.

3. Customer Service and Chatbots

- AI-powered chatbots provide instant support and personalized assistance.
- Improves customer experience and reduces wait times.
- Gathers data on consumer preferences and issues.

4. Sentiment Analysis

- AI analyzes social media and review data to gauge consumer sentiment.
- Helps brands understand public perception and respond proactively.

5. Dynamic Pricing

- AI adjusts prices in real-time based on demand, competition, and consumer behavior.
- Maximizes revenue and optimizes sales strategies.

6. Behavioral Targeting

- AI identifies micro-segments and targets consumers with customized ads.
- Increases ad relevance and ROI for marketers.

7. Visual and Voice Recognition

- Enables shopping through voice commands or image search.
- Makes the buying process easier and more intuitive.

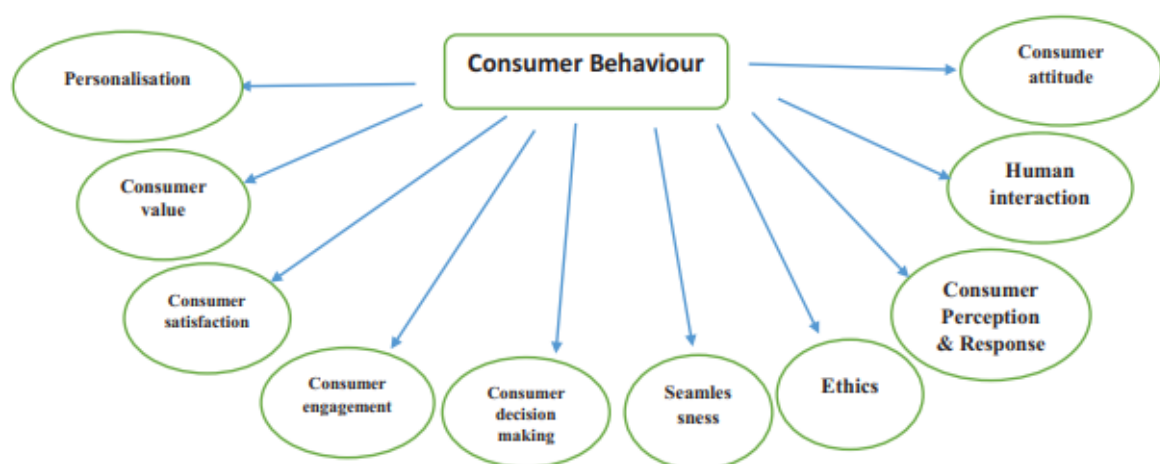
AI and Consumer Behavior in E-commerce

AI is revolutionizing e-commerce by deeply influencing consumer behavior and enhancing the shopping experience. Through personalized recommendations based on browsing and purchase history, AI helps consumers discover products that fit their preferences, increasing engagement and sales. Predictive analytics allow e-commerce platforms to anticipate customer needs, optimizing inventory and marketing efforts. AI-powered chatbots provide instant support, answering queries and guiding buyers through their journey seamlessly. Visual and voice search technologies simplify product discovery, while dynamic pricing ensures competitive offers tailored to demand and consumer behavior.

Additionally, AI analyzes customer reviews and social media sentiment to understand buyer preferences and improve products and services. Overall, AI creates a more personalized, efficient, and satisfying shopping experience in e-commerce.

AI and Consumer Buying Behavior – Future Marketing

The future of marketing is deeply intertwined with AI's ability to understand and predict consumer behavior with unprecedented accuracy. AI analyzes vast data from multiple sources to create hyper-personalized experiences, tailoring offers, content, and recommendations to individual preferences in real time. This level of personalization helps brands connect more meaningfully with consumers, boosting engagement and loyalty. Predictive AI enables marketers to anticipate customer needs before they arise, allowing for proactive, timely campaigns. Additionally, AI-powered tools like sentiment analysis and emotion detection help craft messages that resonate on a deeper emotional level. The rise of voice assistants and visual search will redefine how consumers interact with brands, making shopping more seamless and intuitive. At the same time, ethical considerations around data privacy will shape consumer trust and brand reputation. Overall, AI empowers marketers to move beyond broad, generic campaigns toward precise, data-driven strategies that align closely with evolving consumer behavior, setting a new standard for marketing effectiveness in the digital age.



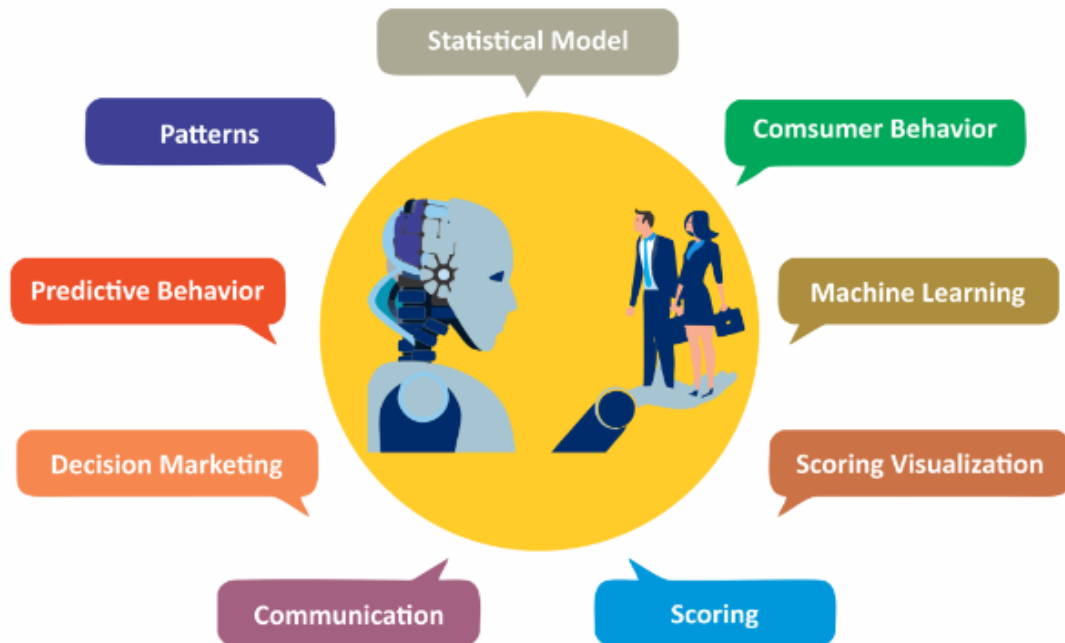
How AI simplifies Consumer Buying Behavior

AI simplifies consumer buying behavior by analyzing individual preferences and past actions to offer personalized product recommendations, reducing the time and effort consumers spend searching. It predicts what buyers want, making the shopping process faster and more intuitive. AI-powered chatbots assist customers instantly, answering questions and guiding them through purchases without waiting. Technologies like visual search let consumers find products easily by uploading images, while voice assistants allow hands-free shopping. Dynamic pricing algorithms ensure consumers see competitive prices tailored to demand. Overall, AI removes barriers, making buying smoother, quicker, and more satisfying.

Role of AI in Consumer Behavior

AI plays a crucial role in understanding, predicting, and influencing consumer behavior by leveraging data and automation. It helps businesses analyze vast amounts of customer information—such as purchase history, browsing patterns, and preferences—to gain deep insights into consumer needs and motivations. AI enables personalized marketing by delivering tailored recommendations, offers, and content that resonate with individual consumers. It enhances customer experiences through AI-powered chatbots and virtual assistants, providing instant support and guidance throughout the buying journey. Additionally, AI-driven predictive analytics forecast future buying trends, allowing companies to anticipate demand and optimize inventory and pricing strategies. Sentiment analysis lets brands monitor customer feedback and adjust their products or messaging accordingly. Overall, AI simplifies decision-making for consumers and helps businesses create more relevant, engaging, and efficient interactions.

Role of AI In Predicting Consumer Behavior



Challenges in Understanding Consumer Buying Behavior:

1. Complex Influences:

Consumer choices are shaped by many factors—cultural, social, personal, and psychological—which interact in complicated ways.

2. Evolving Preferences:

Consumer tastes change rapidly due to trends, technology, and social influence, making predictions difficult.

3. Data Gaps and Bias:

Collecting accurate, unbiased data on consumers is challenging, leading to incomplete insights.

4. Multi-Channel Complexity:

Consumers shop across online and offline platforms, complicating the tracking of their full buying journey.

5. Emotional vs. Rational:

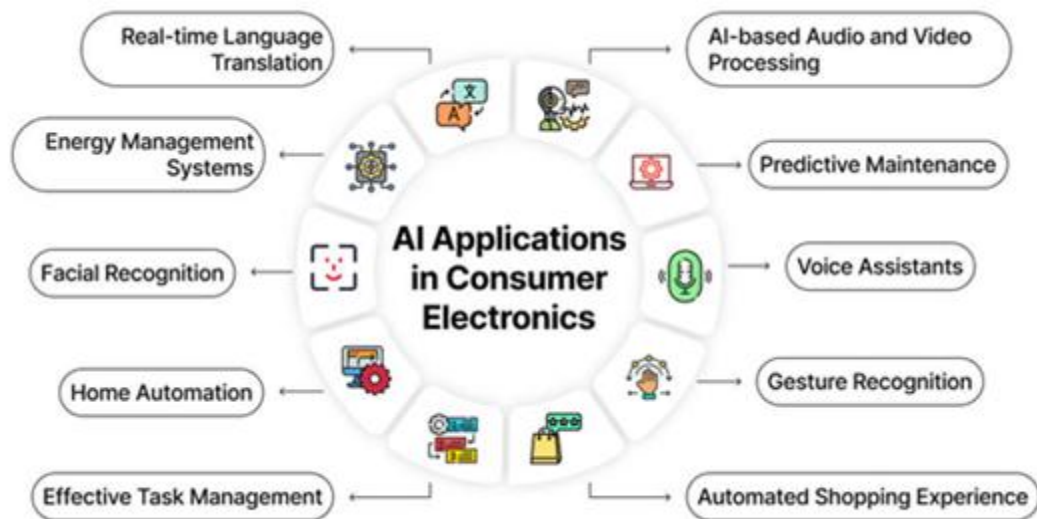
Emotions often drive purchases, making behavior less predictable based on logic alone.

Artificial Intelligence in Consumer Behavior Analysis

Artificial Intelligence (AI) plays a vital role in analyzing consumer behavior by processing large volumes of data to uncover patterns and insights. AI tools use machine learning and data mining to predict buying habits, preferences, and future trends, allowing businesses to tailor marketing strategies effectively. Sentiment analysis evaluates customer feedback from social media and reviews to understand emotions and opinions about products and brands. AI-powered recommendation systems personalize shopping experiences by suggesting relevant products based on individual behavior. Additionally, AI chatbots enhance customer engagement by providing instant support and gathering valuable consumer data. Overall, AI enables businesses to make data-driven decisions, improve customer satisfaction, and increase sales through more precise targeting and personalization.

Applications of AI in Understanding Consumer Behavior

Artificial Intelligence (AI) has become a powerful tool for understanding consumer behavior by analyzing vast amounts of data and uncovering hidden patterns. One of the key applications is personalized recommendations, where AI suggests products and services based on a consumer's past behavior and preferences, enhancing the shopping experience. AI also enables predictive analytics, allowing businesses to forecast future buying trends and proactively adjust their strategies. Through customer segmentation, AI groups consumers based on shared traits or behaviors, enabling highly targeted and relevant marketing. Sentiment analysis helps brands understand customer emotions and opinions from reviews and social media, offering insights into brand perception. Additionally, AI-powered chatbots and virtual assistants improve customer service by offering instant, personalized support. Dynamic pricing, another AI-driven tool, adjusts prices in real time based on demand and consumer behavior. AI also facilitates visual and voice search, simplifying how consumers find products. Together, these applications help businesses better understand, anticipate, and respond to consumer needs, leading to more effective engagement and improved satisfaction.



Conclusion

Artificial Intelligence has emerged as a powerful force transforming consumer buying behavior across every stage of the purchasing journey. From personalized product recommendations and targeted marketing to intelligent customer support and predictive analytics, AI enables brands to engage with consumers in more meaningful, efficient, and data-driven ways.

By automating routine interactions and anticipating consumer needs, AI not only enhances convenience and satisfaction but also reshapes expectations around speed, personalization, and relevance. However, as AI becomes more embedded in commerce, it also raises critical concerns around privacy, transparency, and algorithmic bias. Consumers are increasingly aware of how their data is used, and trust is becoming a central factor in their purchasing decisions.

To stay competitive in this evolving landscape, businesses must balance innovation with ethical responsibility—leveraging AI to improve the customer experience while safeguarding consumer rights. The future of consumer behavior will be defined not just by what AI can do, but by how responsibly and transparently it is applied.

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The Rise Of Social Commerce: Analyzing Consumer Engagement Through Social Media Platforms

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Abstract

Social commerce is reshaping the digital economy by blending social media with online shopping, transforming how consumers engage with brands. This study explores the growth of social commerce and its impact on consumer behavior. Platforms like Instagram, Facebook, TikTok, and Pinterest drive content-focused strategies to enhance engagement. The research examines features such as live shopping, influencer marketing, and user-generated content, revealing their role in building trust and influencing purchases. Through mixed methods, the study finds that social media enables real-time interaction and community-based decision- Personalization, storytelling, and peer influence are key to driving sales and loyalty. The study concludes that businesses must adapt to evolving consumer behaviors using data-driven, platform-specific strategies to succeed in a social commerce landscape.

Keywords: Social Commerce, Consumer Engagement, Social Media Platforms, Influencer Marketing, User-Generated Content, Live Shopping, Digital Marketing, E-commerce, Visual Storytelling, Online Consumer Behavior

Introduction

The digital revolution has significantly reshaped the global retail landscape, with social media emerging as a central force in influencing consumer behavior. One of the most transformative developments in this space is **social commerce**—the integration of social

media platforms with e-commerce, allowing users to discover, interact with, and purchase products directly through social networks. As platforms like Instagram, Facebook, TikTok, and Pinterest continue to evolve, they are no longer just spaces for social interaction but have become powerful tools for brand promotion and sales. Businesses are leveraging features such as shoppable posts, live streaming, and user-generated content to enhance visibility and build trust with their audiences. This shift has changed the dynamics of consumer engagement, where trust, convenience, and social proof play a more significant role than ever before. This study aims to explore the rise of social commerce and its impact on consumer engagement. It analyzes how social media features and marketing strategies influence consumer decisions, behavior, and loyalty. By understanding these interactions, businesses can develop more effective digital marketing approaches to thrive in an increasingly social and connected marketplace.

Objectives

1. To analyze consumer engagement behaviors such as likes, shares, comments, and purchase actions.
2. To identify key social commerce features—like influencer marketing and shoppable content—that drive interaction and trust.
3. To evaluate the impact of personalization, visual storytelling, and peer recommendations on purchase decisions.

What is Social Commerce?

Social commerce is a subset of e-commerce that involves buying and selling products or services directly through social media platforms such as Instagram, Facebook, TikTok, Pinterest, and others. Unlike traditional e-commerce, which typically happens on standalone websites or apps, social commerce integrates shopping features into social media environments. These may include:

- Shoppable posts and stories
- Live-stream shopping events
- Influencer and user-generated product promotions
- In-app checkout options
- Reviews, comments, and social sharing

The key Differences between Social Commerce and E-commerce

Parameter	Ecommerce	Social Commerce
Place of purchase/transaction	When it comes to ecommerce development – all the transactions are managed from the website.	Interaction occurs both online and on social networks during a social commerce transaction. Social purchasing is seen as a progression of internet shopping in this manner.
Relationship with customers	Relationships are usually one-way in conventional eCommerce (if we can call it). When a consumer visits the business, they make a purchase and wait for their order to arrive at their door	Before making a purchase, a client who engages in social commerce makes comparisons, asks questions, and converses with us to reinforce their affinity for a certain brand. There are still a few steps before the consumer completes the purchase or executes the buying decision
Brand Promotion	If you're a business owner, you may find that your consumers know more about you than you do. Specifiers of your brand or product may be a possibility if this is the case. It was not feasible to determine who these customers were via Ecommerce. You may consider hiring an ecommerce development company	But in social commerce, They may be recognized and transformed into community focal places. Additionally, the information supplied by these people through social media might assist retailers in gaining an understanding of their consumers' surroundings, interests, and so on.
Product Range	Previously, the main grounds for changing the items presented in ecommerce development services were user visits and the products in which consumers have shown a higher level of interest during the transaction.	Social commerce enables the measurement of this and the discovery of what customers are saying about the items and why they feel they are better or worse than similar ones on the market.

Consumer engagement in social media

Consumer engagement in social media Consumer engagement on social media platforms in the context of e-commerce can take various forms, each contributing to build a strong brand presence, fostering customer loyalty and driving sales. Here are some of the key forms of consumer engagement in e-commerce on social media:

- i. **Comments:** Comments allow users to directly interact with the content by sharing their thoughts, opinions and feedback. Engaging with comments by responding promptly and meaningfully can lead to conversations and a sense of community around the brand.
- ii. **Shares and Retweets:** Sharing content from an e-commerce brand amplifies its reach to a wider audience. Users who share the posts are essentially endorsing the brand to

their own followers, which can lead to increased visibility and potentially new customers.

- iii. **User-Generated Content (UGC):** It can consist of photos, videos, reviews and testimonials. Sharing UGC on social media profiles not only showcases real-world use of the products but also encourages other customers to engage and share their experiences.
- iv. **Hashtags and Challenges:** This can lead to a viral effect as more users join in, contributing to a sense of community and engagement.
- v. **Contests and Giveaways:** Hosting contests or giveaways on social media can drive engagement by requiring users to like, share, comment or tag friends to enter. This helps spread the brand's reach and generate excitement.
- vi. **Direct Messaging and Customer Service:** Many social media platforms allow users to send direct messages to the brand. Prompt and helpful responses to customer inquiries and issues can improve customer satisfaction and build trust.
- vii. **Live Streaming and Webinars:** E-commerce brands can use live streaming to showcase products, answer customer questions in real-time and provide behind-the-scenes glimpses. Webinars can be used to educate customers about the products or industry.
- viii. **Interactive Features:** Platforms like Instagram and Facebook offer interactive features like polls, quizzes and question stickers that allows to engage directly with the audience and gather insights
- ix. **Collaborations and Influencer Marketing:** Partnering with influencers or other brands for co-branded content or takeovers can introduce the products to new audiences and lend credibility.

Influence of social media in purchase decisions

Social media plays a significant and multifaceted role in the consumer decision-making process. It has become an integral part of people's lives and has revolutionized how consumers gather information, evaluate products or services and make purchase decisions. Here's a comprehensive discussion of the role of social media in the consumer decision-making process:

Information Gathering and Research

- i. **Product Discovery:** Social media platforms serve as a source of product discovery. Consumers often come across new products, brands or services through advertisements, influencer recommendations or posts from friends and family.
- ii. **Reviews and Ratings:** Users rely on social media to access real-time reviews and ratings from peers, which can greatly influence their perceptions of a product or service
- iii. **Comparative Analysis:** Consumers can easily compare products or services by reading comments, reviews and discussions on social media, helping them make informed choices.

Building Trust and Credibility

- i) **Influencers and Experts:** Many consumers follow influencers and experts in specific niches who provide trustworthy recommendations and insights, which can influence their purchasing decisions.
- ii) **User-Generated Content (UGC):** UGC, such as user reviews, photos and videos, adds authenticity to brands and products, building trust among potential buyers.

Engagement and Interaction

- i. **Customer Support:** Brands use social media for customer support, responding to inquiries, resolving issues and enhancing their reputation for responsiveness.
- ii. **Community Building:** Brands can create communities and engage with customers, fostering a sense of belonging and loyalty that can impact purchase decisions.

Product Information and Education

- i. **Tutorials and How-Tos:** Social media platforms are often used to share tutorials and educational content about products, helping consumers understand how to use them effectively.
- ii. **Product Updates:** Brands can inform their audience about product updates, features and improvements through social media.

Influence on Brand Perception

- i. **Brand Personality:** Social media allows brands to showcase their personality, values and culture, which can attract consumers who align with those attributes.

- ii. **Brand Storytelling:** Brands can tell their stories and create emotional connections with consumers, influencing their attachment to the brand.

Social Proof and FOMO (Fear of Missing Out)

- i. **Trendsetting:** Social media can create trends and induce FOMO, pushing consumers to make purchases based on the desire to be part of a trend or community.
- ii. **Social Validation:** Consumers often make decisions based on what others in their social network are doing or buying.

Advertising and Promotions

- i. **Targeted Ads:** Social media platforms offer highly targeted advertising options, enabling brands to reach specific demographics and interests.
- ii. **Flash Sales and Promotions:** Brands can use social media to announce and promote limited-time offers and discounts, creating a sense of urgency.

Post-Purchase Experience

Social media has transformed the post-purchase phase into an ongoing opportunity for consumer engagement. After completing a purchase, consumers can easily share feedback, post reviews, and express their experiences directly on platforms such as Instagram, Facebook, and TikTok. This not only provides brands with valuable insights into customer satisfaction but also fosters a sense of community and connection. Positive experiences often lead to brand loyalty and advocacy, as satisfied customers recommend products to their networks. In conclusion, social media has become an influential touchpoint throughout the consumer decision-making process. It not only provides information and builds trust but also shapes brand perceptions, influences trends, and facilitates continuous engagement between consumers and brands. To succeed in today's digital marketplace, businesses must strategically leverage social media as a core component of their marketing and customer relationship efforts.

Conclusion

The rise of social commerce has fundamentally reshaped how consumers interact with brands, shifting the focus from traditional e-commerce to more interactive, social-driven experiences. Social media platforms now serve as powerful tools for product discovery, peer influence, real-time engagement, and post-purchase interaction. Consumers are not just

passive buyers but active participants who contribute to brand narratives through content creation, reviews, and direct engagement. This evolution demands that businesses move beyond conventional marketing and adopt more personalized, responsive, and community-oriented strategies. By effectively leveraging the features of social media—such as influencer partnerships, user-generated content, direct messaging, and feedback loops—brands can strengthen consumer relationships, drive loyalty, and ultimately enhance long-term success. As social commerce continues to grow, staying agile and consumer-centric will be key to thriving in the digital marketplace.

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Ethical And Aesthetic Dimensions In The Representation Of Trauma In Contemporary Fiction

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Abstract

*The representation of trauma in contemporary fiction presents both an ethical challenge and an aesthetic opportunity. Writers seek to convey the intensity of psychological and emotional suffering while avoiding sensationalism or appropriation of pain. This study investigates how contemporary fiction balances these demands. To analyze how select contemporary authors ethically and aesthetically render traumatic experiences, this paper explores the techniques and narrative strategies that confront the limits of representation, ethical responsibility, and reader engagement. Using trauma theory and ethical literary criticism, this study performs close readings of three novels: *Beloved* by Toni Morrison, *Atonement* by Ian McEwan, and *A Little Life* by Hanya Yanagihara. These works are examined for their use of narrative form, character focalization, temporal structure, and aesthetic devices in shaping trauma's literary portrayal. The findings reveal that ethical trauma fiction often adopts formal fragmentation, temporal disruption, interior monologue, and ambiguity to resist voyeurism and foster reader empathy. Aesthetically, authors deploy symbolism, metafiction, and hyperrealism to capture trauma's ineffability while invoking reflective engagement. The ethical and aesthetic dimensions in trauma fiction are intricately linked. Literature becomes a space where unrepresentable suffering can be acknowledged without being exploited. Such fiction creates avenues for witnessing, memory work, and moral responsibility.*

Keywords: trauma fiction, ethical representation, aesthetics, narrative, memory

Trauma and the Literary Imagination

Trauma, both personal and collective, defies straightforward narration. It fragments memory, disrupts temporality, and often escapes verbal expression. Nevertheless, contemporary authors continue to shape literary representations of trauma that emphasize both psychological authenticity and moral seriousness. This paper investigates how *Beloved* (1987) by Toni Morrison, *Atonement* (2001) by Ian McEwan, and *A Little Life* (2015) by Hanya Yanagihara approach the task of ethically and aesthetically representing traumatic experience. Each of these novels navigates the tension between telling painful stories and honoring the dignity of the victims.

Theoretical Frameworks and Methodological Approach

This analysis is grounded in trauma theory and ethical literary criticism. Cathy Caruth (1996) conceptualizes trauma as a belated, unassimilable event that returns repetitively through flashbacks and narrative disruption. In her view, trauma is not only a psychological

condition but also a textual and historical challenge: “The traumatized... carry an impossible history within them, or they become themselves the symptom of a history that they cannot entirely possess” (Caruth, 1996, p. 5). Dominick LaCapra (2001) distinguishes between “acting out” and “working through,” encouraging narratives that do not merely repeat trauma but enable reflection and ethical understanding.

The close reading methodology employed here evaluates narrative form, voice, time structure, and symbolism in the selected texts. This method allows for a nuanced understanding of how trauma is both represented and refracted through aesthetic choices.

Narrative Innovation and Ethical Tensions

In *Beloved*, Morrison’s fragmented structure and symbolic storytelling convey the inescapable legacy of slavery. Sethe, the protagonist, is haunted by the ghost of her dead daughter. Her memories break into the narrative without warning, reflecting trauma’s recursive nature. One of the most powerful lines—“It was not a story to pass on” (Morrison, 1987, p. 274)—underscores the ethical tension between remembering and silencing historical trauma. Morrison does not sensationalize suffering; instead, she uses metaphoric imagery and multiple voices to create a polyphonic narrative. This prevents the trauma from being reduced to a single point of view or consumed as spectacle.

In *Atonement*, McEwan constructs a metafictional narrative that blurs the lines between fiction, memory, and atonement. The reader gradually discovers that the narrator, Briony, has fabricated parts of the story in an attempt to make amends for a lie she told as a child. Her statement—“I gave them their happiness, but I was not so self-serving as to let them forgive me” (McEwan, 2001, p. 350)—raises questions about the efficacy of fiction as a redemptive tool. McEwan’s polished prose and carefully constructed plot draw attention to the tension between narrative aesthetics and moral responsibility.

Yanagihara’s *A Little Life* is arguably the most controversial of the three. The novel details Jude’s lifelong trauma with an unrelenting emotional intensity. Scenes of abuse and self-harm are depicted with graphic detail. While some critics accuse the novel of exploiting suffering, others see in it a courageous refusal to sanitize trauma. Jude’s belief that “the only trick of friendship... is to find people who are better than you—not smarter, not cooler, but kinder” (Yanagihara, 2015, p. 738) reflects the novel’s fragile thread of hope. The narrative structure, which loops through time and memory, echoes trauma’s persistence and shapes the reader’s ethical involvement.

Voice, Time, and the Ethics of Representation

Narrative voice is central to how trauma is framed and received. In *Beloved*, Morrison uses shifting points of view, allowing readers to experience trauma from multiple perspectives, including Sethe, Denver, Paul D, and the larger Black community. This collective storytelling challenges the isolated conception of trauma and roots it in shared memory.

McEwan’s narrator is unreliable, and her fictional control over other characters’ fates complicates the reader’s moral alignment. Briony’s position as both the source of harm and the author of the narrative forces the audience to interrogate the limits of literary justice.

Yanagihara employs a close third-person perspective that gives readers intimate access to Jude’s inner world. The prolonged exposure to his thoughts and suffering invites empathy but also risks overwhelming the reader. However, the refusal to resolve Jude’s trauma through healing or redemption may itself be an ethical act, acknowledging that for many, trauma is not a phase but a permanent condition.

The temporal structures of all three novels mirror trauma's disruption of linear time. Morrison's interwoven past and present reflect how traumatic memory continuously resurfaces. McEwan manipulates chronology to reveal hidden truths, while Yanagihara uses recursive memory to show how trauma dominates the present. In each case, form reinforces ethical content, making narrative structure an integral part of the ethical response to trauma.

Conclusion: Literature as Ethical Witness

The representation of trauma in contemporary fiction is an act of moral imagination. Morrison, McEwan, and Yanagihara demonstrate that trauma fiction need not exploit suffering in order to evoke emotional depth. Their novels show how narrative techniques—such as fragmented time, shifting voices, symbolic imagery, and metafiction—can serve ethical as well as aesthetic ends. Each author respects the complexity of trauma and challenges readers to reflect on their roles as witnesses.

Rather than offering resolution, these texts foreground trauma's lingering effects and resist simplistic portrayals of recovery. Literature, in these cases, does not cure trauma, but it provides a space for recognition, confrontation, and ethical engagement. In this way, trauma fiction becomes more than storytelling; it becomes an ethical act.

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Digital India And Sustainable Development: Empowering Rural Communities Through Common Service Centres

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Abstract

This study explores the role of Common Service Centres (CSCs) in India's Digital India initiative in promoting key Sustainable Development Goals (SDGs), particularly Gender Equality and Industry, Innovation, and Infrastructure. Digital India aims to bridge the digital divide between urban and rural regions by providing citizens with easy access to government services through technology-based platforms. The research primarily focuses on the individuals managing these common service centres and their empowerment following the establishment of CSCs. The study employs both primary data, collected via self-administered questionnaires from 396 Village Level Entrepreneurs (VLEs) in Kerala, and secondary data from official reports and digital governance sources. Statistical techniques such as chi-square tests, correlation, and regression were used to assess the socio-economic impacts of CSCs. The findings reveal significant improvements in digital access, income generation, and women's empowerment linked to CSC activities.

Keywords: Digital India Initiative, Common Service Centre, Village Level Entrepreneurs, SDGs

Introduction

India's *Digital India* initiative represents a visionary step towards bridging the technological divide between rural and urban populations. By leveraging modern tools such

as mobile applications and cloud computing, this mission aims to revolutionize how citizens interact with government services, information, and learning opportunities. Rooted in inclusivity, the program aspires to provide seamless, on-demand access to services regardless of geography. Anchored in three foundational pillars—digital infrastructure, on-demand governance, and citizen empowerment—Digital India is streamlining service delivery, enhancing transparency, and boosting civic participation. Key innovations like e-Health, e-Education, Digital Locker, and e-Sign reflect the government's commitment to building an efficient and accessible digital ecosystem that benefits every individual, from metropolitan cities to the remotest villages.

1.1. Aligning Digital Progress with Global Sustainable Goals

The Sustainable Development Goals (SDGs) form a global blueprint for a better and more equitable future. India's *Digital India* initiative aligns closely with this agenda, serving as a transformative enabler in achieving several key SDGs. These include goals related to education, gender equality, infrastructure, and inclusive economic growth. By extending digital identity, connectivity, and services to underserved regions, the initiative supports not just improved access but also broader social inclusion. Tools such as digital payments, telemedicine, and regional-language e-governance platforms empower citizens, promote digital literacy, and foster a culture of innovation and entrepreneurship. In doing so, Digital India strengthens the nation's ability to meet the 2030 Agenda, serving as a powerful model of how digital transformation can promote sustainable development at scale.

1.2. Common service centres (CSCs) and SDGs

The National e-Governance Plan (NeGP), launched by the Indian government in 2006, aimed to improve the delivery of public services to both citizens and businesses. As part of this broader initiative, the Common Service Centre (CSC) scheme was officially approved in September 2006 (Rajeev & Bhandarkar, 2022). Beyond simply offering digital services, CSCs have evolved into catalysts for rural transformation—promoting local entrepreneurship and improving livelihoods in underserved areas. The government's decision to adopt the CSC-based service delivery model marked a strategic effort to bridge the digital divide that separates urban and rural populations, as well as the digitally privileged and those with limited access. Today, there are over 1.7 lakh operational CSCs across the country, with the long-term goal of establishing at least one CSC in each of India's 2.5 lakh Gram Panchayats. This vision is being realized through the Village Level Entrepreneur (VLE)

model, which empowers local individuals—nearly 2.4 lakh so far—to run these centers and serve their communities.

In 2015, under the Digital India Program, the government introduced the CSC 2.0 program based on the evaluation of the CSC system. By 2019, it is hoped that CSCs would have reached every one of the nation's 2.50 lakh Gram Panchayats. The CSC 2.0 initiative aims to establish a network of 2.5 lakh Common Service Centres (CSCs) in Gram Panchayats. It will offer a host of services on single digital platform. The initiative is on standardisation of services and equipping people with required skills, with local Help Desk facilitation. One of the key goals is to enable Village Level Entrepreneurs (VLEs) to earn sufficient income through transparent commission sharing models.

. The initiative also enables more women to become VLEs, empowering rural digital business to grow for all.

Common Service Centres play a pivotal role in advancing several Sustainable Development Goals by offering digital access to health, finance, education, and governance services. By focusing on underserved rural populations, CSCs act as digital inclusion hubs, especially for women. These centers help narrow the gender digital divide by empowering women entrepreneurs and enhancing their access to employment, healthcare, and education. As part of the Digital India framework, CSCs not only support goals such as No Poverty, Quality Education, and Gender Equality, but also contribute to Reduced Inequalities and Decent Work and Economic Growth. Their presence in rural areas ensures that development is both inclusive and sustainable. This paper highlights how CSCs—driven by VLEs—serve as critical change agents, strengthening local economies and fostering digital empowerment in alignment with India's SDG commitments.

Literature Review

The growing digital divide in many developing nations continues to raise critical concerns about equitable access to Information and Communication Technologies (ICT). Although technological tools and services have become more affordable, large segments of the rural population remain excluded from meaningful participation in digital initiatives. This exclusion limits their ability to access vital services such as e-governance, thus reinforcing existing inequalities (Gupta & Das, 2018).

In response to these disparities, the Government of India launched the Digital India programme, an ambitious national initiative aimed at fostering a digitally inclusive and empowered society. This initiative aligns closely with the Sustainable Development Goals (SDGs), particularly SDG 5 (Gender Equality) and SDG 9 (Industry, Innovation, and Infrastructure). Key components of the programme include Aadhaar for providing a universal digital identity, BharatNet for delivering high-speed internet to rural areas, and the establishment of Common Service Centres (CSCs) as key digital service access points at the village level. These interventions have significantly contributed to improving public service delivery, advancing financial inclusion, and enhancing grassroots engagement (Ministry of Electronics and IT, 2018). Additionally, digital platforms such as DigiLocker, UMANG, and Direct Benefit Transfer (DBT) have streamlined access to government services and increased transparency.

Despite these achievements, several challenges persist. Numerous studies highlight issues such as low digital literacy, inadequate infrastructure, and limited public awareness, which continue to hinder the overall impact of digital programmes. Heeks (2002) introduces the concept of the “design-reality gap”, emphasizing the disconnect between the intended outcomes of ICT initiatives and the ground realities in resource-constrained areas.

While Bhatnagar (2009) underlines the strategic importance of CSCs in bridging this gap, others—including Madon (2005) and Misra (2013)—identify persistent barriers in implementation. These include insufficient local infrastructure, bureaucratic inefficiencies, and weak institutional support. The role of Village-Level Entrepreneurs (VLEs), who operate these CSCs, is also critical, yet many face difficulties such as inadequate training, financial limitations, and inconsistent assistance from government authorities (Kumar & Best, 2006). Further complicating matters are external challenges such as corruption, local conflicts, and language barriers, which are especially prevalent in remote and tribal regions (Singh et al., 2011).

These findings collectively underscore the urgent need for context-specific strategies, robust institutional frameworks, and inclusive multi-stakeholder collaboration to ensure that digital access initiatives like CSCs are not only effective but also sustainable over the long term.

Research Gap

In recent years, substantial academic attention has been given to the *Digital India* mission, particularly its potential to bridge the digital divide between urban and rural populations. A wealth of research has analyzed the operations of Common Service Centres (CSCs), their effectiveness in delivering e-governance services, and their broader role in enhancing digital infrastructure in underserved regions. Similarly, a growing body of literature has focused on the United Nations Sustainable Development Goals (SDGs), emphasizing the role of digital technologies in promoting inclusive and sustainable progress.

Despite these contributions, there is a clear lack of focused research that examines how CSCs—and more specifically, *Village Level Entrepreneurs* (VLEs)—contribute directly to the achievement of SDGs at the grassroots level. While existing studies may touch on digital inclusion or the socio-economic impact of digital service delivery, very few delve into the active role of VLEs as drivers of development. The contribution of VLEs to key goals such as Gender Equality (SDG 5), Quality Education (SDG 4), Decent Work (SDG 8), and Reduced Inequalities (SDG 10) is often underexplored. Additionally, current literature tends to focus on macro-level policy analysis, largely ignoring the ground-level realities, lived experiences, and empowerment journeys of these rural digital entrepreneurs—especially women.

This research seeks to fill that gap by shedding light on the *practical, everyday contributions* of VLEs in enabling access to critical services and supporting local communities. By centering the role of CSCs and VLEs in the larger SDG framework, this study emphasizes their significance in driving inclusive development from the bottom up and making global goals locally relevant.

Significance Of The Study

This study sheds light on the powerful role that Common Service Centres (CSCs) play in promoting sustainable and inclusive development, with a special emphasis on gender empowerment and infrastructure—key priorities under Sustainable Development Goals five and nine. Focusing on women-led CSCs in rural and semi-urban parts of India, the research explores how these digital hubs help bridge the gender digital divide and overcome infrastructure gaps that often limit access to essential services. By examining the demographic backgrounds and empowerment levels of CSC entrepreneurs, the study offers valuable insights into how grassroots digital entrepreneurship can challenge deep-rooted socio-economic barriers and support more equitable growth. The findings highlight the need

to empower women in the digital economy and position the CSC model as a scalable, adaptable strategy for inclusive development—relevant to policymakers, practitioners, and researchers alike.

Research Design

Data: The primary data collection method employed was a self-administered questionnaire. While secondary data was gathered from various sources such as research papers, journal and newspaper articles, NSA report, as well as websites including the Ministry of Information and Technology (www.mit.gov.in) and the common service centre website (www.csc-india.org). Additionally, several other websites reporting on the status of these Common Service Centers (CSCs) and the digitalization process in India were consulted to obtain information.

Research Design, Sampling Plan and Sample Size: The researcher collects information from 396 village level entrepreneurs in Thrissur districts in Kerala utilizing a pretested structured questionnaire. For this study, male and female respondents were chosen at random from Two districts in Kerala, Thrissur and Malappuram

Research instruments: The collected data underwent analysis utilizing statistical methods like percentage analysis, chi-square test of independence, correlation and regression facilitated by statistical software to ensure mathematical rigor and fulfill the research objectives.

1.3.Objective

- To analyze the contribution and alignment of Common Service Centres (CSCs) with the objectives of Sustainable Development Goals (SDGs)

Digital Profile Of India

In order to understand the success rate of digital India initiative , it is necessary to find its impact on economy especially GDP, Internet connectivity, education, health and banking .India currently ranks second with just under half of its population (55.1%) using the internet, which accounts for 806 million people.The US rounds off the top three with 322 million of its 340.1 million population using the internet (95.68%).Here are the top 10nations ranked by total number of internet users:

Table 1: Top 10 countries with highest number of internet users

Rank	Nation	Region	Internet users	population	Internet penetration rate
1	China	Asia	1.11 billion	1.416 billion	78.17%
2	India	Asia	806 million	1.464 billion	55.1%
3	US	North America	332 million	347 million	95.68%
4	Indonesia	Asia	212 million	286 million	74.13%
5	Brazil	South America	183 million	213 million	85.92%
6	Russia	Asia	133 million	144 million	92.36%
7	Pakistan	Asia	116 million	255 million	45049%
8	Mexico	North America	110 million	132 million	83.33%
9	Japan	Asia	109 Million	123 Million	88.62%
10	Nigeria	Africa	107 Million	238Million	44.96%

Source: Digital 2025: Global Overview Report- [Data Reportal](#), [Worldometer](#) (2025)

Table 2: The statistics of Telephone and mobile phone accessibility in India

TITLE	At the end of March									
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Number of telephone Subscriber s (In Millions):										
Mobile phone	969.54	1034.11	1170.59	1188.99	1161.71	1157.67	1180.96	1142.09	1143.91	1165.49
Landline	26.59	25.22	24.40	22.81	21.70	19.13	20.24	24.84	28.41	33.79

Teledensity in India (Per 100 Inhabitant s): Total:	79.36	83.40	93.01	93.27	90.10	88.66	88.17	84.88	84.51	85.69
Urban:	149.04	154.18	171.52	166.64	159.66	153.68	141.07	134.94	133.81	133.72
Rural:	48.04	51.26	56.98	59.25	57.50	57.87	60.27	58.07	57.71	59.19
Internet Subscriber s in India (In Millions)	302.36	342.65	422.20	493.96	636.73	743.19	759.00	824.89	881.25	954.40
Total:Urban:	194.80	230.71	285.68	348.13	409.72	457.22	360.00	523.26	439.25	556.05
n: Rural:	107.56	111.94	136.52	145.83	227.01	285.97	399.00	357.99	442.00	398.35

Source: TRAI

From 2015 to 2024, India has witnessed significant growth in its telecommunications and digital infrastructure. Mobile phone subscribers increased from 969.54 million in 2015 to 1165.49 million in 2024, while landline usage declined from 26.59 million to 19.13 million in 2020, then rose to 33.79 million by 2024 due to increased demand for broadband connectivity. Teledensity improved from 79.36 to 85.69, with rural teledensity rising from 48.04 to 59.19, reflecting progress in bridging the urban-rural digital divide. Internet subscriptions tripled from 302.36 million in 2015 to 954.40 million in 2024, with rural users growing from 107.56 million to 398.35 million. This growth aligns closely with SDG 9 (Industry, Innovation, and Infrastructure) by expanding digital access and supports SDG 5 (Gender Equality) through the empowerment of women via Common Service Centres (CSCs), especially those led by Women Village Level Entrepreneurs (VLEs). These CSCs play a crucial role in delivering e-governance, education, healthcare, and financial services, promoting inclusive development and advancing India's sustainable development agenda.

Table 3: Share of Telecom in GVA(at constant price)(In crore)

Year ending	Total GVA	GVA telecom sector	Share of telecom sector

2015	97,12,133	1,25,227	1.8
2016	104,91,870	1,41,331	1.9
2017	113,28,285	1,32,941	1.17
2018	120,34,171	1,98,344	1.5
2019	127,44,203	1,97,214	1.7
2020	132,71,471	2,19,178	1.7
2021	12687344	2,20,966	1.7
2022	13876840	2,37,908	1.7
2023	14804900.	2,62,710	1.8
2024	16151476	2,85,338	1.8

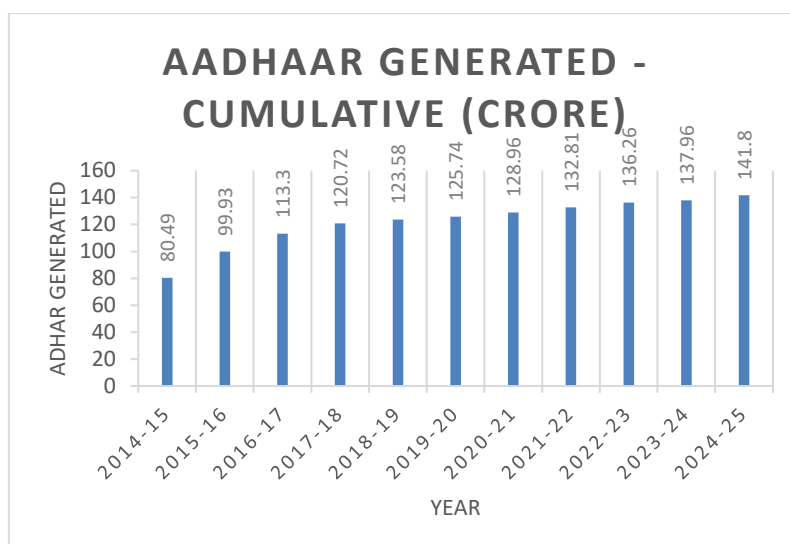
Source: MoSPI- National Account Statistics(NSA)-2024

From 2015 to 2024, the contribution of the telecom sector to India's Gross Value Added (GVA) has shown a consistent presence, with slight variations over the years. In 2015, the telecom sector contributed ₹1,25,227 crore to a total GVA of ₹97,12,133 crore, accounting for 1.8% of the total. This share increased slightly to 1.9% in 2016 but declined to 1.17% in 2017. However, it recovered in subsequent years, reaching 1.7% in 2019 and remaining steady through 2020 to 2022. By 2024, the telecom sector's GVA rose to ₹2,85,338 crore, contributing 1.8% to the total GVA of ₹1,61,51,476 crore. This trend indicates the telecom sector's steady economic role, supporting national infrastructure (SDG 9) and enabling digital inclusion.

Adhar Card

Aadhaar, developed by the Unique Identification Authority of India (UIDAI), is a robust digital identity platform designed to provide every resident with a unique 12-digit number generated through biometric de-duplication. Built on scalable, open-source technology, Aadhaar enables easy, electronic, and cost-effective identity authentication. It allows individuals to prove their identity anytime and anywhere, helping service providers verify users and deliver targeted services and benefits efficiently.

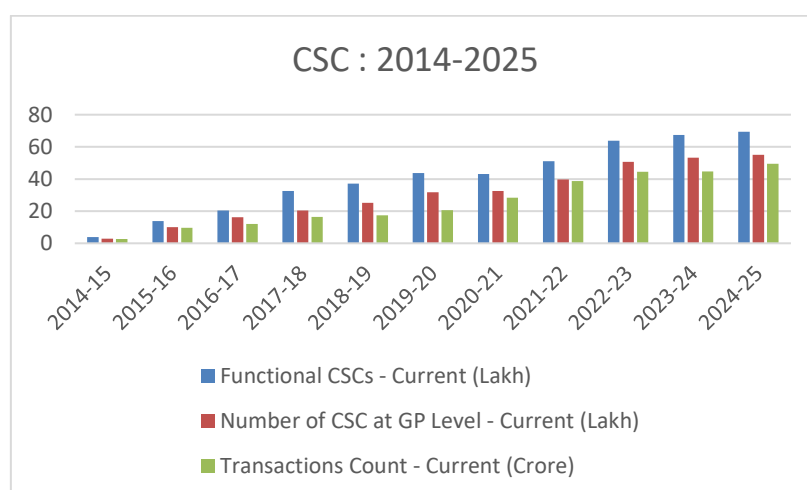
Figure 1: No.of Aadhar card generated



Data Source: Ministry of Electronics and Information Technology, GoI

Common Service Centres

Figure 2 : Common Service centres in India – FY2015 /FY2025



Source: Data Source: Ministry of Electronics and Information Technology, GoI

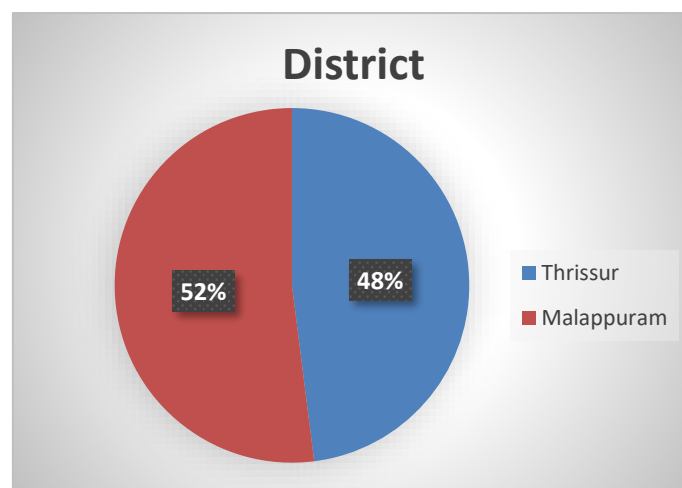
From 2014–15 to 2024–25, the Common Service Centres (CSCs) network in India has expanded significantly, both in reach and usage. The number of functional CSCs grew from 3.82 lakh in 2014–15 to 69.34 lakh in 2024–25. At the Gram Panchayat (GP) level, CSCs increased from 2.8 lakh to 54.95 lakh during the same period, indicating a strong push toward rural digital inclusion. Alongside this expansion, transaction volumes surged from 2.59 crore in 2014–15 to 49.46 crore in 2024–25. This growth highlights the increasing reliance on CSCs for delivering essential digital services, reflecting their key role in promoting e-governance, financial inclusion, and public service accessibility across India.

Result & Interpretation

Demographic Profile of Respondents

Sample of the study are the CSC Village Level Entrepreneurs in Kerala. Demographic variables included in the study are Gender, Age, Level of education, Nature of area and profession before becoming CSC VLEs. All the demographic variable have significant influence on the satisfaction level and problems faced by CSC VLEs. Hence, demographic variables are important part of the analysis and must be studied in detail. It is worthwhile to narrate a brief demographic profile of CSC entrepreneur respondent on the basis of relevant demographic variables.

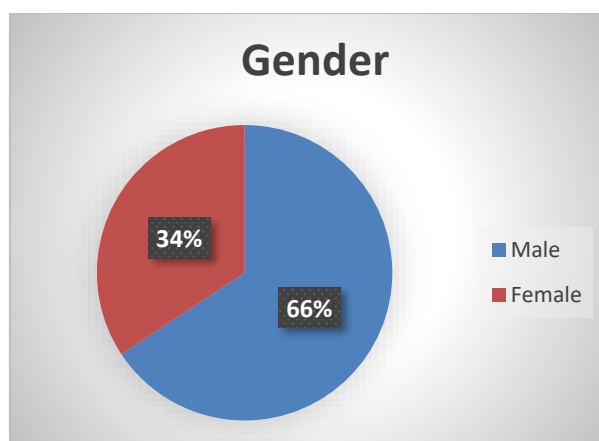
Figure 3: *Distribution of Entrepreneurs by District wise*



Source: Primary data

The table 1 depicts that out of the respondents, 52.02 percent are from Malappuram district and 48 percent are from Thrissur district.

Figure 4: *Distribution of Entrepreneurs by their Gender*



Source: Primary data

Gender-wise, the majority of the respondents are male; hence, males comprise 65.7 percent, whereas female comprises 34.3 percent.

Table 4: *Distribution of Entrepreneurs by their Nature of area*

Characteristics		N	%
Nature of area	Rural	311	78.5
	Urban	85	21.5
Total		396	100.0

Source: Primary data

A vast majority (311 VLEs) operate in rural areas, comprising 78.5% of the total. A smaller proportion (85 VLEs) are based in urban areas, making up 21.5% of the total. This suggests that while CSCs are available in urban settings, their primary focus remains on rural outreach.

Table 5: *Distribution of Entrepreneurs by their Education*

Characteristics		N	%
Education	Plus two/Pre Degree	39	9.8
	Degree	102	25.8
	Master degree	175	44.2
	Plus two/Pre Degree	80	20.2
Total		396	100.0

Source: Primary data

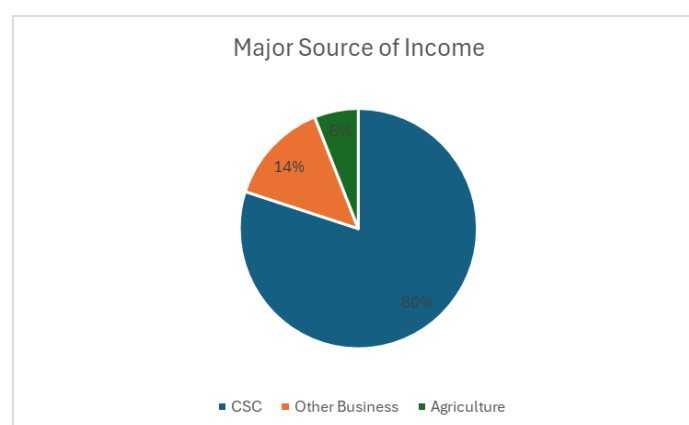
As far as educational qualifications go, most respondents are graduates at 44.2%; while 25.8% of the respondents have completed Pre-degree or Plus Two, 20.2% possess postgraduate degrees, and 9.8% hold a Matriculation qualification.

A vast majority (311 VLEs) operate in rural areas, comprising 78.5% of the total. A smaller proportion (85 VLEs) are based in urban areas, making up 21.5% of the total. This suggests that while CSCs are available in urban settings, their primary focus remains on rural outreach.

Major Source of Personal Income

The pie chart illustrates the primary sources of income for Common Service Center (CSC) Village Level Entrepreneurs (VLEs). A significant majority, 80%, depend on CSC operations as their main source of income, showcasing its pivotal role in sustaining the livelihoods of VLEs. Additionally, 14% of VLEs earn their primary income from other business ventures, reflecting a degree of diversification among a minority of individuals. Meanwhile, 6% rely on agriculture as their main income source, indicating its relatively limited contribution compared to the other categories. Overall, the chart highlights the centrality of CSCs in rural economic empowerment, while some VLEs maintain supplemental or alternative income sources through business and agriculture.

Figure 5: *Major source of Income*



Source: Primary data

Average Monthly Income Before and After Csc

The change in the average monthly income of persons and households, after setting up and running a CSC will continue one of the leading indicators of empowerment. Changing incomes represent a direct aspect of the economic benefits achieved by participation in the new economy, as well as opportunities to stimulate development through entrepreneurship. Before the establishment of CSCs, income opportunities in most rural and semi-urban areas were constrained to either agriculture or some informal sectors or temporary job. This comparative study of the income level pre and post opening of the CSCs provides some kind of insights into the effects of digital entrepreneurship on economic systems.

Table 6: Monthly Income Before and After CSC

Monthly Income	Before joining CSC		After joining CSC	
	N	%	N	%
Below 5000	110	27.8	-	-
5000-10000	91	23.0	195	49.2
10000-15000	86	21.7	184	46.5
15000-20000	46	11.6	17	4.3
More than 20000	63	15.9	-	-

Source: Primary data

Association Between Demographic Profile and Income

Null Hypothesis (H0): There is no significant relationship between demographic profile and income

Alternate Hypothesis (H1): There is significant relationship between demographic profile and income

An attempt has been made to examine the association between socio economic status of VLEs and demographic profiles like age, gender, educational level, opening year, district , nature of area and monthly income of CSC VLEs. Chi-square test was applied to examine whether there is any significant relationship between socio economic status of VLEs and demographic profiles of respondents. The Table shows the chi square values and the level of significance.

Table 7 : Association between Demographic Profile and Income

	Variables	Chi square statistical value	DF	P value	Significance	Inference
1.	Age	18.899a	8	.015*	Significant	Reject H0
	Gender	10.051a	2	.007**	Significant	Reject H0
	Area	13.601 ^a	2	.001*	Significant	Reject H0
	Education	11.659a	6	.070	Insignificant	Accept H0

	Major source of income	6.083 ^a	4	.193	Insignificant	Accept H0
	District	10.969 ^a	2	.004**	Significant	Reject H0

Source: Primary data

Statistical analysis evaluates significant variables concerning a particular context. It brings out the extremely insightful relationships between them. Age ($p = 0.015$), Gender ($p = 0.007$), Area ($p = 0.001$), and District ($p = 0.004$) were statistically significant, as their p-value was less than the cutoff point of 0.05, thereby indicating meaningful relationships or effects in this particular study. As such, area and district may strongly, if understandably, affect the study, thus underscoring their potential importance in the present context.

Education ($p = 0.070$), Major Source of Income ($p = 0.193$), and Opening Year ($p = 0.225$) have then turned out not to be statistically significant because they fail to proceed above the threshold of 0.05, which means that they do not show significant meaning statistically as far as this study is concerned. Education, for example, though normally an important factor to consider in many contexts, does not seem to hold a much direct or significant link here.

Variables with a p-value less than 0.05 (Age, Gender, Area, and District) are statistically significant, meaning they are likely to have a meaningful effect or relationship.

Variables with a p-value greater than 0.05 (Education, Major Source of Income, and Opening Year) are not statistically significant, suggesting no evidence of a meaningful relationship in this context.

Empowerment Achieved Through CSCs

The responses of 396 CSC VLEs highlight the capabilities achieved through their roles in CSCs:

Table 8: Empowerment Through CSCs

Variables	Mean	SD
Household income increase	4.18	.830
Change in consumption pattern	4.46	.757
Changes in saving pattern	4.46	.757
Change in Education and health expenditure	4.31	1.039
Changes in modes of transportation	2.66	1.325
Economic independence	3.40	1.451

Social status	4.58	.948
Confidence	4.57	.658
Positive contribution to society	4.57	.696
Freedom and mobility	3.47	1.402
Change in banking habits	4.47	.706
Employment	4.53	.884

Source: Primary data

Descriptive statistics support that respondents' perceive strong positive change in numerous socio-economic attributes. Strong mean scores of social status (4.58), confidence (4.57), contribution to society (4.57), and labour market situation (4.53) depict high perceived empowerment and integration within society. Similarly, improvements in banking behavior (4.47), consumption and saving habits (4.46), and expenditure on education and health (4.31) depict healthier financial conduct and investment in wellness. In contrast, moderate means on economic independence (3.40) and freedom and mobility (3.47) reflect areas needing additional improvement. The lowest mean was registered on changes in modes of transportation (2.66), suggesting minimal change in mobility dimensions. Altogether, the data indicates a pattern of increased economic and social empowerment with some pragmatic limitations in physical and financial freedom.

According to information from 396 Village Level Entrepreneurs (VLEs) both by gender, correlation and regression tests were applied to investigate the effect of factors on respondents' capabilities.

Table 9: Pearson's Correlation Analysis-Income & Empowerment

Pearson's Correlation Analysis		INCOME	Empowerment
INCOME	Pearson Correlation	1	.495**
	Sig. (2-tailed)		.000
	N	396	396
Empowerment	Pearson Correlation	.495**	1
	Sig. (2-tailed)	.000	
	N	396	396
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Primary data

There was a moderate to strong positive correlation between income and capabilities ($r = 0.495$, $p < 0.01$), meaning that capability scores improve with increasing income. This implies that increased income could improve access to facilitative resources like education, digital equipment, and connectivity that are essential for enhancing capabilities.

Women Entrepreneurs and Empowerment

In order to get a sense of the connection between women-operated Common Service Centers (CSCs) and women's empowerment, this study focuses particularly on the 136 woman-operated CSCs that were selected from a larger pool of 396. By focusing on these woman-operated centers, the study aims to reflect the direct correlation between women's active engagement with digital governance and their empowerment impact. This targeted strategy enables a more accurate assessment of how running a CSC affects different aspects of women's capabilities, such as economic independence, online literacy, confidence, and social standing.

Table 10: Correlation analysis- Income earned by Women Entrepreneurs and Empowerment

		INCOME	Women capabilities
INCOME	Pearson Correlation	1	.429**
	Sig. (2-tailed)		.000
	N	136	136
women empowerment	Pearson Correlation	.429**	1
	Sig. (2-tailed)	.000	
	N	136	136
**. Correlation is significant at the 0.01 level (2-tailed).			

Source: Primary data

Correlation analysis shows a statistically significant positive relationship ($r = 0.429$, $p < 0.01$) between women entrepreneurs' income and the abilities they claim to acquire. This moderate positive correlation indicates that higher income generated from CSCs goes on to improve women's capabilities and empowerment.

Table 11: Regression analysis- Income earned by Women Entrepreneurs and Empowerment achieved

Model		Standardized Coefficients	t	Sig.
		Beta		
1	(Constant)		25.295	.000
	INCOME	.429	5.501	.000
Dependent variable: Women empowerment				

Source: Primary data

The findings are further supported by the regression analysis, where income was found to have a significant positive effect on women's capacities ($\beta = 0.429$, $t = 5.501$, $p < 0.01$). The finding supports that income earned from CSC operations is an important factor in enhancing women's capacities, which aligns with gender empowerment and inclusive development objectives.

Findings

Over the past decade, India has witnessed a digital revolution. Between 2015 and 2024, mobile subscribers rose from 969.54 million to 1165.49 million, while internet users tripled from 302.36 million to 954.40 million. Importantly, the number of rural internet users surged from 107.56 million to 398.35 million, pointing to a closing digital divide. This expansion directly supports SDG 9, which promotes sustainable infrastructure and innovation.

The telecom industry remained a stable pillar of India's economy, with its contribution to Gross Value Added (GVA) increasing from ₹1.25 lakh crore in 2015 to ₹2.85 lakh crore in 2024. Although the percentage hovered around 1.7–1.8%, the steady growth underscores its importance in supporting digital infrastructure and national productivity.

CSCs have become the digital heartbeat of rural India. Their numbers jumped from 3.82 lakh in 2014–15 to 69.34 lakh in 2024–25, while service transactions surged

from 2.59 crore to 49.46 crore. At the Gram Panchayat level, CSC coverage rose from 2.8 lakh to 54.95 lakh, making essential services more accessible than ever before.

The Aadhaar initiative, a cornerstone of Digital India, grew from 80.49 crore enrolments in 2014–15 to 141.8 crore in 2024–25. This universal digital ID system has enabled secure and seamless access to countless public services.

Of the 396 Village Level Entrepreneurs (VLEs) surveyed in Kerala: 65.7% were men and 34.3% women. A large majority (78.5%) operated in rural areas. 44.2% had postgraduate degrees, showing the rising education levels among rural digital service providers.

80% of VLEs consider CSCs their primary source of income. Incomes increased significantly post-CSC setup. Nearly 49.2% of VLEs now earn between ₹5,000–₹10,000 per month, up from just 23% previously.

Chi-square tests indicated that age, gender, area, and district had a statistically significant relationship with income levels.

Income was not just about money—it deeply influenced satisfaction across all aspects of work life:

Statistical analysis revealed a moderate to strong correlation ($r = 0.495$) between income and the personal/professional capabilities VLEs developed. Higher earnings translated into greater self-confidence, improved household financial practices, and better access to health and education.

Among 136 women VLEs, a positive correlation ($r = 0.429$) between income and empowerment was observed.

Regression analysis confirmed that income significantly predicted women's ability to gain economic independence, digital skills, and enhanced self-worth ($\beta = 0.429$, $p < 0.01$).

Conclusion

The study clearly demonstrates that Common Service Centres (CSCs) are not just service outlets—they are agents of transformation. Rooted in the Digital India initiative, CSCs have redefined access, inclusion, and empowerment, especially in India's rural heartlands.

From enabling Aadhaar to ensuring doorstep delivery of financial, health, and education services, CSCs have been instrumental in bringing e-governance to the grassroots. More importantly, they have created livelihood opportunities and sparked

digital entrepreneurship, particularly for women—making progress toward SDG 5 (Gender Equality) and SDG 9 (Industry, Innovation, and Infrastructure) tangible and measurable.

The rise in income, and social status among VLEs—particularly Women VLEs—highlights the real-life impact of digital inclusion. It is not merely about infrastructure or access; it's about dignity, autonomy, and the ability to shape one's own future.

Moving forward, sustained policy support, better digital infrastructure, and targeted interventions to bring more women into the fold can ensure that CSCs remain the backbone of India's inclusive digital journey. This study serves as a testament to the power of technology as a tool for empowerment, not just development.

Acknowledgement

I would like to express my sincere gratitude to the Common Service Centers (CSCs) and the Village Level Entrepreneurs (VLEs), who generously shared their time, experiences, and insights for the purpose of this study. Their openness and commitment to their work made this research both meaningful and impactful.

Conflicts of Interest Declaration

All authors declare that they have no conflicts of interest.

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Chapter : 62

മാതൃഭാഷാധിഷ്ഠിത ബഹുഭാഷാവിദ്യാഭ്യാസം ഇന്ത്യയിൽ - വെല്ലുവിളികളും സാധ്യതകളും

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സംഗ്രഹം

ഭാഷ മനുഷ്യന്റെ ആശയവിനിമയത്തിനും ആത്മപ്രകടനത്തിനുമുള്ള മുഖ്യ ഉപാധിയാണ്. ഭാഷയിലൂടെ വ്യക്തി ലോകത്തെ കാണുകയും അനുഭവിക്കുകയും ചെയ്യുന്നു. ഈ പരിപ്രേക്ഷ്യത്തിൽ, കുട്ടികൾ ആദ്യം പഠിക്കുന്നതും അവരുടെ ചിന്താപ്രക്രിയയുടെ അടിസ്ഥാനവുമായ മാതൃഭാഷയ്ക്ക് വളരെയധികം പ്രാമുഖ്യമുണ്ട്. മാതൃഭാഷയിലൂടെ ഒരു വ്യക്തി തന്റെ സംസ്കാരത്തെ തിരിച്ചറിയുകയും മൂല്യങ്ങളെ ഉൾക്കൊള്ളുകയും ചെയ്യുന്നു. അതുകൊണ്ടാണ് വിദ്യാഭ്യാസരംഗത്ത് മാതൃഭാഷയ്ക്ക് സവിശേഷമായ മുൻതൂക്കം നൽകുന്നത്. കുട്ടികളുടെ ബൗദ്ധിക, മാനസിക, സാംസ്കാരിക വളർച്ചയ്ക്ക് അനിവാര്യമായി കണക്കാക്കുന്നത്.

ഈ ഗവേഷണ പ്രബന്ധം ഇന്ത്യയിൽ മാതൃഭാഷാധിഷ്ഠിത ബഹുഭാഷാവിദ്യാഭ്യാസത്തിന്റെ (*Mother Tongue-Based Multilingual Education - MTB-MLE*) സാധ്യതകളും വെല്ലുവിളികളും വിശകലനം ചെയ്യുന്നു, പ്രത്യേകിച്ച് 2020ലെ ദേശീയ വിദ്യാഭ്യാസ നയത്തിന്റെ (NEP 2020) പശ്ചാത്തലത്തിൽ. കുട്ടികളുടെ ആശയവിനിമയ ശേഷിയും ബൗദ്ധികവും

സാംസ്കാരികവുമായ വളർച്ചയും മാതൃഭാഷയുമായി ഉൾച്ചേരുന്നുവെന്ന് ശാസ്ത്രീയവും പരിചിതവുമായ തെളിവുകൾ ഉയർത്തിക്കാട്ടുന്നു. NEP 2020, 2023-ലെ ദേശീയ പാഠ്യപദ്ധതി ചട്ടക്കൂടിലൂടെ (NCF) പ്രാഥമിക വിദ്യാഭ്യാസം മാതൃഭാഷയിലാക്കുന്നതിനു ത്രിഭാഷാ ഫോർമുലയുടെ അടിസ്ഥാനത്തിൽ ശക്തമായ പിന്തുണ ലഭിക്കുന്നു.

ഈ പഠനം ഭാഷാ വൈവിധ്യം, യോഗ്യതയുള്ള അധ്യാപകരുടെ കുറവ്, അധ്യാപക പരിശീലനപരിപാടികൾ, നിലവാരമുള്ള അധ്യാപന വിഭവങ്ങളുടെ അഭാവം, ഉന്നത വിദ്യാഭ്യാസമേഖലയിലെ ഭാഷാമാറ്റത്തിൽ ഉള്ള പ്രയാസങ്ങൾ എന്നിവയെ പഠനവിധേയമാക്കുന്നു. അതേസമയം, വിദ്യാഭ്യാസത്തിൽ തുല്യത, ഉൾവായ്പ്, മെച്ചപ്പെട്ട പഠനഫലങ്ങൾ, സാംസ്കാരിക അവബോധം എന്നിവയുടെ വളർച്ചയ്ക്കുള്ള ശക്തമായ സാധ്യതകളും മുന്നോട്ടുവയ്ക്കുന്നു. അന്തിമമായി മാതൃഭാഷാധിഷ്ഠിത ബഹുഭാഷാവിദ്യാഭ്യാസം ശാസ്ത്രീയമായും സാമൂഹികമായും മൂല്യവത്തായ വിദ്യാഭ്യാസ പരിഷ്കാരമായി ഇന്ത്യയിൽ നടപ്പാക്കാവുന്നതാണ്. വ്യത്യസ്ത വിദ്യാഭ്യാസ ഭാഗധാരികളുടെ ഏകോപിത പങ്കാളിത്തത്തിലൂടെ ഈ നയം കൂടുതൽ ഫലപ്രദമാക്കുകയും തുല്യവും സമഗ്രവുമായ വിദ്യാഭ്യാസപരിസരം സൃഷ്ടിക്കുകയും ചെയ്യാനാകുമെന്നതാണ് പഠനത്തിന്റെ പ്രധാന നിർണ്ണയം.

താക്കോൽ വാക്കുകൾ: മാതൃഭാഷ,ബഹുഭാഷാവിദ്യാഭ്യാസം, ദേശീയ പാഠ്യപദ്ധതി ചട്ടക്കൂട്,വൈജ്ഞാനിക വികസനം,സാംസ്കാരിക പൈതൃകം, ആശയവിനിമയം, ഉന്നത വിദ്യാഭ്യാസം

ആമുഖം

മാതൃഭാഷയെക്കുറിച്ചുള്ള നെൽസൺ മണ്ടേലയുടെ ഈ വാക്കുകൾ പ്രസക്തമാണ്.

"If you talk to a man in a language he understands, that goes to his head. If you talk to him in his language that goes to his heart".

കുട്ടികൾ ജന്മനാ ഭാഷാവൈദഗ്ദ്ധ്യത്തോടെയാണ് ജനിക്കുന്നത്. ദൈനംദിന അനുഭവങ്ങളിലൂടെയും ശാസ്ത്രീയ പഠനങ്ങളിലൂടെയും അതു നമുക്ക് വ്യക്തമാണ്. മിക്ക കുട്ടികളും സ്കൂൾ വിദ്യാഭ്യാസം ആരംഭിക്കുന്നതിന് മുമ്പുതന്നെ ഭാഷ എന്ന സങ്കീർണ്ണവും നിയമനിർമ്മിതവുമായ ഘടനയെ ആന്തരികവൽക്കരിക്കുകയും, അതിന്റെ അടിസ്ഥാനത്തിൽ സമഗ്രമായ ഭാഷാവൈദഗ്ദ്ധ്യം കൈവരിക്കുകയും ചെയ്യുന്നു.

സാധാരണഗതിയിൽ കുട്ടികൾ സ്കൂളിൽ പ്രവേശിക്കുമ്പോൾ അവരുടെ വാമൊഴി-കേൾവി പ്രാവീണ്യത്തിൽ ഇതിനകം രണ്ടോ മൂന്നോ ഭാഷകളിൽ പരിചയമുള്ളവരായിരിക്കും. ഈ ഭാഷകൾ അവർ കൃത്യമായി മാത്രമല്ല, ഉചിതമായ സാഹചര്യങ്ങളിൽ പ്രായോഗികമായി ഉപയോഗിക്കുകയും ചെയ്യുന്നു. സംസാരഭാഷകൾ ഉപയോഗിക്കാൻ പ്രയാസമുള്ള ഭിന്നശേഷിയുള്ള കുട്ടികളായാലും ആശയവിനിമയത്തിനും ആവിഷ്കാരത്തിനുമായി സങ്കീർണ്ണമായ ബദൽ ചിഹ്നസംവിധാനങ്ങൾ നാം വികസിപ്പിക്കുന്നതായി നിരീക്ഷിക്കപ്പെടുന്നു. ഇത് ഭാഷാവികസനത്തിന്റെ സ്വാഭാവികതയും മനുഷ്യ അനുഭവങ്ങളുമായി അതിന്റെ അങ്ങേയറ്റം ഉൾച്ചേരലും തെളിയിക്കുന്നു. ഈ പശ്ചാത്തലത്തിൽ, വിദ്യാഭ്യാസപ്രക്രിയയിൽ കുട്ടികളുടെ മാതൃഭാഷാവൈദഗ്ദ്ധ്യവും

ബഹുഭാഷാ കഴിവുകളും പരിഗണിക്കപ്പെടേണ്ടതിന്റെ അനിവാര്യത ഉദ്ബോധിപ്പിക്കുന്നു.

ലോകരാജ്യങ്ങൾക്കിടയിൽ ദ്വിഭാഷാവിദ്യാഭ്യാസം പ്രചരിപ്പിക്കുന്നതിൽ യുനെസ്കോയും യൂണിസെഫും ഒരു പ്രധാന പങ്ക് വഹിക്കുന്നു. ഇന്ത്യൻ സാഹചര്യത്തിൽ NCF-2005 ഉം അങ്ങനെ തന്നെ ചെയ്യുന്നു. സാങ്കേതികവിദ്യയുടെയും മാധ്യമങ്ങളുടെയും പുരോഗതി കാരണം, ആളുകൾ കൂടുതൽ ഭാഷകളിൽ മുഴുകുകയും അതിന്റെ ഫലമായി സമ്പന്നമായ ഒരു ബഹുഭാഷാ അന്തരീക്ഷം സൃഷ്ടിക്കപ്പെടുകയും ചെയ്യുന്നു. അതിന്റെ ഫലമായി വിദ്യാഭ്യാസ മേഖലയിൽ മാതൃഭാഷാധിഷ്ഠിത ബഹുഭാഷാവിദ്യാഭ്യാസം ആഗോളതലത്തിലും ദേശീയതലത്തിലും വമ്പിച്ച സ്വാധീനം ചെലുത്തിയിട്ടുണ്ട്.

ഭാഷയും മാതൃഭാഷയും

മാതൃഭാഷയുടെ ഉപയോഗം ആവശ്യകരമാണോ എന്ന ചോദ്യത്തിന്റെ ചർച്ച ഭാഷാപരമായും സാമൂഹ്യ-സാംസ്കാരികമായും ഏറെ സജീവവും വികാരാത്മകവുമായൊരു വിഷയമാണ്. ഈ വിഷയത്തിൽ വ്യക്തമായ രണ്ടു പ്രധാന ചിന്താധാരകളുണ്ട് – മാതൃഭാഷയുടെ ഉപയോഗത്തെ പിന്തുണയ്ക്കുന്നവരും അതിന്റെ ആവശ്യമില്ലെന്ന് അവകാശപ്പെടുന്നവരും. ഭാഷയിലൂടെയാണ് ഒരു കുട്ടിക്ക് ലോകം അനുഭവവേദ്യമാകുന്നത്. അതിലൂടെയാണ് അവൻ/അവൾ സ്വന്തം വികാരങ്ങളും ചിന്തകളും ആവിഷ്കരിക്കുന്നത്. മാതൃഭാഷ അവന്റെ/അവളുടെ വ്യക്തിത്വ വികസനവുമായി മാത്രമല്ല, അവരുടെ സമഗ്ര മാനസിക, ബൗദ്ധിക വളർച്ചയുമായി ചേർന്ന് നിലകൊള്ളുന്നു. അതിനാൽ, ഭാഷ വികസിക്കുമ്പോൾ കുട്ടിയുടെ ബോധവും

അനുഭവവുമെല്ലാം രൂപപ്പെടുന്നു.ഭാഷയും സംസ്കാരവും തമ്മിലുള്ള ബന്ധം അത്രയേറെ ഊർജ്ജസ്വലമാണ്. മാതൃഭാഷ മനുഷ്യന്റെ സംസ്കാരിക പാരമ്പര്യത്തെ അറിയിക്കുന്നതിലും പകർന്നുനൽകുന്നതിലും നിർണ്ണായക പങ്ക് വഹിക്കുന്നു. ഒരു സമൂഹത്തിന്റെ നാടോടിക്കഥകൾ, നാടൻപാട്ടുകൾ, പഴഞ്ചൊല്ലുകൾ, ശൈലികൾ, സാഹിത്യരചനകൾ തുടങ്ങിയവ മാതൃഭാഷയിലൂടെയാണ് തലമുറകൾക്കിടയിൽ കൈമാറുന്നത്. മാതൃഭാഷയുടെ അസ്തിത്വം ഒരു വ്യക്തിയുടെ വളർച്ചക്കും സാമൂഹ്യപാരമ്പര്യത്തിന്റെ തുടർച്ചയ്ക്കും അനിവാര്യമാണെന്ന് വ്യക്തമാണ്.

മാതൃഭാഷാധിഷ്ഠിത ബഹുഭാഷാ വിദ്യാഭ്യാസം (MTB-MLE) എന്നത് പഠനത്തിന് ആധാരമാവുന്ന ഭാഷയായി വിദ്യാർത്ഥിയുടെ മാതൃഭാഷയെ ഉപയോഗിക്കുന്നതോടൊപ്പം, മറ്റ് ഭാഷകളിലേക്കുള്ള മാറിപ്പോകൽ കൽ സുസ്ഥിരവും ഫലപ്രദവുമാകുന്ന രീതിയിലാണ് പ്രയോഗവൽക്കരിക്കുന്നത്. ഈ രീതിയിലൂടെ വിദ്യാർത്ഥികൾക്ക് കൃത്യമായ ഭാഷാ അടിസ്ഥാനം ലഭിക്കുകയും അവരവരുടെ സംസ്കാരത്തെയും തിരിച്ചറിവുകളെയും വിദ്യാഭ്യാസത്തിൽ ഉൾക്കൊള്ളിക്കാനാവുകയും ചെയ്യുന്നു. ഭാഷാ വൈവിധ്യങ്ങളുടെ നാടായ ഇന്ത്യയിൽ *Mother-Tongue-Based Multilingual Education (MTB-MLE)* സാമൂഹ്യവളർച്ചയിൽ മുഖ്യ പങ്ക് വഹിക്കുന്നു. നമ്മുടെ രാജ്യത്ത്, കുട്ടികൾക്ക് അവരുടെ മാതൃഭാഷയിൽ വിദ്യാഭ്യാസം ആരംഭിക്കാൻ അവസരം നൽകുന്നത് തുല്യതയും സമൂഹനന്മയും ഉറപ്പാക്കുന്നു.

ആഗോള പശ്ചാത്തലം

വിവിധ രാജ്യങ്ങളുടെയും ചരിത്രത്തിൽ ദ്വിഭാഷാ അല്ലെങ്കിൽ ബഹുഭാഷാ വിദ്യാഭ്യാസത്തെക്കുറിച്ചുള്ള വ്യക്തമായ രേഖകൾ വളരെ വിരളമാണ്. എന്നാൽ ലഭ്യമായ തെളിവുകൾ പ്രകാരം, ഈ മേഖലയിലെ ആദ്യകാല ശ്രമങ്ങളിൽ ഒന്നായി കണക്കാക്കുന്നത് 1839-ൽ അമേരിക്കയിൽ നടന്ന ഒരു സംഭവമാണ്. ആ സമയത്ത് ജർമ്മൻ ഭാഷ സംസാരിക്കുന്ന കുടിയാന കുടുംബങ്ങളുടെ അഭ്യർത്ഥനപ്രകാരം, കുട്ടികൾക്ക് ജർമ്മൻമാതൃഭാഷയിലും ഇംഗ്ലീഷിലും പഠിക്കാൻ കഴിയുന്നവിധത്തിൽ ദ്വിഭാഷാ വിദ്യാഭ്യാസം അവിടെ നടപ്പിലാക്കിയിരുന്നു. ബഹുഭാഷാ വിദ്യാഭ്യാസത്തിന്റെ രേഖപ്പെടുത്തപ്പെട്ട ആദ്യകാല പരിശ്രമങ്ങളിലൊന്ന് ഇതാണ്. 1953-ൽ, യുനെസ്കോ പ്രസിദ്ധീകരിച്ച "വിദ്യാഭ്യാസത്തിൽ പ്രാദേശിക ഭാഷകളുടെ ഉപയോഗം" എന്ന പ്രബന്ധം മാതൃഭാഷയുടെ പ്രാധാന്യത്തെ ശക്തമായി ഉന്നയിക്കുകയും പ്രാദേശിക ഭാഷകളിൽ പ്രാഥമിക വിദ്യാഭ്യാസം നൽകേണ്ടതിന്റെ ആവശ്യകതയും ശുപാർശയും ഉന്നയിക്കുകയും ചെയ്തു. ഈ രേഖ, മാതൃഭാഷയിലുള്ള പഠനം കുട്ടികളിൽ ഗ്രാഹ്യശേഷിയും സംവേദനക്ഷമതയും വളർത്തുന്നതിന് അത്യന്താപേക്ഷിതമാണെന്ന് ആധികാരികമായി പ്രതിപാദിച്ചു. എന്നിരുന്നാലും, അതിന്റെ പ്രസക്തിയും പ്രധാന്യവും പല രാജ്യങ്ങളിലും ഭാവിയിൽ സ്വീകരിക്കപ്പെട്ടില്ല - ദീർഘകാലം അത് പ്രാമുഖ്യമില്ലാതെ തന്നെ നിലകൊണ്ടു.

ഈ അവഗണനയ്ക്ക് ഒടുവിൽ മാറ്റം കണ്ട് തുടങ്ങുന്നത് 1990-കളിലാണ്. ഈ കാലഘട്ടത്തിൽ, യുനെസ്കോ, *SIL International* എന്ന ഭാഷാ ഗവേഷണ-വികസന സ്ഥാപനവും മറ്റ് അന്താരാഷ്ട്ര ഏജൻസികളും ചേർന്ന്, വൈവിധ്യമാർന്ന ഭാഷാസമൂഹങ്ങൾ ഉൾപ്പെടുന്ന രാജ്യങ്ങളിൽ *MLE (Multilingual Education)* സാധ്യതയിൽ വിദ്യാഭ്യാസപദ്ധതികളിൽ

ഉൾപ്പെടുത്താൻ ശ്രമിച്ചു. പ്രത്യേകിച്ച് ആഫ്രിക്ക, ഏഷ്യൻ, ലാറ്റിനമേരിക്കൻ പ്രദേശങ്ങളിൽ MTB-MLE പ്രോത്സാഹിപ്പിക്കാൻ പദ്ധതികൾ നടപ്പിലാക്കി. ഈ നീക്കങ്ങൾക്ക് ഊർജ്ജം നൽകിയത് 2003-ൽ യുനെസ്കോ പുറത്തിറക്കിയ "*Education in a Multilingual World*" (ബഹുഭാഷാ ലോകത്തിലെ വിദ്യാഭ്യാസം) എന്ന നിലപാട് രേഖയായിരുന്നു. ഇത് യുഎൻ സാക്ഷരതാ ദശകത്തിന്റെ (UN Literacy Decade) ഭാഗമായാണ് പുറത്തിറക്കിയത്. ഈ പ്രസിദ്ധീകരണം വിദ്യാഭ്യാസത്തിൽ മാതൃഭാഷയുടെ പങ്ക് ശക്തമായി പിന്തുണച്ചു. പ്രത്യേകിച്ച് ആദിവാസി സമൂഹങ്ങൾ, ആൽപീയ ഭാഷാപ്രവർത്തകർ എന്നിവരുമായി ബന്ധപ്പെട്ട വിദ്യാഭ്യാസ നയങ്ങളിൽ. അതിന്റെ ഭാഗമായി, പല രാജ്യങ്ങളും സാമ്പാന്നത്തിൽ മാതൃഭാഷയിൽ അധിഷ്ഠിതമായി അന്യഭാഷകളുടെ പഠനം ആരംഭിച്ചു. ഇതിലൂടെ, പല രാജ്യങ്ങളിലും വിദ്യാർത്ഥികളുടെ പഠനം സംവേദനാത്മകവും വൈജ്ഞാനികനിഷ്ഠവുമായിത്തീർന്നതായി പഠനങ്ങൾ തെളിയിച്ചു. ഈ ആഗോള നീക്കങ്ങൾ മാതൃഭാഷാധിഷ്ഠിത വിദ്യാഭ്യാസത്തിന് ശക്തമായ ശാസ്ത്രീയതയും സാമ്പത്തികമായ അടിത്തറ ഒരുക്കുകയും, അങ്ങനെ ഒരേയൊരു ഭാഷയ്ക്ക് മാത്രം പ്രാധാന്യം നൽകുന്ന, പഴയ വിദ്യാഭ്യാസനടപടികളിൽ നിന്നുള്ള പുരോഗമനമാക്കി മാറ്റുകയും ചെയ്തു.

ഇന്ത്യയിലെ ദേശീയ വിദ്യാഭ്യാസ നയം

ഇന്ത്യയിലെ വിദ്യാഭ്യാസവിചക്ഷണരും വിദ്യാഭ്യാസത്തിൽ മാതൃഭാഷയുടെ പ്രാധാന്യം കണ്ടെത്തി. ഇന്ത്യൻ സ്കൂൾ പാഠ്യപദ്ധതിയിൽ അടിസ്ഥാന വിദ്യാഭ്യാസത്തിൽ മാതൃഭാഷ ഉൾപ്പെടുത്തുന്നതിലേക്ക് ഈ കണ്ടെത്തൽ നയിച്ചു. ഇത് വിദ്യാർത്ഥികൾക്ക് പുതിയ വാതിലുകൾ

തുറക്കുകയും കൂടുതൽ ഫലപ്രദമായി പഠിക്കാൻ അവരെ പ്രാപ്തരാക്കുകയും ചെയ്തു. പരമ്പരാഗതവും ആധുനികവുമായ വിദ്യാഭ്യാസ സമ്പ്രദായങ്ങൾ തമ്മിലുള്ള വിടവ് നികത്താനും ഇത് സഹായിച്ചു.

2022 ലെ ദേശീയ പാഠ്യപദ്ധതി ചട്ടക്കൂട്, എട്ട് വയസ്സ് വരെ കുട്ടികളെ അവരുടെ മാതൃഭാഷയിൽ (മാതൃഭാഷ) പഠിപ്പിക്കണമെന്ന് ശുപാർശ ചെയ്യുന്നു. 2022ലെ ദേശീയ പാഠ്യപദ്ധതി ചട്ടക്കൂട് (National Curriculum Framework) നിർദ്ദേശിക്കുന്നതുപോലെ, എട്ട് വയസ്സുവരെ കുട്ടികൾക്ക് പഠനം മാതൃഭാഷയിലായിരിക്കേണ്ടത് ആവശ്യമാണ്. ഇത് 2009 ലെ വിദ്യാഭ്യാസ അവകാശ നിയമത്തിലെ (Right to Education Act) അഞ്ചാം അധ്യായത്തിലെ സെക്ഷൻ 29 (എഫ്) മായി ഒത്തുചേരുന്നതാണ്. ആ വകുപ്പ് വ്യക്തമാക്കുന്നത്, "പ്രായോഗികമായി കഴിയുന്നിടത്തോളം, പഠനമാധ്യമം കുട്ടിയുടെ മാതൃഭാഷയിലായിരിക്കണം" എന്നാണ്.

മാതൃഭാഷയിലോ പ്രാദേശിക ഭാഷകളിലോ പാഠ്യവസ്തുക്കളുടെ പരിഭാഷ നടപ്പിലാക്കിയാൽ, വിദ്യാർത്ഥികൾക്ക് വിഷയങ്ങൾ അനായാസമായി ഗ്രഹിക്കാനും അവരുടെ പഠനാനുഭവം സമഗ്രമായി മെച്ചപ്പെടുത്താനും കഴിയും. ഇത്തരമൊരു സമീപനം കുട്ടികളുടെ ബുദ്ധിമുട്ടുകൾ കുറച്ച്, വിദ്യാഭ്യാസത്തിൽ കൂടുതൽ ആഴവും താൽപര്യവും ഒരുക്കുന്നു. 2020 ലെ ദേശീയ വിദ്യാഭ്യാസ നയം നിർദ്ദേശിക്കുന്നത്, പൊതു, സ്വകാര്യ സ്കൂളുകളിൽ "സാധ്യമാകുന്നിടത്തെല്ലാം, കുറഞ്ഞത് 5-ാം ക്ലാസ് വരെ, എന്നാൽ 8-ാം ക്ലാസ് വരെയോ അതിനുശേഷമോ വിദ്യാഭ്യാസ മാധ്യമം മാതൃഭാഷ/പ്രാദേശിക ഭാഷ/ എന്നിവയായിരിക്കണമെന്നാണ്".

വിദ്യാഭ്യാസത്തിൽ മാതൃഭാഷയുടെ പ്രാധാന്യം

കുട്ടികളെ മാതൃഭാഷയിൽ പഠിപ്പിക്കുന്നത്, പ്രത്യേകിച്ച് അടിസ്ഥാന വർഷങ്ങളിൽ (3 മുതൽ 8 വയസ്സ് വരെ), ഉയർന്ന മെമ്മറി നിലനിർത്തൽ, ഉയർന്ന പ്രാവീണ്യം, അതിശയോക്തി കുറഞ്ഞ ഗ്രന്ഥകൾ, മെച്ചപ്പെട്ട പരീക്ഷാ സ്കോറുകൾ എന്നിവയ്ക്ക് കാരണമാകുമെന്ന് വിവിധ ഗവേഷണങ്ങളും തെളിവുകളും തെളിയിച്ചിട്ടുണ്ട്.

1 മികച്ച ഇടപെടൽ

മാതൃഭാഷയിൽ പഠിക്കുന്ന വിദ്യാർത്ഥികൾ പഠന പ്രക്രിയയിൽ കൂടുതൽ വ്യാപൃതരാകുന്നു. കാരണം അവർക്ക് ഉള്ളടക്കം കൂടുതൽ ഫലപ്രദമായി മനസ്സിലാക്കാൻ കഴിയുന്നതിനാലും വിഷയത്തിൽ കൂടുതൽ താൽപ്പര്യമുള്ളതിനാലും മികച്ച പഠന ഫലങ്ങൾ നേടുന്നതിനും കൊഴിഞ്ഞുപോക്ക് കുറയ്ക്കുന്നതിനും ഇത് സഹായിക്കുന്നു.

2 മെച്ചപ്പെട്ട വൈജ്ഞാനിക വികസനം

മാതൃഭാഷയിൽ പഠിക്കുന്ന വിദ്യാർത്ഥികൾക്ക് ആശയങ്ങൾ നന്നായി ഗ്രഹിക്കാനും വിവരങ്ങൾ ഓർമ്മിക്കാനും കഴിയുമെന്ന് യൂനെസ്കോ തെളിയിച്ചിട്ടുണ്ട്. അവർക്ക് ഭാഷയുമായി കൂടുതൽ പരിചയമുണ്ട്, ഒരു വിദേശ ഭാഷയെക്കാൾ നന്നായി അത് മനസ്സിലാക്കാനും കഴിയും. മാതൃഭാഷയെ പഠന മാധ്യമമായി പ്രോത്സാഹിപ്പിക്കുന്നതിലൂടെ, വിദ്യാർത്ഥികൾക്ക് അവരുടെ വൈജ്ഞാനിക കഴിവുകൾ കൂടുതൽ ഫലപ്രദമായി വികസിപ്പിക്കാൻ കഴിയും, അതുവഴി മികച്ച പഠന ഫലങ്ങൾ കൈവരിക്കാൻ കഴിയും. മികച്ച പ്രശ്നപരിഹാരത്തിനും വ്യക്തിപരവും അക്കാദമികവുമായ വിജയത്തിന് അത്യാവശ്യമായ വിമർശനാത്മക ചിന്താശേഷിക്കും സഹായിക്കുന്നു.

3 സാംസ്കാരിക പൈതൃകം സംരക്ഷിക്കൽ

മാതൃഭാഷയെ പഠന മാധ്യമമായി പ്രോത്സാഹിപ്പിക്കുന്നത് രാജ്യത്തിന്റെ സാംസ്കാരിക പൈതൃകം സംരക്ഷിക്കാൻ സഹായിക്കും. സ്വന്തം മാതൃഭാഷയിൽ പഠിക്കുന്നതിലൂടെ, വിദ്യാർത്ഥികൾക്ക് അവരുടെ സംസ്കാരത്തെ കൂടുതൽ ഫലപ്രദമായി മനസ്സിലാക്കാനും അഭിനന്ദിക്കാനും കഴിയും. സാമൂഹിക ഐക്യവും ദേശീയ ഐക്യവും പ്രോത്സാഹിപ്പിക്കുന്നതിന് ഇത് സഹായിക്കും.

4 മെച്ചപ്പെട്ട ആശയവിനിമയ രീതികൾ

സ്വന്തം മാതൃഭാഷയിൽ പഠിക്കുന്നത് വിദ്യാർത്ഥികൾക്ക് മികച്ച ആശയവിനിമയ പാടവം വികസിപ്പിക്കാൻ സഹായിക്കും, കാരണം അവർക്ക് സ്വന്തം മാതൃഭാഷയിൽ സ്വയം പ്രകടിപ്പിക്കാൻ കൂടുതൽ സൗകര്യപ്രദമായിരിക്കും, കൂടാതെ ഭാഷയുടെ സൂക്ഷ്മതകൾ കൂടുതൽ ഫലപ്രദമായി മനസ്സിലാക്കാനും കഴിയും. ഇത് അവരുടെ അക്കാദമിക് പ്രവർത്തനങ്ങളിൽ മാത്രമല്ല, അവരുടെ വ്യക്തിപരവും തൊഴിൽപരവുമായ ജീവിതത്തിലും ഗുണം ചെയ്യും.

ഉദാഹരണത്തിന്, സ്വന്തം മാതൃഭാഷയിൽ പഠിക്കുന്ന വിദ്യാർത്ഥികൾക്ക് സങ്കീർണ്ണമായ പാഠങ്ങൾ നന്നായി വായിക്കാനും മനസ്സിലാക്കാനും കഴിയും, ഇത് അവരെ കോളേജിലും ഭാവി കരിയറിലും വിജയിക്കാൻ സഹായിക്കും.

5 മെച്ചപ്പെട്ട അധ്യാപക-വിദ്യാർത്ഥി ബന്ധം

മാതൃഭാഷയിൽ പഠിപ്പിക്കുന്ന അധ്യാപകർക്ക് വിദ്യാർത്ഥികളുമായി മികച്ച ബന്ധം സ്ഥാപിക്കാൻ കഴിയും. കൂടുതൽ

ഫലപ്രദമായി ആശയവിനിമയം നടത്താനും വിദ്യാർത്ഥിയുടെ ആവശ്യങ്ങൾ മനസ്സിലാക്കാൻ കഴിയുന്നതിനാൽ, ഇത് കൂടുതൽ പോസിറ്റീവ് പഠന അന്തരീക്ഷത്തിലേക്ക് നയിക്കും, ഇത് വിദ്യാർത്ഥികളുടെ മൊത്തത്തിലുള്ള വികസനത്തിന് അത്യാവശ്യമാണ്. അടിസ്ഥാന വിദ്യാഭ്യാസത്തിൽ സാങ്കേതികവിദ്യ പ്രാദേശികവൽക്കരണവുമായി സംയോജിപ്പിക്കുന്നത് പഠനത്തെ കൂടുതൽ സംവേദനാത്മകവും ആകർഷകവുമാക്കുന്നു. അതുവഴി വിദ്യാർത്ഥികൾക്ക് വിഷയങ്ങളും മുഴുവൻ വിദ്യാഭ്യാസ സാമഗ്രികളും വേണ്ടത്ര മനസ്സിലാക്കാൻ കഴിയും.

6 നിയമപരവും ഔപചാരികവുമായ ഭാഷാ പ്രാവീണ്യം

നിയമപരവും ഔപചാരികവുമായ ആശയവിനിമയങ്ങളിൽ മാതൃഭാഷ ഒരു പ്രധാന പങ്ക് വഹിക്കുന്നു, ഭരണപരവും പൊതുജീവിതത്തിലും അതിന്റെ പ്രസക്തി ശക്തിപ്പെടുത്തുന്നു. നിയമപരമായ ഭാഷ മനസ്സിലാക്കുകയും ഉപയോഗിക്കുകയും ചെയ്യുന്നത് പ്രാപ്യതയെ പ്രോത്സാഹിപ്പിക്കുകയും വ്യക്തികളെ നിയമവ്യവസ്ഥയിലും പൗരകാര്യങ്ങളിലും ഇടപഴകാൻ പ്രാപ്തരാക്കുകയും ചെയ്യുന്നു.

ഇന്ത്യയിൽ മാതൃഭാഷ പഠന മാധ്യമമാകുമ്പോൾ നേരിടുന്ന

വെല്ലുവിളികൾ

മാതൃഭാഷയെ അടിസ്ഥാനമാക്കിയുള്ള വിദ്യാഭ്യാസം വിവിധ വെല്ലുവിളികളെ നേരിടുന്നു. ഇതിൽ പ്രധാനപ്പെട്ടവയായി പരിമിതമായ അധ്യാപനസാമഗ്രികൾ, യോഗ്യതയുള്ള അധ്യാപകരുടെ കുറവ്, മാതൃഭാഷാധിഷ്ഠിത വിദ്യാഭ്യാസത്തിന്റെ ഗുണഫലങ്ങളെ കുറിച്ചുള്ള അവബോധത്തിന്റെ അഭാവം എന്നിവ ഉൾപ്പെടുന്നു. കൂടാതെ, ചില മാതാപിതാക്കളും അധ്യാപകരും ഇംഗ്ലീഷ് പോലുള്ള പ്രബലഭാഷകൾക്ക്

മുൻതൂക്കം നൽകുന്നത് മാതൃഭാഷ അധിഷ്ഠിത വിദ്യാഭ്യാസം നടപ്പിലാക്കുന്നതിൽ തടസ്സമായി മാറുന്നു.

1 ഇന്ത്യയിലെ ഭാഷാ വൈവിധ്യം

മാതൃഭാഷാധിഷ്ഠിത വിദ്യാഭ്യാസത്തിന് ഊന്നൽ നൽകുന്ന 2020 ലെ ദേശീയ വിദ്യാഭ്യാസ നയം (NEP) നടപ്പിലാക്കുന്നതിൽ അവസരങ്ങളും വെല്ലുവിളികളും ഉയർത്തുന്നു, പ്രത്യേകിച്ച് സ്കൂൾ വിദ്യാഭ്യാസത്തിന്റെ അടിസ്ഥാനഘട്ടത്തിൽ (ആദ്യ 8 വർഷം). വിദ്യാർത്ഥികളുടെ മാതൃഭാഷയിൽ ആശ്വാസവും ആവിഷ്കാരവും വർദ്ധിപ്പിക്കുന്നതിനൊപ്പം, വൈജ്ഞാനികവും സാംസ്കാരികവുമായ വികസനത്തിനായി ബഹുഭാഷയെ പ്രോത്സാഹിപ്പിക്കുക എന്നതാണ് ലക്ഷ്യം. 2023 ലെ ദേശീയ പാഠ്യപദ്ധതി ചട്ടക്കൂട് (NCF) ത്രിഭാഷാ ഫോർമുലയെ (R1, R2, R3) പിന്തുണയ്ക്കുന്നു, അതേസമയം ഒന്നിലധികം ഭാഷകളിൽ സാക്ഷരതയും പ്രാവീണ്യവും ലക്ഷ്യമിടുന്നു, അതേസമയം ഇന്ത്യയുടെ സാഹിത്യ പൈതൃകത്തോടുള്ള വിലമതിപ്പ് വളർത്തുകയും പാർശ്വവൽക്കരിക്കപ്പെട്ട സമൂഹങ്ങൾക്കും വൈകല്യമുള്ള വിദ്യാർത്ഥികൾക്കും ഉൾക്കൊള്ളുന്ന വിദ്യാഭ്യാസം ഉറപ്പാക്കുകയും ചെയ്യുന്നു.

എന്നിരുന്നാലും, നടപ്പാക്കാൻ കാര്യമായ വെല്ലുവിളികൾ നേരിടുന്നു:

അധ്യാപക ക്ഷാമം: എല്ലാ പ്രാദേശിക, ന്യൂനപക്ഷ ഭാഷകളിലും, പ്രത്യേകിച്ച് ഭാഷാപരമായ ചെറിയ സമൂഹങ്ങളിലും, പ്രാവീണ്യമുള്ള മതിയായ പരിശീലനം ലഭിച്ച അധ്യാപകരെ കണ്ടെത്തുക പ്രയാസമാണ്.

ഭാഷാവൈവിധ്യം: 2011 ലെ സെൻസസ് 270 മാതൃഭാഷകളെ തിരിച്ചറിഞ്ഞതോടെ, എല്ലാ ഭാഷകളിലും പാഠ്യപദ്ധതിയും വിഭവങ്ങളും മാനദണ്ഡമാക്കുന്നത് സങ്കീർണ്ണമായ ഒരു കടമയാണ്.

ആത്യന്തികമായി, NEP 2020 ഉൾക്കൊള്ളുന്നതും മാതൃഭാഷാധിഷ്ഠിതവുമായ വിദ്യാഭ്യാസത്തെ പ്രോത്സാഹിപ്പിക്കുന്നുണ്ടെങ്കിലും, ഫലപ്രദമായി നടപ്പിലാക്കുന്നതിന് അധ്യാപക ലഭ്യത, വിഭവ വികസനം, ദേശീയ പാഠ്യപദ്ധതി മാനദണ്ഡങ്ങളുമായി ഭാഷാ വൈവിധ്യത്തെ സന്തുലിതമാക്കൽ തുടങ്ങിയ പ്രശ്നങ്ങൾ പരിഹരിക്കേണ്ടതുണ്ട്.

2 പ്രാവിണ്യമുള്ള അധ്യാപകരുടെ ലഭ്യത

മാതൃഭാഷാധിഷ്ഠിത അധ്യയനം വിജയകരമായി നടപ്പിലാക്കുന്നത് പ്രാദേശിക ഭാഷകളിൽ ഉയർന്ന തലത്തിലുള്ള പ്രാവിണ്യമുള്ള അധ്യാപകരുടെ ലഭ്യതയെ അടിസ്ഥാനമാക്കിയാണ്. എന്നിരുന്നാലും, ആവശ്യമായ ഭാഷാ വൈദഗ്ദ്ധ്യമുള്ള യോഗ്യതയുള്ള അധ്യാപകരുടെ കുറവ് പലപ്പോഴും ഉണ്ടാകാറുണ്ട്, ഇത് മാതൃഭാഷയിലെ വിദ്യാഭ്യാസത്തിന്റെ ഫലപ്രദമായ വിതരണത്തിന് തടസ്സമാകും. ബഹുഭാഷാ വിദ്യാഭ്യാസം വിജയകരമാകണമെങ്കിൽ, അധ്യാപനപരമായ മാറ്റങ്ങളും ക്ലാസ് മുറിയിൽ നിരവധി ഭാഷകൾ കൈകാര്യം ചെയ്യാനും കൂട്ടിയെ മാതൃഭാഷയിൽ പഠിപ്പിക്കാനും കഴിയുന്ന പരിശീലനം ലഭിച്ച അധ്യാപകരും ഉണ്ടായിരിക്കണം. മാതൃഭാഷയിലുള്ള പുസ്തകങ്ങളുടെ അഭാവം അധ്യാപകന് ഒരു വെല്ലുവിളിയായി മാറിയേക്കാം.

3 അധ്യാപക പരിശീലന പരിപാടികൾ

മാതൃഭാഷാധിഷ്ഠിത പ്രബോധനം നടപ്പിലാക്കുന്നതുമായി ബന്ധപ്പെട്ട വെല്ലുവിളികളെ മറികടക്കാൻ, സമഗ്രവും ലക്ഷ്യബോധമുള്ളതുമായ അധ്യാപക പരിശീലന പരിപാടികൾ അത്യാവശ്യമാണ്. ഈ പരിപാടികൾ പ്രാദേശിക ഭാഷകളിൽ അധ്യാപകരുടെ ഭാഷാ പ്രാവീണ്യം വർദ്ധിപ്പിക്കുന്നതിലും, ആ ഭാഷകൾക്ക് പ്രത്യേകമായുള്ള അധ്യാപന തന്ത്രങ്ങൾ ഉപയോഗിച്ച് അവരെ സജ്ജമാക്കുന്നതിലും, ക്ലാസ് മുറിയിൽ സാംസ്കാരിക സംവേദനക്ഷമത പ്രോത്സാഹിപ്പിക്കുന്നതിലും ശ്രദ്ധ കേന്ദ്രീകരിക്കണം

4 അധ്യാപന സാമഗ്രികളുടെ വികസനം

പ്രാദേശിക ഭാഷകളിൽ പാഠപുസ്തകങ്ങൾ, വർക്ക്ബുക്കുകൾ, അനുബന്ധ വിഭവങ്ങൾ എന്നിവയുൾപ്പെടെ ഉയർന്ന നിലവാരമുള്ള അധ്യാപന സാമഗ്രികളുടെ വികസനവും ലഭ്യതയും ഒരു നിർണായക വെല്ലുവിളിയാണ്. മതിയായതും നിലവാരമുള്ളതുമായ മെറ്റീരിയലുകളുടെ അഭാവം പ്രബോധനത്തിന്റെ ഫലപ്രാപ്തിയെ തടസ്സപ്പെടുത്തുകയും വിദ്യാർത്ഥികൾക്ക് ഗുണനിലവാരമുള്ള വിദ്യാഭ്യാസ സ്രോതസ്സുകളിലേക്കുള്ള പ്രവേശനം പരിമിതപ്പെടുത്തുകയും ചെയ്യും. മാതൃഭാഷയിൽ പുതിയ പഠന സാമഗ്രികൾ വികസിപ്പിക്കുന്നതിന് വലിയ നിക്ഷേപം ആവശ്യമാണ്, പ്രത്യേകിച്ച് ലിപിയില്ലാത്ത ഭാഷകൾക്ക് (കൊക്കണി, ഖാസി, മെഴി).

5 സെക്കൻഡറിയിൽ നിന്ന് ഉന്നത വിദ്യാഭ്യാസത്തിലേക്കുള്ള

മാറ്റം

മാതൃഭാഷയിൽ അധ്യയനം ലഭിക്കുന്ന സെക്കൻഡറി വിദ്യാഭ്യാസത്തിൽ നിന്ന്, ഇംഗ്ലീഷോ മറ്റൊരു ഭാഷയോ അധ്യയന മാധ്യമമായി ഉപയോഗിക്കുന്ന ഉന്നത വിദ്യാഭ്യാസത്തിലേക്ക് വിദ്യാർത്ഥികൾ മാറുമ്പോൾ മറ്റൊരു വെല്ലുവിളി ഉയർന്നുവരുന്നു. വിദ്യാർത്ഥികൾ ഇംഗ്ലീഷിലോ മറ്റ് ഭാഷകളിലോ ആവശ്യമായ

പ്രാവീണ്യം നേടുന്നത് ഉന്നത വിദ്യാഭ്യാസത്തിലും ഭാവിയിലെ കരിയർ അവസരങ്ങളിലും അവരുടെ വിജയത്തിന് നിർണായകമാകും.

ഉപസംഹാരം

മേൽപറഞ്ഞ വിശകലനങ്ങളുടെ അടിസ്ഥാനത്തിൽ, 2020ലെ ദേശീയ വിദ്യാഭ്യാസ നയം (NEP 2020) മാതൃഭാഷയെ പഠനമാധ്യമമായി പ്രോത്സാഹിപ്പിക്കുന്നത് ഗൗരവമുള്ള വെല്ലുവിളികൾ ഉയർത്തുന്നതായും, അതിനോടൊപ്പം നിരവധി ശാക്തീകരണ സാധ്യതകൾ തുറന്ന് കൊടുക്കുന്നതായും വ്യക്തമാകുന്നു. ഭാഷാ വൈവിധ്യം, അധ്യാപക ലഭ്യത, പരിശീലനം, പഠന വിഭവങ്ങളുടെ വികസനം തുടങ്ങിയ മേഖലകളിൽ ആസൂത്രിതവും ഏകീകൃതവുമായ ഇടപെടലുകൾ അനിവാര്യമാണ്. അധ്യാപകർ, നയരൂപകർത്താക്കൾ, വിദ്യാഭ്യാസ സ്ഥാപനങ്ങൾ, രക്ഷിതാക്കൾ എന്നിങ്ങനെയുള്ള വിവിധ ഭാഗധാരികളുടെ സജീവ സഹകരണത്തിലൂടെയാണ് ഈ ലക്ഷ്യങ്ങൾ യാഥാർത്ഥ്യമാക്കാൻ കഴിയുക. ബഹുഭാഷാശേഷിയെയും സാംസ്കാരിക അന്വയശേഷിയെയും ഉൾക്കൊണ്ടുള്ള മാതൃഭാഷാധിഷ്ഠിത വിദ്യാഭ്യാസം, ഇന്ത്യയുടെ വിദ്യാഭ്യാസ രംഗത്ത് സമഗ്രതയുള്ള, ഉൾവായ്പ്പുള്ള, തുല്യതയെ ഉറപ്പാക്കുന്ന ഒരു വിദ്യാഭ്യാസപരിസരം രൂപപ്പെടുത്തുന്നതിനുള്ള ഘടകമായി മാറും. അതിനാൽ, NEP 2020-ൽ മാതൃഭാഷയ്ക്ക് നൽകിയ ഊന്നൽ, ഇന്ത്യൻ വിദ്യാഭ്യാസത്തെ പുതിയ ഒരു ദിശയിലേക്കും, ഉൾവായ്പ്പുള്ള വളർച്ചയിലേക്കും നയിക്കാനുള്ള ഒരു അവസരമായി കണക്കാക്കേണ്ടതായിരിക്കുന്നു.

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മലയാള സാഹിത്യഗ്രന്ഥങ്ങളിലെ ഭാഷ, സ്വത്വം, ജാതി: ഒരു സാമൂഹിക-ഭാഷാ പര്യവേഷണം

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സംഗ്രഹം

വ്യക്തിപരവും കൂട്ടായതുമായ സ്വത്വം രൂപപ്പെടുത്തുന്നതിൽ ഭാഷ പ്രധാന പങ്ക് വഹിക്കുന്നു. ജാതി അടിസ്ഥാനമാക്കി സാമൂഹിക ചട്ടക്കൂടുകളുള്ള ഒരു സമൂഹത്തിൽ അതിന്റെ പങ്ക് വളരെ വലുതാണ്. മലയാള സാഹിത്യത്തിലെ ആദ്യകാല കൃതികളിൽ മുതൽ ആധുനിക കൃതികൾ വരെ ഭാഷ സ്വത്വം ജാതി എന്നിവയുടെ സങ്കീർണ്ണമായ വിഭജനങ്ങളെ പ്രതിഫലിപ്പിക്കുന്നുണ്ട്. വാക്കുകളുടെ തിരഞ്ഞെടുക്കലുകൾ, കഥാപാത്രങ്ങളുടെ സംഭാഷണങ്ങൾ, ആഖ്യാന ശൈലി തുടങ്ങിയവയിലൂടെ മലയാള സാഹിത്യകൃതികൾ ജാതി ശ്രേണികളെ എങ്ങനെയാണ് പ്രതിരോധിക്കുന്നതെന്ന് തിരഞ്ഞെടുത്ത മലയാള കൃതികളെ മുൻനിർത്തി വിശകലനം ചെയ്തു പരിശോധിക്കുന്നു. ഇതിലൂടെ അരികുവെക്കപ്പെട്ട ശബ്ദങ്ങളിലെ ഭാഷാ ശക്തിയുടെയും പ്രതിരോധത്തിന്റെയും ഉപകരണമായി പ്രവർത്തിക്കുന്നതെങ്ങനെയെന്നും അന്വേഷിക്കുന്നു.

താക്കോൽ വാക്കുകൾ : മലയാള സാഹിത്യം, ജാതി, കേരളം , ശബ്ദം, ഭാഷാ ദളിത് , സ്ത്രീ

ആമുഖം

ഇന്ത്യപോലെയുള്ള ഒരു ബഹു ഭാഷാ സമൂഹത്തിൽ ഭാഷയും സാമൂഹികഘടനകളും തമ്മിലുള്ള ബന്ധം സങ്കീർണ്ണവും ആഴത്തിൽ വേരൂന്നിയവയുമാണ്. മലയാള സാഹിത്യത്തിൽ ഭാഷാ കേവലം ആശയം കൈമാറുന്നതിനുള്ള ഒരു മാധ്യമം മാത്രമല്ല, മറിച്ച് സാമൂഹികസ്ഥാനം, ജാതിസ്വത്വം, പ്രതിരോധം, എന്നിവയുടെ അടയാളങ്ങളാണ്. അടിച്ചമർത്തപ്പെട്ട സമൂഹങ്ങളുടെ വാമൊഴി പാരമ്പര്യങ്ങൾ മുതൽ വരേണ്യ എഴുത്തുകാരുടെ പരിഷ്കൃത ഗദ്യം വരെ മലയാള സാഹിത്യം ജാതി ഭാഷാ ആവിഷ്കാരം

പ്രതിഫലിപ്പിക്കുന്നുണ്ട്. ചരിത്രപരമായി മലയാള സാഹിത്യത്തിൽ ആധിപത്യം പുലർത്തിയിരുന്നത് വരേണ്യ ശബ്ദങ്ങളായിരുന്നു. അവരുടെ ഭാഷ പലപ്പോഴും പാർശ്വവത്കരിക്കപ്പെട്ട സമൂഹങ്ങളുടെ ശബ്ദങ്ങളെ ഒഴിവാക്കി. എന്നിരുന്നാലും ദളിത് സമൂഹത്തിൽ നിന്നുള്ള എഴുത്തുകാർ അവരുടെ ജീവിതാനുഭവങ്ങളെ സാഹിത്യത്തിലൂടെ ആവിഷ്കരിക്കാൻ തുടങ്ങിയപ്പോൾ വലിയൊരു മാറ്റത്തിനാണ് സാക്ഷ്യം വഹിച്ചത്. ഇവിടെ അത്രയും നാൾ വേരൂന്നിനിന്നിരുന്ന മുൻനിര ഭാഷാഭേദങ്ങളെയും ആവിഷ്കാരങ്ങളെയും വെല്ലുവിളിച്ചു.

മലയാള സാഹിത്യ കൃതികളിൽ ഭാഷയിലൂടെ ജാതിസ്വത്വം എങ്ങനെ പ്രകടമാവുന്നു എന്നതാണ് ഈ ലേഖനം അന്വേഷിക്കുന്നത്. ഭാഷ ജാതിയെ എങ്ങനെയാണ് സൂചിപ്പിക്കുന്നതിനൊപ്പം അതെ ഭാഷയെ അതിനെതിരെ ചോദ്യം ചെയ്യുവാൻ എഴുത്തുകാർ ഉപയോഗിക്കുന്നതെങ്ങനെയെന്നും പി കേശവദേവ് സി അയ്യപ്പൻ, സാറാജോസഫ്, സന്തോഷ് എച്ചിക്കാണും എന്നിവരുടെ തിരഞ്ഞെടുത്ത കൃതികളെ മുൻനിർത്തിക്കൊണ്ട് ജാതിയുടെ സാമൂഹിക ഭാഷാ രൂപരേഖകൾ കണ്ടെത്തുവാൻ ശ്രമിക്കുന്നു.

കേരളത്തിലെ ഭാഷ ജാതി സ്വത്വം

സാമൂഹിക സ്വത്വ നിർമ്മാണത്തിൽ ഭാഷ ഒരു കേന്ദ്ര ശക്തിയാണ്. മലയാളം ഒരു സാംസ്കാരിക പ്രതീകമായും പ്രായോഗിക മാധ്യമമായും പ്രവർത്തിക്കുന്ന കേരളത്തിൽ, ചരിത്രപരമായ ശ്രേണികൾ, മത പരിഷ്കരണ പ്രസ്ഥാനങ്ങൾ, രാഷ്ട്രീയ മാറ്റങ്ങൾ എന്നിവയാൽ ഭാഷയുടെയും ജാതിയുടെയും വിഭജനം രൂപപ്പെട്ടിട്ടുണ്ട്. കേരളത്തിന്റെ ഭാഷാ പാരമ്പര്യങ്ങളിൽ ജാതിയും സ്വത്വവും എങ്ങനെ ഉൾച്ചേർന്നിരിക്കുന്നുവെന്നും ജാതി അടിസ്ഥാനമാക്കിയുള്ള ഘടനകളെ ശക്തിപ്പെടുത്തുന്നതിനും ചെറുക്കുന്നതിനും മലയാള സാഹിത്യം എങ്ങനെ ഇടം നൽകുന്നുവെന്നും അന്വേഷിക്കുന്നു. ക്ഷേത്ര സംസ്കാരത്താൽ വളരെയധികം സ്വാധീനിക്കപ്പെട്ടതും സംസ്കൃതവൽക്കരിക്കപ്പെട്ടതുമായ ക്ലാസിക്കൽ മലയാളം, വരേണ്യവർഗത്തിന്റെ ഭാഷയായി പരിണമിച്ചു, അതേസമയം താഴ്ന്ന ജാതികളുടെയും ഗോത്ര വിഭാഗങ്ങളുടെയും സംസാരഭാഷ പലപ്പോഴും അശുദ്ധമോ സംസ്കാരമില്ലാത്തതോ ആയി തള്ളിക്കളയപ്പെട്ടു. ഭാഷാപരമായ ഈ അരികുവൽക്കരണം കാരണം, 20-ാം നൂറ്റാണ്ട് വരെ സാഹിത്യസൃഷ്ടിയിൽ താഴ്ന്ന ജാതിക്കാരുടെ ശബ്ദങ്ങൾ വളരെ അപൂർവ്വമായി മാത്രമേ കേട്ടിരുന്നുള്ളൂ. പൊതുചർച്ചകൾ , പാഠപുസ്തകങ്ങൾ, റേഡിയോ, പത്രങ്ങൾ എന്നിവയിൽ പ്രചരിപ്പിച്ചിരുന്ന മലയാളം, ഭൂരിപക്ഷം ജനങ്ങളുടെയും, പ്രത്യേകിച്ച് ദളിതരുടെയും ആദിവാസികളുടെയും സംസാരരീതിയിൽ നിന്ന് വളരെ അകലെയായിരുന്നു.

19-ാം നൂറ്റാണ്ടിന്റെ അവസാനത്തിലും 20-ാം നൂറ്റാണ്ടിന്റെ തുടക്കത്തിലും ശ്രീനാരായണ ഗുരു, അയ്യങ്കാളി, ചട്ടമ്പി സ്വാമികൾ തുടങ്ങിയ വ്യക്തികൾ നയിച്ച സാമൂഹിക പരിഷ്കരണ പ്രസ്ഥാനങ്ങൾ ജാതിയുടെ ആധിപത്യത്തെ വെല്ലുവിളിക്കുന്നതിൽ പരിവർത്തനാത്മക പങ്ക് വഹിച്ചു. ഈ പ്രസ്ഥാനങ്ങൾ സാമൂഹിക സമത്വം ആവശ്യപ്പെട്ടു എന്നു മാത്രമല്ല, ഭാഷയ്ക്കും സാഹിത്യത്തിനും മേലുള്ള ഉയർന്ന ജാതിക്കാരുടെ കുത്തകയെ ചോദ്യം ചെയ്യുകയും ചെയ്തു. ഒരാളുടെ ഭാഷ ഒരാളുടെ ജീവിച്ചിരിക്കുന്ന യാഥാർത്ഥ്യത്തെ പ്രതിഫലിപ്പിക്കണമെന്ന ആശയം പ്രചാരം നേടി. അതേ സമയം, മലയാള അച്ചടി വികസിച്ചതോടെ അരികുവൽക്കരിക്കപ്പെട്ട ശബ്ദങ്ങൾക്ക് പുതിയ ഇടങ്ങൾ ലഭിച്ചു.

20-ാം നൂറ്റാണ്ടിന്റെ മധ്യത്തോടെ, മലയാള സാഹിത്യം കാര്യമായ മാറ്റങ്ങൾക്ക് സാക്ഷ്യം വഹിക്കാൻ തുടങ്ങി. കേശവദേവ്, തകഴി ശിവശങ്കരപ്പിള്ള, വൈക്കം മുഹമ്മദ് ബഷീർ തുടങ്ങിയ എഴുത്തുകാർ ഭാഷാപരവും, മണ്ണിന്റെ സ്വഭാവമുള്ളതും, സാധാരണക്കാരുടെ സംസാരത്തിൽ വേരുന്നിയതുമായ പ്രാദേശിക മലയാളം ഉപയോഗിക്കാൻ തുടങ്ങി. ഈ മാറ്റം വിപ്ലവകരമായിരുന്നു, കാരണം അത് ദൈനംദിന ഭാഷയ്ക്ക് അന്തസ്സ് നൽകുകയും മുമ്പ് ഒഴിവാക്കപ്പെട്ട സമൂഹങ്ങളുടെ ശബ്ദങ്ങൾ ഉൾപ്പെടുത്തുകയും ചെയ്തു. എന്നിട്ടും, ഭാഷാ ഉപയോഗത്തിൽ ജാതി സൂക്ഷ്മമായി നിലനിൽക്കുന്ന ഒരു അന്തർധാരയായി തുടർന്നു. ദലിത് കഥാപാത്രങ്ങളെ ചിത്രീകരിച്ചപ്പോഴും, അവരുടെ ഭാഷയെ പലപ്പോഴും ദലിത് ഇതര എഴുത്തുകാർ ഹാസ്യനുകരണമായും സഹതാപത്തിന്റേയോ വിദേശീയതയുടെയോ മുഖം നൽകി അവതരിപ്പിക്കുകയോ ചെയ്തിരുന്നു. 1980 കളിലും 1990 കളിലും ദലിത് എഴുത്തുകാർ സ്വത്വവും പ്രതിരോധവും ഉറപ്പിക്കാൻ ഭാഷാഭേദം, വാമൊഴി ശൈലികൾ എന്നിവ മനഃപൂർവ്വം ഉപയോഗിച്ചുകൊണ്ട് തങ്ങളുടെ രചനകൾ പ്രസിദ്ധീകരിക്കാൻ തുടങ്ങിയപ്പോഴാണ് യഥാർത്ഥ ഭാഷാപരമായ വിള്ളൽ ഉണ്ടായത്.

ക്ലാസിക്കൽ മലയാള സാഹിത്യത്തിലെ ജാതിയും അധികാര ഭാഷയും

ജാതി ശ്രേണി ആഴത്തിൽ വേരുന്നിയ ഒരു സാമൂഹിക-സാംസ്കാരിക പശ്ചാത്തലത്തിലാണ് ക്ലാസിക്കൽ മലയാള സാഹിത്യം വികസിച്ചത്. നിഷ്പക്ഷമോ സാർവത്രികമോ ആകുന്നതിനുപകരം, നിലവിലുള്ള അധികാര ഘടനകളെ പ്രതിഫലിപ്പിക്കുകയും ശക്തിപ്പെടുത്തുകയും ചെയ്ത ഭാഷയിലൂടെ

ആയിരുന്നു ഇത്. പ്രത്യേകിച്ച് സംസ്കൃതവൽക്കരിക്കപ്പെട്ട മലയാളത്തിന്റെ ഉപയോഗം, ഭക്തിയുടെയും ധാർമ്മികതയുടെയും പ്രമേയങ്ങൾ, കീഴാള ശബ്ദങ്ങളുടെ മായ്ച്ചുകളയൽ എന്നിവയെല്ലാം ജാതി സാഹിത്യ ഉൽപാദനത്തെ എങ്ങനെ രൂപപ്പെടുത്തി എന്നതിന്റെ സൂചകങ്ങളായിരുന്നു.

ആദ്യകാല മലയാള സാഹിത്യത്തിന്റെ ഭൂരിഭാഗവും സംസ്കൃതത്തിന്റെയും മലയാളത്തിന്റെയും സങ്കരയിനമായ മണിപ്രവാളത്തിലാണ് എഴുതിയത്. നമ്പൂതിരി ബ്രാഹ്മണരും ക്ഷേത്ര കവികളും പ്രധാനമായും ഉപയോഗിച്ചിരുന്ന ഈ ശൈലി, മനോഹരവും വരേണ്യവുമായിരുന്നു, മലയാളത്തെ ക്ലാസിക്കൽ സംസ്കൃത പാരമ്പര്യങ്ങളുമായി സമന്വയിപ്പിക്കാൻ രൂപകൽപ്പന ചെയ്തതായിരുന്നു. ലീലാതിലകം, കൃഷ്ണഗാഥ തുടങ്ങിയ ഗ്രന്ഥങ്ങൾ ഈ പ്രവണതയെ പ്രകടമാക്കുന്നു.

സംസ്കൃതവൽക്കരിച്ച ഒരു ശൈലിയുടെ തിരഞ്ഞെടുപ്പ് താഴ്ന്ന ജാതിക്കാരുടെ ഭാഷാ രീതികളെ ഫലപ്രദമായി ഒഴിവാക്കി. ഉയർന്ന ജാതിക്കാർ ഭക്തി കവിതകൾ, ക്ഷേത്ര വിവരണങ്ങൾ, കഥകളി എന്നീ അലങ്കാര രൂപങ്ങളിൽ രചിച്ചപ്പോൾ അടിച്ചമർത്തപ്പെട്ടവരുടെ വാമൊഴി പാരമ്പര്യങ്ങൾ, പാട്ടുകൾ, കഥകൾ എന്നിവ ലിഖിത നിയമത്തിന് പുറത്തായിരുന്നു. ഇത് സാമൂഹിക ശ്രേണിയെ പ്രതിഫലിപ്പിക്കുന്ന ഒരു ഭാഷാ ശ്രേണി സൃഷ്ടിച്ചു.

ക്ലാസിക്കൽ സാഹിത്യം അരികുവൽക്കരിക്കപ്പെട്ട സമൂഹങ്ങളിൽ നിന്നുള്ള കഥാപാത്രങ്ങൾക്ക് വളരെ അപൂർവമായി മാത്രമേ ശബ്ദം നൽകിയിട്ടുള്ളൂ. കവിതകളിലോ നാടകങ്ങളിലോ പുലയരെയോ പറയരെയോ പോലുള്ളവർ പ്രത്യക്ഷപ്പെട്ടപ്പോൾ, അവരെ പലപ്പോഴും അപമാനകരമോ, ഹാസ്യപരമോ, വിധേയത്വപരമോ ആയ വേഷങ്ങളിലാണ് ചിത്രീകരിച്ചിരുന്നത്. അവരുടെ താഴ്ന്ന നിലവാരത്തെ ശക്തിപ്പെടുത്തുന്ന വിധത്തിൽ അവരുടെ സംസാരം ശൈലീകരിച്ചിരുന്നു. ഉദാഹരണത്തിന്, എഴുത്തച്ഛന്റെ അധ്യാത്മ രാമായണത്തിൽ, പ്രാപ്യമായ മലയാളത്തിൽ എഴുതിയതാണെങ്കിലും, ജാതിവ്യവസ്ഥയുമായി പൊരുത്തപ്പെടുന്ന ഒരു ആത്മീയ ശ്രേണി നിലനിർത്തുന്നു. താഴ്ന്ന ജാതി കഥാപാത്രങ്ങൾ ഒന്നുകിൽ ഇല്ലാതിരിക്കുകയോ അല്ലെങ്കിൽ ഉയർന്ന ജാതിക്കാരായ വ്യക്തികളെ ആത്മീയമായി ആശ്രയിക്കുകയോ ചെയ്യുന്നു.

ഫ്യൂഡൽ ഭൂപ്രഭുക്കന്മാർ സംരക്ഷിക്കുന്ന സാഹിത്യ-നാടക കലാരൂപമായ കഥകളി പോലും സംസ്കൃതവൽക്കരിക്കപ്പെട്ട ഭാഷയും ഇതിഹാസങ്ങളിൽ നിന്നുള്ള പ്രമേയങ്ങൾ മാത്രം ഉൾക്കൊള്ളുന്നവയും ആയിരുന്നു, സാധാരണക്കാരുടെ ജീവിതത്തെക്കുറിച്ച് വലിയ ആശങ്ക അവക്കുണ്ടായിരുന്നില്ല.

വിദ്യാഭ്യാസത്തിലേക്കും ലിപിയിലേക്കുമുള്ള പ്രവേശനം തന്നെ ഒരു പ്രത്യേക പദവിയുടെ അടയാളമായിരുന്നു. ആധുനികകാലത്തിനു മുമ്പുള്ള കേരളത്തിൽ, ഗ്രന്ഥ ലിപിയും മലയാള ലിപിയുടെ ആദ്യകാല രൂപങ്ങളും ബ്രാഹ്മണ പണ്ഡിതന്മാരായിരുന്നു നിയന്ത്രിച്ചിരുന്നത്. വേദങ്ങൾ പോലുള്ള വിശുദ്ധ ഗ്രന്ഥങ്ങൾ വായിക്കുന്നതിലുള്ള ജാതി അടിസ്ഥാനത്തിലുള്ള നിയന്ത്രണങ്ങൾ താഴ്ന്ന ജാതിക്കാർക്ക് പലപ്പോഴും സാഹിത്യത്തിലേക്കുള്ള പ്രവേശനം മാത്രമല്ല, എഴുത്തിന്റെ ഭാഷയും നിഷേധിച്ചിരുന്നു. അങ്ങനെ, ഭാഷ സാമൂഹിക നിയന്ത്രണത്തിനുള്ള ഒരു ആയുധമായി മാറി: ഭാഷയെ നിയന്ത്രിച്ചവർ അതിന്റെ എഴുത്ത് രൂപം, സൗന്ദര്യശാസ്ത്രം, ദൈവികതയുമായുള്ള ബന്ധം എന്നിവയിലൂടെ സമൂഹത്തിന്റെ ആഖ്യാനത്തെയും നിയന്ത്രിച്ചു. സാഹിത്യ ഭാഷ സൗന്ദര്യത്തെയോ സർഗ്ഗാത്മകതയെയോ കുറിച്ചുള്ളതല്ല, മറിച്ച് നിയമസാധുത, വിശുദ്ധി, ശക്തി എന്നിവയെക്കുറിച്ചായിരുന്നു.

19-ാം നൂറ്റാണ്ടിന്റെ അവസാനത്തിലും 20-ാം നൂറ്റാണ്ടിന്റെ തുടക്കത്തിലും അച്ചടി സംസ്കാരം വികസിക്കുകയും പരിഷ്കർത്താക്കൾ സംസാര ഭാഷയുടെ മൂല്യം ഊന്നിപ്പറഞ്ഞതോടെ ഭാഷാപരമായ മാറ്റങ്ങൾക്ക് സാക്ഷ്യം വഹിക്കാൻ തുടങ്ങി. ഭാഷാ പോഷിണി സഭ, മലയാള മനോരമ, മറ്റ് ജേണലുകൾ എന്നിവ സാഹിത്യ ഭാഷയുടെ വികസനത്തെ പ്രോത്സാഹിപ്പിച്ചു. എന്നിരുന്നാലും, ഈഴവ സാമൂഹിക പരിഷ്കർത്താവായ കുമാരനാശാൻ, കേശവദേവ് തുടങ്ങിയ എഴുത്തുകാർ ഭാഷയ്ക്കും പ്രാതിനിധ്യത്തിനും വേണ്ടി വാദിക്കാൻ തുടങ്ങുന്നതുവരെ ക്ലാസിക്കൽ പ്രവണതകൾ ആധിപത്യം പുലർത്തി. ആശാന്റെ കവിതകൾ ആത്മീയ സമത്വത്തിന്റെയും മാനുഷിക അന്തസ്സിന്റെയും പ്രമേയങ്ങൾ അവതരിപ്പിച്ച് ക്ലാസിക്കൽ സാഹിത്യത്തിന്റെ യാഥാസ്ഥിതികതയെ നേരിട്ട് വെല്ലുവിളിച്ചു. അദ്ദേഹത്തിന്റെ "ദുരവസ്ഥ" ഒരു അന്തർജാതി ദമ്പതികളുടെ ദുരവസ്ഥ കൈകാര്യം ചെയ്യുന്നു,

ക്ലാസിക്കൽ മലയാള സാഹിത്യം ജാതി അടിസ്ഥാനമാക്കിയുള്ള ഭാഷയിലൂടെ രൂപപ്പെടുകയും നിലനിൽക്കുകയും ചെയ്തു. സംസ്കൃതവൽക്കരണം, ശൈലീപരമായ പ്രത്യേകത, കീഴാള ഭാഷകളുടെ നിശബ്ധത എന്നിവ സൗന്ദര്യാത്മകമായി സമ്പന്നവും എന്നാൽ സാമൂഹികമായി ഒഴിവാക്കപ്പെടുന്നതുമായ ഒരു സാഹിത്യ ഇടം സൃഷ്ടിച്ചു. ആധുനിക മലയാള സാഹിത്യം എങ്ങനെയാണ് ചെറുത്തുനിൽപ്പിന്റെ ഒരു വേദിയായി ഉയർന്നുവന്നതെന്ന് കണ്ടെത്തുന്നതിന് ഈ ചരിത്രം മനസ്സിലാക്കേണ്ടത്

അത്യാവശ്യമാണ് - അവിടെ ഭാഷ ജാതി മുൻഗണനകളെ വെല്ലുവിളിക്കാനും തകർക്കാനുമുള്ള ഒരു മാർഗമായി മാറി.

പ്രാന്തപ്രദേശങ്ങളിൽ നിന്നുള്ള ശബ്ദങ്ങൾ - ആധുനിക മലയാള പാഠങ്ങളിലെ കീഴാള ഭാഷാഭേദങ്ങൾ

മുൻകാല മലയാള സാഹിത്യം പലപ്പോഴും ഉയർന്ന ജാതി എഴുത്തുകാരുടെ വീക്ഷണകോണിൽ നിന്ന് താഴ്ന്ന ജാതി കഥാപാത്രങ്ങളെ പ്രതിനിധീകരിച്ചിരുന്നു. ഈ ചിത്രീകരണങ്ങൾ സാധാരണയായി സഹാനുഭൂതിയുള്ളവയായിരുന്നു. പക്ഷേ അപൂർവ്വമായി ആധികാരികമായിരുന്നു. ഈ കഥാപാത്രങ്ങൾക്ക് ആരോപിക്കപ്പെടുന്ന ഭാഷ പലപ്പോഴും ലളിതവൽക്കരിക്കപ്പെട്ടതോ, ഹാസ്യവത്കരിച്ചതോ, വിദേശീയവൽക്കരിച്ചതോ ആയിരുന്നു, അവയെ പൊളിച്ചുമാറ്റുന്നതിനു പകരം സ്റ്റീരിയോടൈപ്പുകളെ ശക്തിപ്പെടുത്തുന്നതായിരുന്നു.

പ്രാതിനിധ്യത്തിൽ നിന്ന് സ്വയം ആവിഷ്കാരത്തിലേക്ക് മാറിയപ്പോൾ സ്വന്തം വാക്കുകളിൽ സ്വന്തം ജീവിതയാഥാർത്ഥ്യങ്ങൾ വിവരിക്കാൻ തുടങ്ങി. ഗ്രാമീണ, ജാതി-നിർദ്ദിഷ്ട ശൈലികൾ ഇടകലർത്തി നിലവാരമില്ലാത്ത മലയാളത്തിന്റെ ഉപയോഗം രാഷ്ട്രീയവും സാംസ്കാരികവുമായ ഒരു പ്രസ്താവനയായി മാറി. സി. അയ്യപ്പന്റെ "ഭ്രാന്ത്" "പ്രേതഭാഷണം" പോലുള്ള ചെറുകഥകളിൽ, സംഭാഷണങ്ങൾ തൊഴിലാളിവർഗ ദലിതരുടെ വൈകാരികമായ, അവർ നേരിട്ടുള്ള, സംസാരത്തെ പ്രതിഫലിപ്പിക്കുന്നു. സ്വരത്തിന്റെ കാഠിന്യം മനഃപൂർവ്വമാണ്. അത് കഥാപാത്രങ്ങൾ അനുഭവിക്കുന്ന മാനസിക അക്രമത്തെ പ്രതിഫലിപ്പിക്കുന്നു. പല ദലിത്, കീഴാള എഴുത്തുകാർക്കും അവരുടെ സാഹിത്യ വിവരണങ്ങൾ നിർമ്മിക്കുന്നതിന് നാടോടി ഗാനങ്ങൾ, വിലാപങ്ങൾ തുടങ്ങിയ വാമൊഴി പാരമ്പര്യങ്ങളിൽ നിന്ന് പ്രചോദനം ലഭിക്കുന്നു ഈ സംയോജനം നാടോടി സംസ്കാരത്തെ സൗന്ദര്യാത്മകമാക്കുന്നതിനേക്കാൾ ലിഖിത, വരേണ്യ ഗ്രന്ഥങ്ങളെ വെല്ലുവിളിക്കുന്നു.

സമകാലികസമൂഹത്തിന്റെ ആതുരാവസ്ഥയിലേക്ക് വിരൽ ചൂണ്ടുന്ന കഥയാണ് സന്തോഷ് എഴുതുന്നതിന്റെ പന്തിഭാജനം. പന്തിഭാജനം എന്ന ശീർഷകം തന്നെ നർമ്മം കലർന്ന വിമർശനസ്പർശമുള്ളതാണ്. വക്കീലന്മാരുടെ വിശ്രമമുറിയിൽ ഉച്ചയൂണിന്റെ സമയത്തു നടക്കുന്ന

കൊച്ചുവർത്തമാനങ്ങളിലൂടെ വ്യക്തിമനസ്സിലും സമൂഹമനസ്സിലും വേരുപിടിപ്പിച്ചിട്ടുള്ള ജാതിബോധത്തിന്റെ ഉള്ളറകളാണ് തുറക്കപ്പെടുന്നത്. ജാതി ഭേദങ്ങൾ നശിപ്പിക്കുന്നതിനു വേണ്ടി വ്യത്യസ്ത ജാതിയിൽപ്പെട്ടവരെ ഒരുമിച്ചിരുത്തി ഭക്ഷണം കഴിപ്പിക്കുന്നതിനു വേണ്ടി സാമൂഹ്യപരിഷ്കർത്താക്കൾ നടത്തിയ പരിപാടിയായിരുന്നല്ലോ പന്തിഭോജനം. എന്നാൽ ഇവിടുത്തെ പന്തിഭോജനത്തിലോ? തൊഴിൽ കണ്ട് ഒരേ ജാതിക്കാരാണെങ്കിലും ഉള്ളിൽ വ്യത്യസ്ത ജാതിചിഹ്നങ്ങൾ പുലർത്തുന്നവരും അതിനനുസൃതമായ താൽപര്യങ്ങൾ കൊണ്ടുനടക്കുന്നവരുമാണ് ഇതിലെ കഥാപാത്രങ്ങളായ യുവ അഭിഭാഷകർ, സുറിയാനി ക്രിസ്ത്യാനിയായ സൂസൻ ഇമ്മാനുവലിനും ബ്രാഹ്മണവിഭാഗത്തിൽപ്പെട്ട സംഗീതാനുമൃതിരിക്കും, രമ്യാനായർക്കും സ്വന്തം സവർണ്ണലക്ഷണങ്ങൾ മാച്ച്ച്ചു കളയാൻ കഴിഞ്ഞിട്ടില്ല

ആധുനിക മലയാള സാഹിത്യത്തിലെ കീഴാള ഭാഷാഭേദങ്ങൾ പ്രാദേശിക നിറമോ ആധികാരികതയോ ചേർക്കുന്നതിനേക്കാൾ കൂടുതൽ പോരാട്ടത്തിന്റെയും സ്ഥിരീകരണത്തിന്റെയും ഒരു സ്ഥലമാക്കി മാറ്റുന്നു. ആധിപത്യ സംസ്കാരത്താൽ അരികുവൽക്കരിക്കപ്പെട്ട ഭാഷാ രൂപങ്ങളുടെ ബോധപൂർവമായ ഉപയോഗത്തിലൂടെ, ഈ എഴുത്തുകാർ സ്വത്വം വീണ്ടെടുക്കുകയും സ്വയംഭരണം ഉറപ്പിക്കുകയും കേരളത്തിന്റെ സാംസ്കാരിക ഭാവനയെ തിരുത്തിയെഴുതുകയും ചെയ്യുന്നു.

മലയാള സാഹിത്യത്തിലെ ദലിത്, സ്ത്രീവാദ ഇടപെടലുകൾ

സാഹിത്യത്തിലെ പ്രതിഷേധം എല്ലായ്പ്പോഴും ഉച്ചത്തിലായിരിക്കില്ല; ചിലപ്പോൾ അത് ഭാഷ, രൂപം, ശബ്ദം എന്നിവയിൽ സൂക്ഷ്മമായി ഇഴചേർന്നിരിക്കുന്നു. മലയാള സാഹിത്യത്തിന്റെ കാര്യത്തിൽ, അരികുവൽക്കരിക്കപ്പെട്ട സമൂഹങ്ങളിൽ നിന്നുള്ള എഴുത്തുകാർ - പ്രത്യേകിച്ച് ദലിതരും സ്ത്രീകളും - കഥകൾ പറയാൻ മാത്രമല്ല, സാമൂഹിക ഘടനകളെ വെല്ലുവിളിക്കാനും ഭാഷ ഉപയോഗിച്ചിട്ടുണ്ട്. പാരമ്പര്യേതര പദപ്രയോഗം, സാഹിത്യ കൺവെൻഷനുകൾ നിരസിക്കൽ, ബദൽ ശബ്ദങ്ങളുടെ അവകാശവാദം എന്നിവയിലൂടെ, അവരുടെ ഭാഷ പ്രതിരോധത്തിന്റെ ഒരു ഉപകരണമായി മാറുന്നു.

മലയാളത്തിലെ ദലിത് എഴുത്തുകാർ പലപ്പോഴും മുഖ്യധാരാ സാഹിത്യത്തിന്റെ ശുദ്ധീകരിച്ചതും മിനുക്കിയതുമായ മലയാളത്തെ മനഃപൂർവ്വം തടസ്സപ്പെടുത്തുന്ന ഒരു ശൈലിയിലാണ് എഴുതുന്നത്. അവരുടെ ഭാഷാപരമായ തിരഞ്ഞെടുപ്പുകൾ സാംസ്കാരിക സ്ഥിരീകരണത്തെയും ചരിത്രപരമായ

അനീതിയോടുള്ള കോപത്തെയും പ്രതിഫലിപ്പിക്കുന്നു. കഥാപാത്രങ്ങൾ സഹതാപം തേടുന്നില്ല; അവർ നീതി ആവശ്യപ്പെടുന്നു. ഉയർന്ന സാഹിത്യത്തിന്റെ മിനുക്കിയ വ്യാകരണത്തെ നിരാകരിക്കുന്ന അവരുടെ ഭാഷ ഏറ്റുമുട്ടൽ നിറഞ്ഞതും അനുഭവപരവും പലപ്പോഴും വേദനാജനകവുമാണ്.

ആലാഹയുടെ പെൺമക്കൾ പോലുള്ള കൃതികളിൽ സാറാ ജോസഫ് അടിച്ചമർത്തപ്പെട്ട സ്ത്രീകളെക്കുറിച്ച് എഴുതുക മാത്രമല്ല, പ്രാദേശിക ഭാഷാശൈലികൾ, കത്തോലിക്കാ ക്രിസ്ത്യൻ ആവിഷ്കാരങ്ങൾ എന്നിവയോടൊപ്പം ഒരു പെൺകുട്ടിയുടെ ശബ്ദം ഉപയോഗിച്ച് വ്യവസ്ഥിതിയെ വെല്ലുവിളിക്കുന്നു.

അടിച്ചമർത്തപ്പെട്ടവർ ഉപയോഗിക്കുമ്പോൾ ഭാഷ ഒരു ഉപകരണത്തേക്കാൾ കൂടുതലായി വിമോചനത്തിനുള്ള ആയുധമായി മാറുന്നു. മലയാള സാഹിത്യത്തിൽ, ദലിത്, സ്ത്രീവാദ എഴുത്തുകാർ ഭാഷയെ പ്രതിഷേധത്തിന്റെ ഒരു വേദിയാക്കി മാറ്റി, കേൾക്കാത്ത ശബ്ദങ്ങൾക്കായി പുതിയ ഇടങ്ങൾ സൃഷ്ടിച്ചു. അവരുടെ പ്രതിരോധം അവർ എന്താണ് പറയുന്നത് എന്നതിൽ മാത്രമല്ല, അവർ അത് എങ്ങനെ പറയുന്നു എന്നതിലും - അവർ ആരെ അനുകരിക്കാൻ വിസമ്മതിക്കുന്നു എന്നതിലും ആണ്.

സി. അയ്യപ്പന്റെ ചെറുകഥകളിലെ ജാതിയുടെയും പ്രതിരോധത്തിന്റെയും ഭാഷ

മലയാള സാഹിത്യത്തിലെ ഒരു വിപ്ലവകരമായ ദലിത് ചെറുകഥാകൃത്തായി സി. അയ്യപ്പൻ (1943-2005) പരക്കെ അംഗീകരിക്കപ്പെട്ടിട്ടുണ്ട്. അദ്ദേഹത്തിന്റെ കഥകൾ അസംസ്കൃതവും ശക്തവും ഭാഷാപരമായി ധൈര്യശാലിയുമാണ്. കേരളത്തിലെ ദലിത് തൊഴിലാളിവർഗത്തിന്റെ ജീവിതാനുഭവങ്ങളെ അവ പ്രതിഫലിപ്പിക്കുകയും ജാതീയ മുഖ്യധാരാ സാഹിത്യ പാരമ്പര്യങ്ങൾക്ക് വിരുദ്ധമായ ആഖ്യാനങ്ങളായി വർത്തിക്കുകയും ചെയ്യുന്നു. അയ്യപ്പന്റെ എഴുത്തിനെ അതുല്യമാക്കുന്നത് അദ്ദേഹം എന്തിനെക്കുറിച്ചാണ് എഴുതുന്നത് എന്നതു മാത്രമല്ല, ഭാഷയെ ആവിഷ്കാരത്തിനും പ്രതിഷേധത്തിനുമുള്ള ഒരു ഉപകരണമായി ഉപയോഗിക്കുന്ന രീതിയുമാണ്.

പ്രേതഭാഷണം എന്ന പ്രസിദ്ധകഥയിൽ കാമുകൻ വഞ്ചിച്ചതുകൊണ്ട് ആത്മഹത്യചെയ്ത പെണ്ടി കുട്ടിയാണ് നായിക. മരണാനന്തരം പതിനാറാം നാൾ അവൾ ശവകുടീരത്തിൽ നിന്ന് എഴുന്നേറ്റ് പ്രതികാരത്തിനായി കാമുകന്റെ വീട്ടിലെത്തുന്നു. അവിടെ കുഞ്ഞാക്കോവ് (കുഞ്ഞ്) എന്ന കാമുകനുണ്ടായിരുന്നില്ല. കാമുകന്റെ സഹോദരി റോസിക്കുട്ടിയോട് ആ പ്രേതം അഥവാ ദുരാത്മാവ്

സംസാരിക്കുന്ന രീതിയിലാണ് ഈ കഥ മുന്നോട്ടു പോകുന്നത്. നമ്മുടെ സമൂഹത്തിൽ ദലിത് സ്ത്രീകൾ അനുഭവിക്കുന്ന വലിയ ചൂഷണമാണ് ഈ കഥയ്ക്ക് ആധാരം, സ്വാതന്ത്ര്യാനന്തരം നമ്മുടെ സാമൂഹിക ജീവിതത്തിൽ വന്ന മാറ്റങ്ങളെല്ലാം ഉപരിപ്ലവമാണെന്നും സമൂഹം പഴയ അനാചാരങ്ങളെയും അന്ധവിശ്വാസങ്ങളെയും ജാതിവ്യവസ്ഥയെയും പിൻതുടരുകയാണെന്നും കഥ പറഞ്ഞുവെയ്ക്കുന്നു. ദലിത് സ്ത്രീകളെ അടിമകളായിക്കാണുന്ന മനോഭാവം നിലനിൽക്കുന്ന മനോരോഗമാണെന്നും കഥ തെളിയിക്കുന്നു. സ്നേഹത്തിനു വേണ്ടി നിലകൊള്ളുന്ന നിഷ്കളങ്കയായ പെൺകുട്ടിയെ ആസൂത്രിതമായി ആത്മഹത്യയിലേക്ക് തള്ളിവിടുന്നതോ കൊലപ്പെടുത്തുന്നതോ ഒരു സാമൂഹിക ആചാരമായി മാറുന്നത് ഭദ്രമായി ഈ കഥയിൽ ആവിഷ്കരിച്ചിരിക്കുന്നു.

പ്രാദേശിക മലയാളത്തിന്റെ മുർച്ചയുള്ള ഉപയോഗത്തിലൂടെയും, ഔപചാരിക പാരമ്പര്യങ്ങളെ നിരാകരിക്കുന്നതിലൂടെയും, ദലിത് ജീവിതത്തിന്റെ നിരുപാധികമായ ചിത്രീകരണത്തിലൂടെയും, സാഹിത്യത്തിന് രാഷ്ട്രീയമായി സമൂലവും സൗന്ദര്യാത്മകവുമായ ശക്തിയുണ്ടാകാമെന്ന് അയ്യപ്പൻ തെളിയിക്കുന്നു. മലയാള സാഹിത്യ വ്യവഹാരത്തിൽ ഭാഷ, സ്വത്വം, ജാതി എന്നിവ എങ്ങനെ ആഴത്തിൽ ഇഴചേർന്നിരിക്കുന്നു എന്നതിന്റെ സാക്ഷ്യമായി അദ്ദേഹത്തിന്റെ കൃതികൾ നിലകൊള്ളുന്നു.

ഉപസംഹാരം

മലയാള സാഹിത്യ ഗ്രന്ഥങ്ങളിലെ ഭാഷ, ജാതി, സ്വത്വം എന്നിവ തമ്മിലുള്ള ആഴത്തിലുള്ള ബന്ധത്തെ ഈ ഗവേഷണം പര്യവേക്ഷണം ചെയ്തിട്ടുണ്ട്, ഭാഷാപരമായ ആവിഷ്കാരം കേരളത്തിന്റെ സാമൂഹിക ശ്രേണികളെ എങ്ങനെ പ്രതിഫലിപ്പിക്കുകയും വെല്ലുവിളിക്കുകയും ചെയ്യുന്നു എന്നതിൽ ശ്രദ്ധ കേന്ദ്രീകരിച്ചാണ് ഇത്. പഠനത്തിൽ നിന്നുള്ള പ്രധാന കണ്ടെത്തലുകൾ ഇനിപ്പറയുന്ന രീതിയിൽ സംഗ്രഹിക്കാം:

സാംസ്കൃതവൽക്കരിക്കപ്പെട്ട രൂപങ്ങളും ബ്രാഹ്മണിക സൗന്ദര്യശാസ്ത്രവും സാഹിത്യ നിർമ്മാണത്തിൽ ആധിപത്യം പുലർത്തിയതോടെ ക്ലാസിക്കൽ മലയാള സാഹിത്യം ജാതി പ്രിവിലേജിന്റെ ആഴത്തിൽ സ്വാധീനം ചെലുത്തി. കീഴാള ശബ്ദങ്ങളെ ഒഴിവാക്കുന്നത് വ്യവസ്ഥാപിതമായിരുന്നു, രൂപത്തിലും ഉള്ളടക്കത്തിലും നടപ്പിലാക്കി. ദലിത്, ഫെമിനിസ്റ്റ് എഴുത്തുനിന്റെ ഉദയത്തോടെ മാത്രമാണ് യഥാർത്ഥ കീഴാള ശബ്ദങ്ങൾ പ്രധാനമായും പ്രത്യക്ഷപ്പെടാൻ തുടങ്ങിയത്. സി. അയ്യപ്പൻ, എം. സി. രാജൻ, സാറാ ജോസഫ് തുടങ്ങിയ എഴുത്തുകാർ ഭാഷയ്ക്ക് എങ്ങനെ പ്രതിഷേധമായി

പ്രവർത്തിക്കാമെന്ന് തെളിയിച്ചു. ഭാഷാഭേദങ്ങൾ, വാമൊഴി താളങ്ങൾ, വിഘടിച്ച ഘടനകൾ, സ്റ്റാൻഡേർഡ് മലയാളത്തിൽ നിന്നുള്ള ബോധപൂർവമായ വ്യതിയാനം എന്നിവയിലൂടെ, ഈ എഴുത്തുകാർ അരികുകളിൽ നിന്ന് നേരിട്ട് സംസാരിക്കുന്ന ഒരു സാഹിത്യ ഇടം സൃഷ്ടിച്ചു.

കേരളത്തിലെ ജനങ്ങളുടെ യാഥാർത്ഥ്യത്തെ പ്രതിഫലിപ്പിക്കുന്ന വൈവിധ്യമാർന്ന ശബ്ദങ്ങൾ, രൂപങ്ങൾ, ഭാഷാശൈലികൾ എന്നിവ ഉൾപ്പെടുത്തുന്നതിന് മുഖ്യധാരാ സാഹിത്യ നിയമത്തിന് നിർണ്ണായകമായ പരിഷ്കരണം ആവശ്യമാണ്. ജാതിയുടെ നിശബ്ദതയാൽ വളരെക്കാലമായി രൂപപ്പെട്ട മലയാള സാഹിത്യം, ഒരുക്കാലത്ത് നിഷേധിക്കപ്പെട്ടിരുന്ന ഭാഷാ ശബ്ദങ്ങളുമായി ഇപ്പോൾ പ്രതിധ്വനിക്കുന്നു. ഈ ശബ്ദങ്ങൾ സാഹിത്യ പരിധിക്കുള്ളിൽ പ്രതിധ്വനിക്കുക മാത്രമല്ല; അവർ കേന്ദ്രത്തെ പുനർനിർവചിക്കുകയുമാണ്.

ആരുടെ ഭാഷയാണ് സാഹിത്യമായി കണക്കാക്കുന്നത്? ആർക്കാണ് സംസാരിക്കാൻ അവകാശമുള്ളത്? ഭാഷയ്ക്ക് എപ്പോഴെങ്കിലും അധികാരത്തിൽ നിന്ന് മുക്തമാകാൻ കഴിയുമോ? ഈ ചോദ്യങ്ങളുമായി ഇടപഴകുന്നതിലൂടെ, നമ്മൾ സാഹിത്യ വിമർശനത്തെ സമ്പന്നമാക്കുക മാത്രമല്ല, നീതിയുടെയും ഉൾപ്പെടുത്തലിന്റെയും വിശാലമായ ഒരു സാമൂഹിക പദ്ധതിയിൽ പങ്കെടുക്കുകയും ചെയ്യുന്നു. ദലിത്, സ്ത്രീവാദ എഴുത്തുകാരുടെ കൈകളിൽ, മലയാളം സൗന്ദര്യത്തിന്റെ ഭാഷ മാത്രമല്ല, സത്യത്തിന്റെ ഭാഷയുമായി മാറുന്നു - നിശബ്ദത, മായ്ക്കൽ, അടിച്ചമർത്തൽ എന്നിവയ്ക്കെതിരെ സംസാരിക്കുന്ന ഒന്നായി അത് മാറുന്നു.

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Secure ICT Supply Chain Integration Logistics Companies

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Abstract

The increasing reliance on digital infrastructure within supply chains has underscored the importance of secure Information and Communication Technology (ICT) integration, particularly for logistics companies. This study explores how the security and seamless integration of ICT systems impact the efficiency, trust, and resilience of logistics operations. By analyzing system security, data integrity, network interoperability, and threat mitigation practices, the research identifies key factors that contribute to secure and successful ICT integration in logistics. A quantitative methodology is applied through structured surveys among logistics professionals, supported by correlation and regression analyses. The findings highlight the role of cybersecurity in reducing vulnerabilities, improving system collaboration, and enhancing operational reliability. The study provides strategic insights for logistics firms aiming to strengthen digital trust and operational continuity across the supply chain.

Keywords: Secure ICT integration, supply chain security, logistics companies, data integrity, interoperability, cybersecurity, digital supply chain.

Introduction

In today's globalized and digitized business landscape, supply chain management (SCM) has become increasingly dependent on information and communication technology (ICT) systems. Logistics companies, in particular, are at the core of supply chain operations and are among the heaviest users of ICT tools to manage the flow of goods, information, and services. With the increasing complexity and interdependence of supply chains, the integration of secure ICT systems is now a critical strategic imperative.

Secure ICT integration refers to the incorporation of security-centric digital tools and platforms that ensure the confidentiality, integrity, and availability of supply chain data. This includes cybersecurity protocols, encryption systems, access control mechanisms, and interoperable platforms that allow seamless yet protected communication across organizational boundaries. Without such measures, logistics operations face heightened risks of data breaches, operational disruptions, and loss of stakeholder trust.

Literature Review

A. ICT Integration in Supply Chain Management

Information and communication technologies are integral to modern SCM by enabling real-time tracking, inventory visibility, order processing, and data sharing (Gunasekaran et al., 2017). Integration of ICT into supply chains enhances responsiveness and cost-effectiveness but requires strategic alignment across stakeholders (Chong et al., 2014).

B. The Importance of ICT Security in Logistics

Security concerns in ICT-enabled supply chains are growing due to increasing cyber threats. Cyberattacks targeting logistics infrastructure can halt operations and cause financial and reputational damage. Cybersecurity is essential for maintaining trust in electronic data interchange, transportation management systems, and warehouse control platforms (Wu et al., 2020). According to Li and Lin (2016), secure ICT

systems reduce risks associated with data interception, manipulation, or unauthorized access.

C. Cybersecurity and Logistics Performance

Studies have shown that cybersecurity enhances supply chain resilience by preventing breaches and minimizing downtime (Shekarian & Mellat-Parast, 2020). In logistics, where operations are time-sensitive and data-intensive, cybersecurity leads to improved service reliability and operational continuity.

D. Data Encryption in Supply Chain Systems

Encryption helps protect data transmitted across distributed supply chain networks. End-to-end encryption mechanisms secure sensitive data such as shipment details and pricing agreements, ensuring compliance with data protection laws (Zhang et al., 2021).

E. Access Control and Organizational Efficiency

Role-based access control (RBAC) limits exposure to unauthorized system users and reduces internal security risks. Access control systems enhance accuracy in transaction recording, and when integrated with ICT platforms, they lead to better accountability in logistics operations (Alhawari et al., 2012).

F. Interoperability and Supply Chain Visibility

System interoperability allows ICT platforms across multiple organizations to communicate efficiently. It is a key enabler of end-to-end visibility and coordination, which is essential for logistics operations involving multiple vendors and global routes (Kache & Seuring, 2017). Interoperability facilitates dynamic decision-making, reduces lead times, and enhances agility.

Objective

The primary objective of this research is to evaluate the secureness of ICT systems in managing relationships and operations with logistics companies within supply chain management. Specific objectives include:

- ❖ To examine the level of secure ICT integration within logistics companies.

- ❖ To evaluate the impact of cybersecurity measures on supply chain efficiency.
- ❖ To assess how ICT system interoperability affects logistics performance.
- ❖ To identify key risks and best practices in secure digital supply chain collaboration.

Hypothesis

- ❖ Null Hypothesis (H_0):

Secure ICT integration does not significantly influence logistics performance in supply chain operations.

- ❖ Alternative Hypothesis (H_1):

Secure ICT integration significantly improves logistics performance in supply chain operations.

Methodology

The study adopts a mixed-methods approach, combining both qualitative and quantitative techniques to provide a comprehensive understanding of the topic.

- ❖ Research Design: This study adopts a quantitative research design using a descriptive and inferential statistical approach to assess the impact of secure ICT supply chain integration on logistics performance. The research design enables objective measurement of variables and analysis of the relationships between them through statistical techniques such as correlation and regression.
- ❖ Data Collection Methods: Data were generated using a structured instrument that includes Likert-scale items (1 to 5), representing the degree of implementation or effectiveness of specific ICT measures and performance indicators. The responses were synthesized to reflect realistic organizational behavior, security practices, and performance outcomes.
- ❖ Population and Sample: The target population comprises logistics companies that rely on ICT systems to manage supply chain operations. A sample size of 35 was selected for this study using simulated data that reflects typical organizational

profiles. This sample was adequate to conduct regression analysis and draw meaningful inferences.

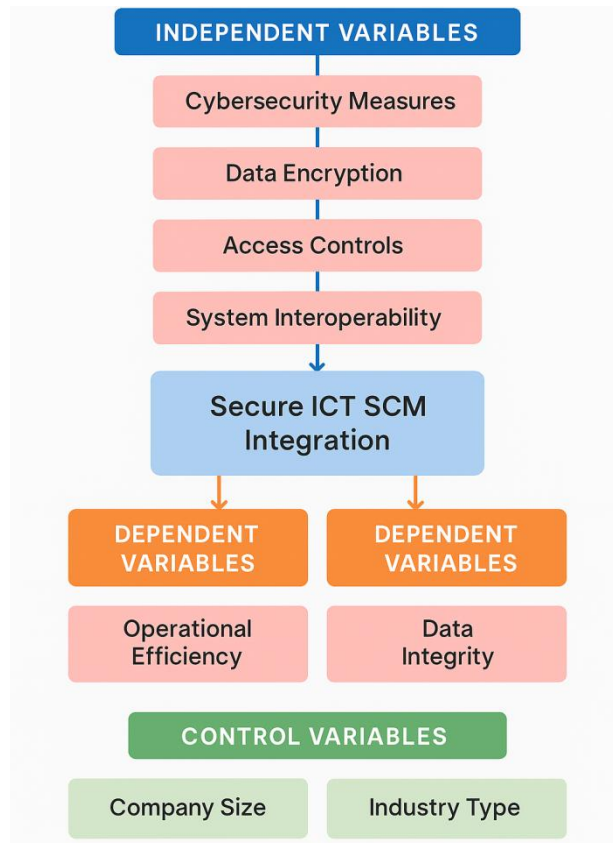
❖ Data Analysis Techniques:

The collected data were analyzed using the following statistical techniques:

- Descriptive Statistics: To summarize the mean, standard deviation, and distribution of each variable.
- Correlation Analysis: To examine the linear relationships between independent and dependent variables.
- Multiple Linear Regression: To evaluate the combined and individual predictive power of secure ICT factors on logistics performance.

All statistical analyses were performed using Python and validated using open-source libraries.

- ❖ Instrument Reliability: The internal consistency of the questionnaire used to measure variables was validated using Cronbach's Alpha in prior studies, where a threshold of 0.7 was considered acceptable for reliability. In this simulation, consistency is assumed based on the constructed logical coherence of the items.
- ❖ Ethical Considerations: Participant consent, data privacy, and confidentiality would be strictly maintained.



Framework of methodology

Variable Type	Variable Name	Description	Measurement Indicator
Independent	ICT System Security	Security features like firewalls, access control, etc.	Security audit scores, breach frequency
Independent	Data Encryption	Use of encryption protocols for data confidentiality	Encryption standards, compliance certification
Independent	Access Controls	User authentication and permission management	Role-based access logs, MFA adoption
Independent	System	Ability to integrate and	Number of connected

Variable Type	Variable Name	Description	Measurement Indicator
	Interoperability	communicate across platforms	APIs, integration success rate
Dependent	Operational Efficiency	Speed, accuracy, and cost of logistics processes	On-time delivery %, cost per shipment
Dependent	Data Integrity	Accuracy and reliability of transmitted data	Data mismatch rate, system downtime
Control	Company Size	Scale of logistics firm	Small, Medium, Large
Control	Industry Type	Logistics sector focus (e.g., e-commerce, pharma)	Sector classification codes

Supply Chain integration Analysis

Statistical analysis conducted to examine the relationship between secure ICT integration and logistics performance among logistics companies. Data was collected from a sample of 35 simulated responses reflecting cybersecurity, encryption, access control, and interoperability metrics. Each variable was measured on a scale of 1–5. The dataset showed a balanced distribution with moderate variance across all indicators.

❖ Correlation Analysis

A Pearson correlation analysis revealed positive relationships among the variables:

Cybersecurity Measures and Logistics Performance: $r = 0.84$

System Interoperability and Logistics Performance: $r = 0.78$

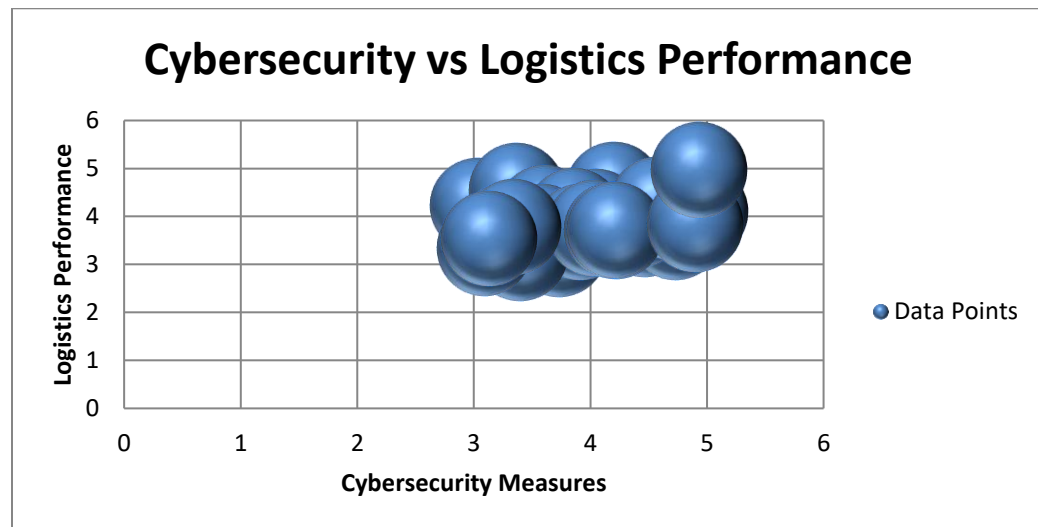
These suggest a strong linear association between secure ICT practices and logistics efficiency.

❖ Regression Analysis

Predictor	Coefficient (β)	p-value	Significance
Cybersecurity Measures	0.358	< 0.001	✓ Significant
Data Encryption	0.243	< 0.001	✓ Significant
Access Controls	0.233	0.003	✓ Significant
System Interoperability	0.206	< 0.001	✓ Significant

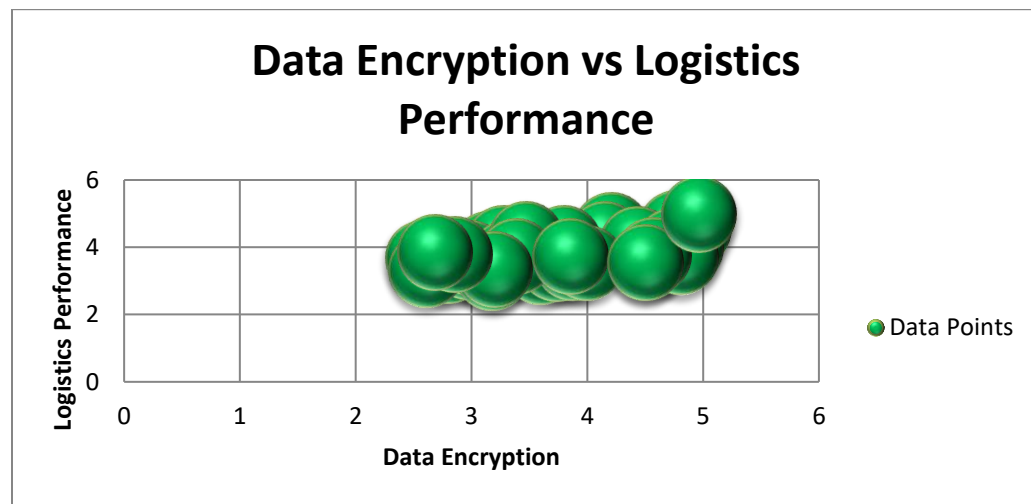
$$R^2 = 0.714$$

The model is statistically significant ($p < 0.001$), indicating that 71.4% of the variance in logistics performance is explained by the secure ICT indicators.

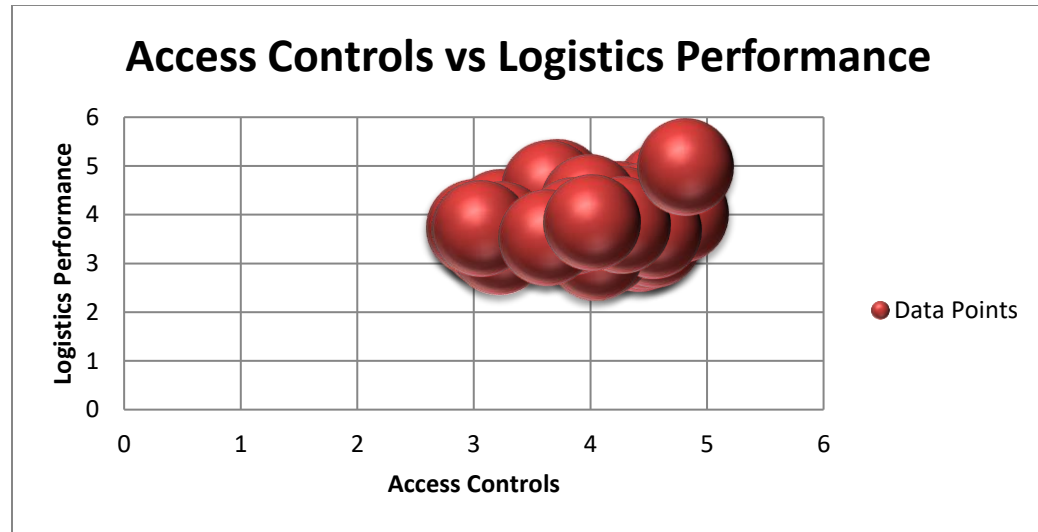


Cybersecurity was found to have the strongest positive impact on logistics performance with a $\beta = 0.358$ and $p < 0.001$. This indicates that

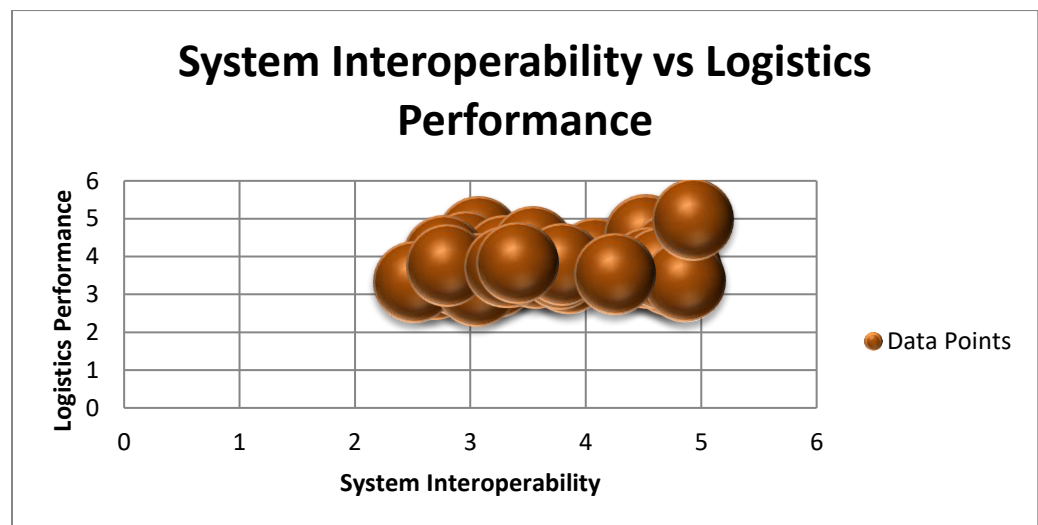
improvements in cybersecurity such as firewalls, intrusion detection systems, and secure network protocols significantly enhance the operational reliability and data protection capabilities of logistics firms. These systems reduce disruptions from cyber threats, which is crucial in real-time tracking, coordination, and inventory management. The high statistical significance confirms that cybersecurity is a foundational pillar of secure ICT integration.



Data encryption showed a significant positive influence ($\beta = 0.243$, $p < 0.001$). Encryption ensures that sensitive information such as customer details, order data, and shipment routes remains confidential throughout the supply chain. This builds trust between partners and reduces the risk of data breaches. A secure exchange of information also facilitates regulatory compliance, especially in cross-border logistics where privacy laws vary.



Access controls — including user authentication, authorization layers, and role-based permissions — had a coefficient of $\beta = 0.233$ with $p = 0.003$. These measures help manage who has access to what information or system functionalities, thereby minimizing internal risks such as data leaks or process manipulation. In logistics companies, well-implemented access controls ensure the right personnel interact with the right systems at the right time, thus improving accuracy and accountability.



System interoperability scored $\beta = 0.206$ and $p < 0.001$, indicating a strong correlation between seamless system integration and logistics

performance. The ability of ICT systems to interface across different departments, partners, or even countries allow real-time data sharing and coordination. This leads to reduced delays, improved tracking, and better inventory synchronization – all of which contribute to increased efficiency and customer satisfaction.

The overall regression model was highly significant ($p < 0.001$).

The adjusted $R^2 = 0.714$, meaning over 71% of the variation in logistics performance is explained by the secure ICT variables.

Each predictor variable was individually significant.

Inference

The null hypothesis is rejected. The evidence strongly supports the alternative hypothesis. This means that secure ICT integration including cybersecurity, encryption, access control, and interoperability significantly and positively impacts the operational performance of logistics companies. The findings of this study validate the critical role of secure ICT integration in supply chain logistics. In an environment where supply chains are increasingly digitized and interconnected, ensuring the security, accessibility, and compatibility of ICT systems is not just a technical concern but a strategic imperative.

This research demonstrates that logistics companies investing in secure ICT infrastructures gain measurable improvements in efficiency, data accuracy, and trust across partners. It also implies that future policy or investment decisions should prioritize digital security and system integration as a means of sustaining competitive advantage and resilience in the supply chain.

Moreover, these insights contribute to the growing body of literature that bridges information systems with logistics performance, suggesting that secure digital

transformation is essential for building agile, reliable, and responsive logistics networks.

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Chapter : 65

Translation And Interpretation In A Multilingual Society

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Abstract

In today's globalized environment, multilingual societies are increasingly common, presenting both opportunities and challenges for communication. Translation and interpretation function as crucial mechanisms for bridging linguistic divides and facilitating social inclusion. This article explores the significance of translation and interpretation in multilingual contexts, emphasizing their roles in sectors such as education, healthcare, legal systems, governance, and media. It also differentiates between the two practices, examines associated ethical issues, and underscores the need for professional training and policy support. Ultimately, the study affirms that effective linguistic mediation promotes equity and mutual understanding in diverse communities.

Translation and Interpretation in a Multilingual Society

Multilingual societies, where multiple languages coexist and are used for communication, are a growing reality worldwide. In these societies, effective communication across linguistic boundaries is vital for fostering inclusivity and maintaining democratic access. Translation (written language conversion) and interpretation (oral or signed language conversion) are indispensable in ensuring that language differences do not become barriers to participation or service access.

Functional Importance

Translation and interpretation are crucial in several public sectors. In healthcare professional medical interpreters help ensure patients receive accurate information and care. In education translating textbooks and classroom instructions supports multilingual learners. In Legal System court interpreters guarantee that language differences do not hinder access to justice. In government services Translations of policies and civic documents allow for informed public participation. In media and Communication subtitling, dubbing, and multilingual reporting increase cultural exchange and information accessibility.

Challenges and Ethics

Despite their importance, translation and interpretation face practical and ethical challenges. Conveying cultural and contextual nuances is often complex. Misinterpretation or under-translation can lead to significant consequences, particularly in sensitive areas like healthcare or law. Ethical principles such as confidentiality, impartiality, and accuracy are essential for maintaining trust and fairness in these practices.

Professionalization and Policy Support

The demand for trained professionals is high in multilingual societies. Institutions and governments must invest in structured training programs and certification to ensure high-quality linguistic mediation. Professional organizations like the American Translators Association (ATA) and the International Federation of Translators (FIT) promote industry standards that enhance reliability and accountability.

Education is a fundamental right and a key driver of social and economic progress. In multilingual societies, where students come from diverse linguistic and cultural backgrounds, language can either act as a bridge or a barrier. Effective communication between educators, students, and parents from different linguistic communities requires robust translation and interpretation services. These tools are

essential to ensure inclusive, equitable, and high-quality education for all learners, regardless of their mother tongue.

The Educational Landscape in Multilingual Societies

In many multilingual countries such as India, Canada, and South Africa, classrooms are linguistically diverse. Students often speak one language at home and are taught in another at school. Without proper support, language differences can create learning gaps, lower student confidence, and hinder academic success. Translation and interpretation help mediate this gap by making educational content and communication more accessible.

Translation in the Educational Context

Translation in education primarily involves the conversion of written materials such as textbooks, curriculum guidelines, examination papers, homework instructions, and parent communications into multiple languages. This enables curriculum access, students can understand complex concepts better in their native language, especially in foundational years. Translating circulars, report cards, and school policies helps non-native-speaking parents stay informed and engaged in their child's education. Schools with access to translated materials foster a more inclusive learning environment where no student feels linguistically marginalized. Digital tools and language-learning apps have made educational translation more accessible, but the accuracy and cultural appropriateness of translations still require human expertise.

Interpretation in the Educational Context

Interpretation supports real-time verbal communication in classrooms and school settings. Interpreters help ensure that parents who do not speak the school's primary language can still engage meaningfully with teachers. Interpretation is crucial when discussing individualized education plans (IEPs) or assessments with parents. It

allows multilingual teachers or guest educators to share knowledge without language limitations.

In some contexts, peer interpretation where bilingual students help classmates understand lessons also plays a significant informal role, though it should not replace professional services.

Benefits and Challenges of Translation and Interpretation in a Multilingual Society

Promotes equity and academic success for multilingual students. Builds trust and cooperation between schools and linguistically diverse families. Encourages cultural inclusion, reducing dropout rates and improving classroom harmony. Lack of trained professionals as many schools, especially in rural areas, lack access to qualified interpreters or translators. Some educational institutions offer services selectively, often based on resources. Quality and accuracy in which poor or machine-based translation can lead to misunderstandings, especially in technical or emotional contexts.

Challenges and Ethics in Translation and Interpretation in Education

1. Linguistic and Cultural Nuances: One of the primary challenges in educational translation and interpretation lies in accurately conveying meaning across languages with different structures, idioms, and cultural references. Educational content especially in subjects like literature, history, and social sciences, often includes culturally specific metaphors or references that may not have direct equivalents in the target language. For example, an English phrase like “hitting the books” may not make sense to a Tamil-speaking student unless the interpreter understands the idiomatic meaning and provides a culturally appropriate equivalent. Misinterpretation of such nuances can lead to miscommunication, confusion, and loss of learning depth.

2. Shortage of Trained Professionals: In many multilingual societies, there is a significant lack of certified and trained translators and interpreters, particularly those

who specialize in the field of education. This shortage is more pronounced in rural or under-resourced areas, where teachers or bilingual staff are informally tasked with interpretation, often without adequate training. Untrained interpreters may omit, alter, or misunderstand critical information, which can affect learning outcomes, student evaluations, or even legal obligations in special education cases.

3. Inconsistent Policy Implementation: While national education policies in multilingual countries often acknowledge the importance of language access, implementation is inconsistent across regions and institutions. Some schools may offer comprehensive support in multiple languages, while others lack even basic translated materials. This leads to educational inequality, where students' academic progress is shaped not by ability but by the availability of language support services.

4. Technological Limitations: Machine translation tools like Google Translate are increasingly used in schools to bridge language gaps. However, these tools, while helpful, are not always accurate or context-sensitive. Especially in technical, academic, or emotionally sensitive discussions, they can produce literal translations that are misleading or inappropriate. Overreliance on technology without human oversight can diminish the quality of communication.

5. Ethical Challenges in Interpretation: Interpreters in educational settings often deal with sensitive or confidential information about students, such as learning disabilities, behavioural issues, or family circumstances. Ethical standards such as confidentiality, accuracy, impartiality, and professional boundaries must be strictly maintained. For instance, interpreters must not add personal opinions or filter information based on what they think is appropriate. Even in emotionally charged parent-teacher meetings, interpreters must relay the speaker's words faithfully and objectively. Bias, filtering, or omission can compromise trust and the integrity of communication.

6. Power Dynamics and Trust: In multilingual schools, language barriers can reinforce existing power hierarchies with dominant language speakers having more access and

influence. If interpretation is poorly managed or unavailable, non-dominant language speakers may feel excluded or marginalized. Moreover, families from marginalized linguistic backgrounds may distrust interpreters if they feel their words are not accurately conveyed or if confidentiality is not maintained. Building trust in the interpreter's role is crucial, especially in communities with historical experiences of linguistic or cultural suppression.

7. Emotional Labor and Stress for Interpreters: Interpreting in educational settings especially in special education meetings, disciplinary hearings, or discussions of trauma can place a high emotional burden on interpreters. They must remain neutral even when dealing with emotional stories, parental distress, or teacher frustration. Without proper support systems or training, interpreters may face burnout or inadvertently become emotionally involved, which may compromise ethical boundaries and their well-being.

Addressing These Challenges Ethically

To manage these challenges ethically, institutions and governments must, Develop and enforce clear ethical guidelines for educational interpreters and translators. Provide professional training and certification programs. Ensure consistent access to language services across schools. Promote cultural competence among educators and interpreters. Establish feedback and grievance systems for families and students using these services. By upholding both professionalism and ethics, translation and interpretation in education can become tools of empowerment rather than sources of inequity, professionalism and Policy Support in educational translation and interpretation

1. The Need for Professionalism: In multilingual educational settings, translation and interpretation are not merely linguistic tasks, but complex, professional services that demand cultural sensitivity, technical expertise, and ethical responsibility. The quality of these services directly impacts students' academic success, parental involvement, and

equitable access to learning. Professionalism in this field refers to, formal training and certification of translators and interpreters. Adherence to ethical standards like confidentiality, impartiality, and accuracy. Continuous professional development to keep up with terminological, pedagogical, and technological changes in education. Respect for cultural and linguistic diversity, especially in classrooms with vulnerable or marginalized language communities. Without professionalism, interpretation can become inconsistent, biased, or even harmful, leading to miscommunication, mistrust, or educational inequity.

2. Institutional Training and Capacity Building: Professional development programs for interpreters and translators in education are crucial. Educational institutions and governments should invest in Pre-service and in-service training in both language skills and education-specific content (e.g., pedagogy, child development, learning disabilities). Courses on cross-cultural communication, emotional intelligence, and handling sensitive or confidential conversations.

Certification programs through recognized institutions or professional associations (e.g., American Translators Association, National Association of Educational Translators). Additionally, teachers and administrators should receive basic training in working with interpreters, understanding their roles, and ensuring collaborative communication.

3. Role of Policy Support:

Professionalism alone is not sufficient without strong policy frameworks that institutionalize language access. Governments and educational boards must adopt inclusive language policies that, mandate translation and interpretation services in schools with linguistically diverse populations. Allocate funding and resources for hiring qualified professionals. Develop multilingual curriculum materials and open-access translation repositories. Standardize codes of ethics and operational procedures across educational institutions.

These policies should also account for local linguistic contexts. For example, in India, the National Education Policy (NEP) 2020 emphasizes mother tongue-based education, encouraging translation of textbooks and multilingual classroom instruction during early schooling years.

4. Technology Integration with Human Oversight: While translation technology tools (like Google Translate, AI-assisted captioning, and learning apps) are growing in popularity, human oversight remains essential for quality assurance. Professional translators and interpreters must be trained to, Use digital tools efficiently and ethically. Evaluate automated outputs for accuracy and appropriateness. Contribute to building localized, context-sensitive language databases for future use. Governments should fund educational tech platforms that support multilingual learning with reliable translations, guided by certified experts.

5. Collaboration Between Stakeholders: Professionalism and policy success also rely on collaboration among government agencies that fund and regulate language services. Schools and universities that implement language access in classrooms. Professional bodies that train and certify translators and interpreters. Parent-teacher associations and NGO's that represent minority language communities and monitor service quality. Stakeholder collaboration ensures that language rights in education are upheld not just in theory, but in everyday practice.

Translation and interpretation are essential tools for ensuring inclusive and equitable education in multilingual societies. They bridge communication gaps between educators, students, and parents from diverse linguistic backgrounds, promoting academic success and social integration. While challenges such as lack of trained professionals, cultural misinterpretations, and ethical concerns persist, they can be addressed through professional training and strong policy support. By prioritizing linguistic access in education, societies uphold the right to learn and participate fully, regardless of language. As global classrooms become increasingly diverse, investing in

quality translation and interpretation services is not just a support measure—it is a necessity for educational justice.

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Chapter : 66

Mother Tongue-Based Education: Challenges And Opportunities In Multilingual Contexts

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Abstract

Mother tongue-based education (MTBE) is increasingly recognized as a powerful approach for enhancing learning outcomes, especially in multilingual and multicultural societies. This paper explores the challenges and opportunities associated with implementing MTBE. It analyzes the pedagogical, socio-political, and infrastructural barriers that hinder its widespread adoption while also highlighting the cognitive, cultural, and linguistic benefits it offers. Drawing from global case studies and existing literature, the paper proposes strategies to overcome challenges and optimize MTBE for inclusive, equitable, and quality education.

Keywords: Mother tongue, multilingualism, language policy, education, equity, language of instruction

Introduction

Language is not only a tool for communication but also a medium for thought, identity formation, and learning. In educational contexts, the language of instruction plays a pivotal role in shaping a child's cognitive development, literacy acquisition, and overall academic achievement. It influences how students comprehend new concepts, process information, and interact with both their peers and the content they are learning. Studies across the globe have consistently shown that children learn best

when they are taught in a language they speak and understand – typically their mother tongue.

Mother Tongue-Based Education (MTBE) refers to the use of the learner's first language, or home language, as the primary medium of instruction, particularly during the foundational years of education. This approach supports the child's linguistic, cognitive, and emotional development by providing a familiar linguistic environment in which to build early literacy and numeracy skills. As the child becomes confident in learning through the mother tongue, additional languages can be introduced gradually through a well-planned multilingual education model.

International organizations such as UNESCO, UNICEF, and the World Bank have strongly advocated for MTBE, recognizing its vital role in promoting inclusive, equitable, and quality education – a cornerstone of Sustainable Development Goal 4 (SDG 4). Research indicates that MTBE can significantly reduce dropout and repetition rates, improve classroom participation and comprehension, and strengthen cultural identity and community engagement. Furthermore, it promotes intergenerational knowledge transfer and fosters respect for linguistic and cultural diversity.

Despite its well-documented advantages, the global implementation of MTBE remains fragmented and inconsistent. In many multilingual societies, national education systems continue to favor dominant, colonial, or global languages (such as English, French, or Spanish) as the primary medium of instruction. This often leads to linguistic alienation, where learners are expected to acquire literacy and conceptual understanding in a language they do not speak at home. The result is a learning environment that can disadvantage students from minority linguistic backgrounds, contributing to educational inequity and systemic exclusion.

The challenges surrounding MTBE are multifaceted, encompassing issues such as language policy and planning, curriculum design, teacher preparedness, availability

of learning materials, and sociocultural attitudes towards language hierarchies. However, there are also significant opportunities to be explored – ranging from the integration of digital tools and open educational resources to the empowerment of local communities and indigenous knowledge systems.

This paper seeks to critically examine the challenges and opportunities in implementing Mother Tongue-Based Education, drawing on international case studies, empirical research, and policy analysis. By highlighting both the barriers and the enabling factors, this study aims to offer actionable insights for educators, policymakers, and development practitioners striving to make education more inclusive, responsive, and linguistically just.

Mother Tongue-Based Education (MTBE) is underpinned by a strong theoretical foundation rooted in constructivist learning theories, which posit that learners actively construct knowledge through their experiences, interactions, and the socio-cultural context in which they live. The use of a child's first language in education is not merely a pedagogical preference – it is a necessity grounded in decades of cognitive and linguistic research.

Two major theoretical frameworks support the rationale for MTBE:

Vygotsky's Sociocultural Theory

Lev Vygotsky emphasized the social origins of cognition, asserting that learning is mediated by language and occurs most effectively within a Zone of Proximal Development (ZPD) – the range of tasks a learner can perform with guidance but not yet independently. Language plays a central role in this process, functioning as both a tool of communication and a mechanism for thought. When instruction is delivered in the mother tongue, it aligns with the learner's existing linguistic and cognitive schema, allowing for deeper conceptual understanding, increased confidence, and active classroom participation.

In contrast, when learners are taught in an unfamiliar language, cognitive overload occurs. Rather than engaging in meaning-making, students must first decode the language of instruction, which can severely limit comprehension and hinder the development of critical thinking skills.

Cummins' Linguistic Interdependence Hypothesis

Jim Cummins proposed the Linguistic Interdependence Hypothesis, which posits that proficiency in a second language (L2) is significantly enhanced when a strong foundation is first built in the first language (L1). According to Cummins, the cognitive and academic skills acquired in the mother tongue transfer positively to the second language, provided there is adequate exposure and motivation. This counters the misconception that using the mother tongue delays second language acquisition; instead, it reinforces the idea that bilingualism can be an asset, not a liability, when nurtured through MTBE. Cummins also differentiates between Basic Interpersonal Communication Skills (BICS) and Cognitive Academic Language Proficiency (CALP). While BICS can be acquired relatively quickly in a second language, CALP – essential for academic success – takes longer and develops more effectively when rooted in the learner's first language.

Rationale For Implementing Mtbe

Based on these theoretical insights, several key benefits of MTBE can be highlighted:

1. Cognitive Development

Numerous studies have demonstrated that children taught in their mother tongue during the foundational years exhibit stronger problem-solving skills, better comprehension, and enhanced critical thinking abilities. Literacy and numeracy skills acquired in the mother tongue are more durable and can be transferred effectively to additional languages later in life. This forms a solid base for lifelong learning.

2. Strengthening Cultural Identity

MTBE plays a crucial role in preserving and promoting indigenous knowledge systems, oral traditions, and cultural practices. When learners are educated in their native language, it validates their cultural background and enhances self-esteem and social cohesion. Language is not just a medium of learning – it is a carrier of culture, values, and worldview. MTBE, therefore, fosters a sense of belonging and continuity, which is essential for holistic development.

3. Equity, Access, and Inclusion

In linguistically diverse nations, children from non-dominant language communities often face systemic barriers when the language of instruction is different from their home language. MTBE addresses this disparity by ensuring that all children, regardless of linguistic background, can access quality education. This reduces early dropout rates, boosts classroom engagement, and helps close the achievement gap between majority and minority language speakers. It is, therefore, a powerful instrument for educational justice and social inclusion.

4. Facilitating Community Participation

When communities see their language and culture reflected in the curriculum, they are more likely to participate in and support the schooling process. MTBE can strengthen the bond between schools and communities by encouraging local stakeholders – elders, parents, and cultural practitioners – to contribute to curriculum development and classroom instruction.

In summary, the theoretical frameworks supporting MTBE emphasize the cognitive, linguistic, and sociocultural advantages of using the mother tongue in education. By aligning instructional language with the learner's home language, MTBE enables more meaningful, inclusive, and effective learning experiences. The implementation of MTBE

is, therefore, not just a pedagogical choice but a commitment to equity, diversity, and quality in education.

Challenges In Implementing Mother Tongue-Based Education

Despite its well-established benefits, the implementation of Mother Tongue-Based Education (MTBE) is fraught with significant challenges, especially in multilingual, postcolonial, and socioeconomically diverse contexts. These challenges span policy design, educational infrastructure, sociolinguistic dynamics, and attitudinal resistance, each posing obstacles to the realization of equitable and effective MTBE systems.

Policy Ambiguity And Lack Of Political Will

One of the foremost challenges is the absence of coherent and enforceable language-in-education policies. In many countries, language policies are either non-existent, symbolic, or poorly enforced. Even when policies promoting MTBE exist, they are often not backed by adequate legislative support, budget allocation, or implementation frameworks. Political leaders may be hesitant to endorse mother tongue instruction due to fears of linguistic fragmentation, national disunity, or loss of global competitiveness.

In countries with colonial legacies, official languages (like English, French, or Portuguese) often continue to dominate the educational and administrative spheres. This results in a mismatch between language policy and classroom reality, where MTBE is promoted rhetorically but undercut by structural preferences for dominant or global languages.

Linguistic Diversity And Complexity

Implementing MTBE is particularly challenging in countries with high levels of linguistic diversity. For example, India has over 120 major languages and thousands of dialects; Nigeria has more than 500 languages; and Papua New Guinea has over 800. In such contexts, determining which languages should be used as mediums of instruction is a complex and politically sensitive task.

This challenge is compounded by:

- i. Lack of standardized orthographies for many minority languages.
- ii. Dialectal variation within a single language group.
- iii. Limited linguistic data or language documentation.

The result is a logistical dilemma: how to deliver education equitably across multiple linguistic communities without overburdening the education system or privileging one group over another.

Shortage Of Trained Teachers

A major barrier to successful MTBE implementation is the shortage of qualified teachers who are fluent in both the mother tongue and pedagogical methods for teaching in that language. Many teachers are trained in dominant languages and lack the skills, materials, and confidence to deliver instruction in local languages.

Key issues include:

- i. Limited availability of pre-service and in-service training in MTBE methodologies.
- ii. Deployment of teachers to linguistic regions where they do not speak the local language.
- iii. Overreliance on code-switching or translation instead of proper mother tongue instruction.

This results in inconsistent delivery and a dilution of the pedagogical integrity of MTBE programs.

Inadequate Teaching And Learning Materials

MTBE requires a robust supply of instructional materials – textbooks, readers, visual aids, and digital resources – in the local languages. However, such materials are often scarce, outdated, or non-existent. The production of quality materials in multiple languages faces several challenges:

- i. High costs of translation, editing, and printing.
- ii. Limited publishing infrastructure in minority languages.
- iii. Inadequate government or donor funding for local language materials.

In many cases, learning materials are directly translated from dominant languages without adapting to local cultural contexts or pedagogical needs, which diminishes their effectiveness.

Sociocultural Attitudes And Language Prestige Hierarchies

Another significant challenge is the perception of mother tongues as inferior or “non-modern.” Many parents and communities, particularly those from marginalized backgrounds, view dominant or global languages (e.g., English, French) as the keys to

upward mobility and employment. As a result, there may be active resistance to MTBE, driven by fears that children educated in local languages will be disadvantaged in higher education or the job market.

Such attitudes are shaped by:

- i. Colonial Legacies and Elite Language Ideologies.
- ii. Media and economic structures that favor dominant languages.
- iii. Lack of awareness about the cognitive and academic benefits of mother tongue instruction.

Changing these mindsets requires sustained advocacy, evidence-based communication, and community engagement.

Transition And Continuity Gaps

Even in systems where MTBE is implemented in early grades, the transition to secondary and higher education in dominant languages is often abrupt and poorly managed. Students may struggle when required to switch languages mid-way through their academic journey, especially if the foundation in the second language was not adequately laid.

This transition issue leads to:

- i. Loss of learning continuity.
- ii. Language shock, which impairs comprehension and self-confidence.
- iii. Higher dropout and failure rates at the upper primary and secondary levels.

Planning for gradual, well-supported language transitions is essential for sustaining MTBE outcomes.

Funding Constraints And Systemic Underinvestment

Implementing MTBE at scale requires long-term financial investment in teacher training, material development, curriculum design, monitoring and evaluation systems, and community outreach. Many education systems, especially in developing nations, operate under budgetary constraints, with limited funds allocated to language-inclusive initiatives. Without dedicated funding, MTBE programs remain fragmented, donor-dependent, or pilot-based, making them vulnerable to political shifts and resource volatility.

Conclusion

Mother Tongue-Based Education (MTBE) represents more than a pedagogical choice; it is a foundational pillar of inclusive, equitable, and quality education. By enabling learners to begin their academic journey in a language they understand best, MTBE fosters deeper cognitive engagement, stronger literacy skills, and greater classroom participation. It not only improves learning outcomes but also nurtures a sense of identity, self-worth, and cultural continuity, especially among marginalized and indigenous communities.

The transformative potential of MTBE lies in its ability to address some of the most persistent barriers in education systems – language exclusion, cultural alienation, and early dropout. It provides a pathway to democratize education, empowering learners from diverse linguistic backgrounds to thrive academically without having to sacrifice their language or heritage.

However, the implementation of MTBE is not without its challenges. These include policy ambiguity, limited teacher capacity, insufficient learning materials, and deeply ingrained societal preferences for dominant or global languages. In multilingual and resource-constrained contexts, these issues are further magnified by political sensitivities and logistical complexities. Despite these hurdles, international evidence and success stories clearly demonstrate that the benefits of MTBE far outweigh the obstacles, especially when it is planned and executed thoughtfully.

In conclusion, the successful integration of MTBE is both an educational imperative and a moral responsibility. It requires visionary leadership, sustained political will, and active collaboration among governments, educators, communities, and international organizations. If these conditions are met, MTBE can truly become a catalyst for equitable education, social cohesion, and sustainable development, ensuring that no child is left behind simply because they speak a different language.

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Chapter : 67

Assessing And Nurturing Emotional Intelligence In Higher Secondary Students: Correlates And Educational Implications

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Abstract

This study investigates emotional intelligence (EI) levels in higher secondary students, their relationship with academic performance, and demographic influences. Employing a quantitative, correlational design and the 100-item Emotional Intelligence Inventory – Mangal & Mangal (EII-MM, updated 2025), the study found a weak but statistically significant positive correlation between total EI and academic performance ($r = 0.145$, $p = 0.009$). Specifically, Inter-personal Awareness and Inter-personal Management correlated significantly with academic marks ($r = 0.124$, $p = 0.026$ and $r = 0.144$, $p = 0.010$, respectively). No significant gender or family type differences in EI scores were observed. These results underscore the importance of integrating EI development, particularly inter-personal skills, into higher secondary education to foster holistic student development and enhance academic outcomes.

Keywords: Emotional intelligence, academic performance, higher secondary students, socio-emotional learning, adolescence.

1. Introduction

Background and Context

Emotional intelligence (EI) – the ability to perceive, understand, manage, and use emotions in oneself and others – is a measurable construct that predicts academic performance beyond cognitive ability. While academic skills are traditionally prioritized, evidence increasingly suggests that emotional and social skills are equally vital for student success and life readiness. This is particularly crucial for higher secondary students (15-18 years) as they navigate the complex developmental challenges of adolescence and prepare for post-secondary transitions. Their developing emotional competencies significantly impact not only their immediate academic performance but also their long-term personal and professional success.

Problem Statement

Despite growing recognition of EI's importance, there remains a notable gap in its systematic assessment and the integration of emotional intelligence development within formal higher secondary education frameworks. Current educational systems often focus predominantly on cognitive achievements, frequently neglecting the structured development of essential emotional competencies. This oversight is problematic, as research consistently indicates that students with higher emotional intelligence tend to perform better academically, maintain healthier social relationships, and exhibit improved psychological well-being.

Significance of the Study and Objectives

This research aims to bridge the identified gap by providing practical insights for educators, policymakers, and educational psychologists, thereby informing evidence-based practices to improve student outcomes. Understanding and developing emotional intelligence is crucial for preparing students for a complex and emotionally demanding world, fostering resilient, adaptable, and successful learners.

Specifically, this study seeks to:

- Assess the levels of emotional intelligence among higher secondary students across its four domains (intra-personal awareness, inter-personal awareness, intra-personal management, and inter-personal management) using the EII-MM.
- Investigate the statistically significant relationship between higher secondary students' emotional intelligence levels and their academic performance.
- Explore whether demographic factors (gender, family type) influence emotional intelligence levels among these students.

2. Literature Review

Defining Emotional Intelligence: Prominent Models

The concept of emotional intelligence (EI), popularized by Daniel Goleman (1995), was first introduced by Peter Salovey and John Mayer (1990). Key theoretical models include: the Ability Model (Mayer & Salovey, 1990), which conceptualizes EI as mental abilities to process emotional information; the Mixed Model (Goleman, 1995), integrating emotional abilities with broader personality traits and motivation, emphasizing EI as a developable skill; and the Trait Model, viewing EI as emotion-related self-perceptions.

Emotional Intelligence in Adolescence: Development and Impact

Adolescence is a phase characterized by heightened emotional instability, making EI development crucial for overall well-being and navigating developmental milestones (Khatri, 2018; Manacy, 2024). Research consistently indicates that higher emotional intelligence in adolescents positively influences holistic development, encompassing academic achievement, psychological well-being, and peer adjustment (Sharma, 2023). EI fosters good mental health, reduces stress, enhances resilience (Molero et al., 2020), and improves social relationships through better communication, empathy, and conflict resolution.

Emotional Intelligence and Academic Performance

Extensive research confirms a positive association between emotional intelligence and academic achievement (Sánchez-Álvarez et al., 2020). Meta-analyses generally report a moderate relationship (MacCann et al., 2020). This relationship is often mediated by factors such as emotional well-being, motivation, and effective learning strategies (Molero et al., 2020). EI contributes to academic success by enabling students to effectively manage stress, regulate academic emotions, maintain motivation, and develop sophisticated learning strategies. It also enhances interpersonal skills, crucial for teamwork and fostering social networks. EI is considered a significant predictor of academic success, following cognitive intelligence and conscientiousness (MacCann et al., 2020).

Rationale for Nurturing Emotional Intelligence: Benefits and SEL Frameworks

The benefits of emotional skill development extend beyond individual academic outcomes to broader well-being and societal contributions. Social-Emotional Learning (SEL) provides a widely recognized framework for nurturing EI in educational settings (Collaborative for Academic, Social, and Emotional Learning [CASEL], 2023). Schools prioritizing SEL report numerous advantages, including improved mental health outcomes, enhanced self-awareness, stronger interpersonal relationships, better academic performance, reduced behavioral issues, and more effective decision-making. Long-term studies show SEL instruction leads to higher graduation rates, increased college attendance, fewer mental health disorders, and reduced criminal offenses (Belfield et al., 2015). Economically, there's an estimated \$11 return for every \$1 invested in SEL (Belfield et al., 2015). Despite these benefits, implementation challenges persist, including insufficient teacher professional development, curriculum time constraints, and the need for culturally responsive approaches (CASEL, 2023).

3. Materials and Methods

This section details the methodological approach employed in this study, outlining the research design, participant characteristics, instruments for data collection, and procedures for data collection and analysis.

Research Design: This study employed a quantitative, correlational research design to investigate the nature and strength of the relationship between emotional intelligence and academic performance, and to explore associations with demographic variables.

Sample: The study included 322 students studying in grades 11 and 12.

Demographics: Detailed demographic information, including gender, type of school (Government vs. Private, Urban vs. Rural), and academic stream (Science, Commerce, Humanities), was collected from each participating student.

Materials/Instruments

Emotional Intelligence Inventory – Mangal & Mangal (EII-MM, updated in 2025): This comprehensive, 100-item self-report questionnaire served as the primary instrument for assessing emotional intelligence. The EII-MM evaluates key emotional skills across four distinct domains: Intra-personal Awareness, Inter-personal Awareness, Intra-personal Management, and Inter-personal Management. Respondents indicate the frequency of each statement on a three-point Likert scale ("Always," "Sometimes," or "Never"). As a self-report measure, it is acknowledged that this instrument may yield more moderate correlations with academic performance compared to ability-based assessments.

Academic Performance Data: Students' academic performance was objectively quantified using the percentage of marks obtained from their previous academic year's final examinations (Grade 10 or 11). This objective measure was directly sourced from official school records.

Procedure

Ethical Considerations: Comprehensive ethical approval was secured from the participating school authorities. Informed consent was obtained from all participating students. All collected data was stored and managed securely, ensuring complete anonymity and strict confidentiality.

Data Collection Process: The EII-MM questionnaire was administered in a controlled classroom setting during regular school hours. Academic performance data was collected directly from official school records with appropriate permissions.

Data Analysis: The collected data underwent rigorous statistical analysis using a recognized statistical software package, with a pre-determined level of significance set at $\alpha=0.05$. Descriptive statistics (means, standard deviations, frequencies, percentages) summarized demographic characteristics, EI levels, and academic performance. Pearson product-moment correlation coefficients examined the relationship between emotional intelligence and academic performance. Simple and multiple linear regression analyses determined the predictive power of emotional intelligence and explored the influence of demographic variables.

4. Results

This section presents the key findings of the study, addressing each of the research questions.

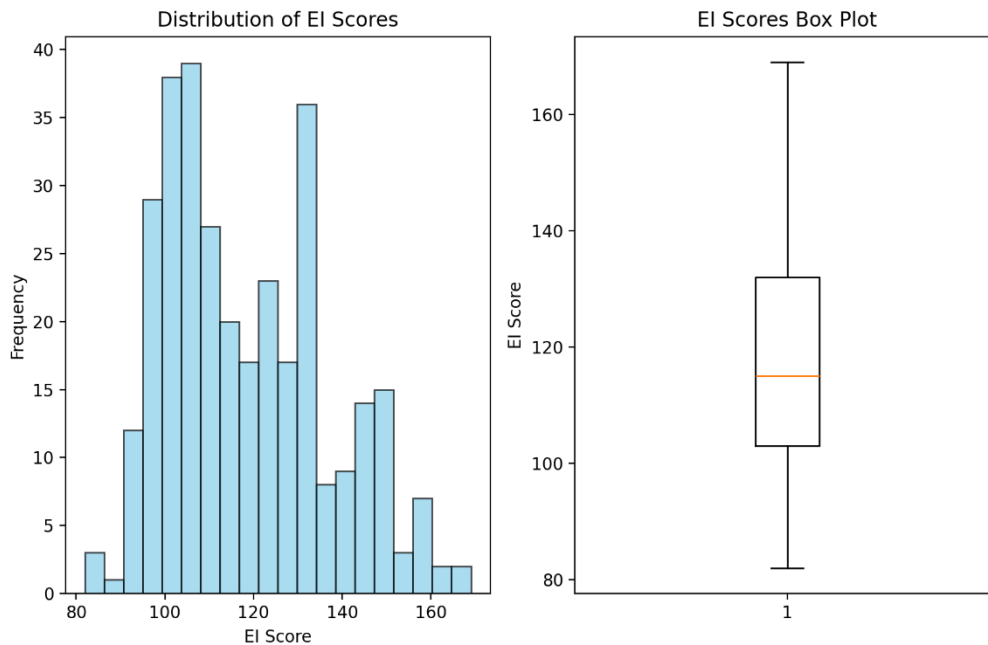
Descriptive Statistics for Emotional Intelligence Scores: The overall emotional intelligence scores of the participants were analyzed. Table 1 presents the descriptive statistics for the total EI scores.

Table 1: Descriptive Statistics for Total EI Scores

	EI
count	322

	EI
mean	118.5590062112
std	18.188642761
min	82
25%	103
50%	115
75%	132
max	169

As shown in Table 1, the mean total EI score for the 322 participants was 118.56 (SD=18.19).



The distribution of EI scores was slightly right-skewed (skewness = 0.509).

Group Differences in Emotional Intelligence Scores: Analyses investigated potential differences in emotional intelligence scores based on gender and family type.

Gender Analysis: Table 2 summarizes the emotional intelligence scores by gender.

Table 2: Emotional Intelligence Scores by Gender

Gender	n	Mean EI Score	Standard Deviation	p-value
Gender 1	95	117.68	15.87	0.577
Gender 2	227	118.93	19.10	

The independent samples t-test revealed no statistically significant difference in emotional intelligence scores between Gender 1 (M=117.68,SD=15.87) and Gender 2 (M=118.93,SD=19.10), with a p-value of 0.577.

Family Type Analysis: Table 3 presents the emotional intelligence scores across different family types.

Table 3: Emotional Intelligence Scores Across Family Types

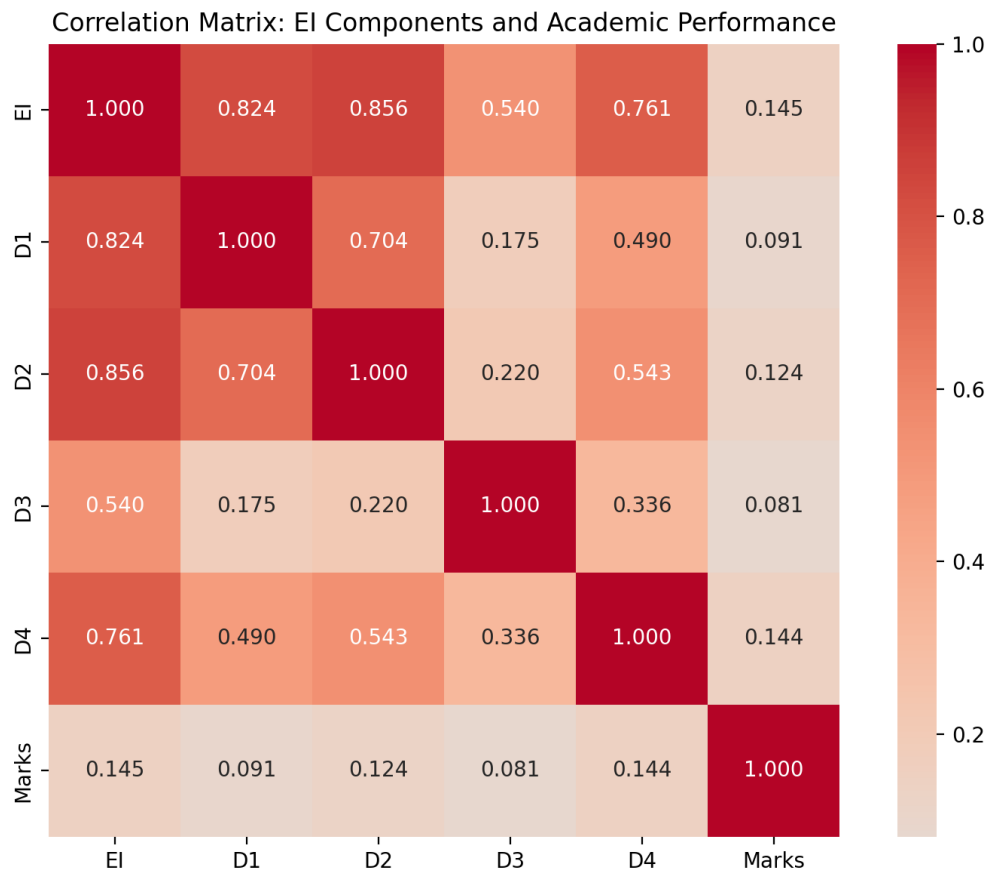
Family Type	n	Mean EI Score	Standard Deviation	p-value
Family 1	235	118.55	17.91	0.162
Family 2	65	120.74	19.60	
Family 3	22	112.18	15.98	

An ANOVA indicated no statistically significant differences in emotional intelligence levels among the various family types (p=0.162).

Correlations with Academic Performance: The relationship between emotional intelligence and academic performance was examined using Pearson product-moment correlation coefficients. Table 4 displays the correlation results.

Table 4: Correlations Between Emotional Intelligence and Academic Performance

Variable	Academic Performance (Marks)
Total EI	$r=0.145, p=0.009$
Inter-personal Awareness (D2)	$r=0.124, p=0.026$
Inter-personal Management (D4)	$r=0.144, p=0.010$



Total emotional intelligence demonstrated a weak but statistically significant positive correlation with academic performance ($r=0.145, p=0.009$). Furthermore, two specific domains of the EII-MM showed significant positive correlations: Inter-personal Awareness (D2) ($r=0.124, p=0.026$) and Inter-personal Management (D4) ($r=0.144, p=0.010$).

5. Discussion

The findings provide valuable insights into the emotional intelligence profiles of higher secondary students and its relationship with academic performance.

Relationship Between Emotional Intelligence and Academic Performance: The observed weak but significant positive correlation ($r=0.145, p<0.01$) between total emotional intelligence and academic performance aligns with broader literature showing a positive association (Sánchez-Álvarez et al., 2020). The quantitative weakness, compared to some meta-analyses (MacCann et al., 2020), might be attributed to using a self-report measure (EII-MM), as ability-based EI assessments often yield stronger associations. Nonetheless, the finding reinforces EI as a personal resource influencing academic outcomes.

The significant correlations found for Inter-personal Awareness (D2) and Inter-personal Management (D4) with academic marks are particularly noteworthy. These domains, related to understanding and managing others' emotions, highlight the social dimension of learning. Higher inter-personal awareness fosters effective communication and empathy in collaborative environments. Strong inter-personal management skills improve teamwork and facilitate positive social networks, contributing to academic success. These findings underscore that academic success is influenced by a student's capacity to navigate social and emotional dynamics, not solely by individual cognition.

Influence of Demographic Factors: The absence of significant differences in EI scores based on gender or family type is an interesting finding. While some previous research indicates gender differences in non-cognitive skills, this study's results suggest that, for this specific sample and using the EII-MM, these demographic factors do not significantly differentiate emotional intelligence levels. This could imply a more uniform distribution of EI or reflect the EII-MM's characteristics. Future research with diverse populations and EI tools could explore these nuances, considering previous

findings where EI influence varied by gender and age (Samanta & Dwivedi, 2025; Begum, 2024).

Implications for Educational Psychology and Practice: The consistent, albeit weak, positive correlation between EI and academic performance, especially the role of inter-personal awareness and management, provides a strong rationale for integrating EI development into higher secondary education. These findings support Social-Emotional Learning (SEL) frameworks, which cultivate non-cognitive skills essential for holistic student development (CASEL, 2023).

Educational interventions should explicitly target inter-personal emotional skills. Programs enhancing empathy, communication, and conflict resolution could improve social relationships and academic outcomes. Such initiatives align with SEL's documented benefits: improved mental health, self-awareness, stronger relationships, better academic performance, and reduced behavioral issues. Long-term SEL benefits, like higher graduation rates, further underscore these findings' importance for policy and practice (Belfield et al., 2015). By nurturing EI, especially its inter-personal dimensions, educational institutions equip students with critical life skills beyond the classroom, preparing them for future success and well-being. This correlation necessitates re-evaluating pedagogical frameworks, positioning educators as pivotal in fostering emotional safety, empathy, and self-regulation. The findings also call for policy interventions championing comprehensive EI frameworks in higher secondary education.

Limitations and Future Research: This study's reliance on a self-report questionnaire (EII-MM) is a limitation, as self-report measures can be subject to social desirability bias, potentially influencing correlation strength. Future research would benefit from multi-method assessments, including ability-based EI measures. The findings are specific to the sampled population, limiting generalizability without further investigation. Rigorous empirical validation of proposed intervention programs

is imperative. Future longitudinal studies could explore causal pathways and long-term EI impact. Qualitative investigations are suggested for nuanced lived experiences, and exploring mediating roles of parental involvement, teacher SEL training, and school culture is crucial for a holistic framework.

6. Conclusion

This study systematically assessed emotional intelligence levels among higher secondary students using the EII-MM, investigating its relationship with academic performance and the influence of demographic factors. Findings revealed a weak but statistically significant positive correlation between overall emotional intelligence and academic performance, with inter-personal awareness and inter-personal management emerging as particularly relevant domains. Critically, no significant differences in emotional intelligence were found based on gender or family type within the sampled cohort. These results underscore emotional intelligence, especially its inter-personal dimensions, as a valuable non-cognitive skill contributing to academic success. The study reinforces the compelling rationale for integrating emotional intelligence development into educational curricula, aligning with broader Social-Emotional Learning (SEL) initiatives. By fostering students' abilities to understand and manage their own emotions and those of others, educational institutions can cultivate individuals who are not only academically proficient but also emotionally resilient, socially adept, and well-prepared for the complexities of modern life. This research provides a foundational basis for advocating for targeted interventions and policies that prioritize holistic student development, ensuring future generations are equipped with the full spectrum of skills necessary to thrive.

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Chapter : 68

Assessing Language Skills In Communicative English Teaching: Bridging Theory And Practice

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Abstract

This study examines the dynamic interplay between theory and practice in assessing language skills within Communicative English Language Teaching (CELТ). Emphasizing the shift from traditional discrete-point testing to performance-based assessment, the research explores how communicative competence can be effectively measured through tasks that mirror authentic language use. Drawing on contemporary frameworks and empirical studies, the work highlights the challenges teachers face in aligning theoretical principles with practical classroom constraints, including reliability, validity, and washback effects. The study also considers technological innovations that support communicative assessment and discusses their pedagogical implications. By bridging theoretical insights and real-world practices, this research aims to inform more balanced and contextually responsive approaches to language testing in CELТ classrooms, ultimately fostering learner-centered evaluation that promotes meaningful language development.

Keywords: Communicative Language Teaching, Language Assessment, Communicative Competence, Performance-based Testing, Language Evaluation

Introduction

Assessment of language skills is a vital and inseparable component of the multifaceted process of language learning and teaching, particularly within Communicative English Language Teaching (CELТ). Rather than being a peripheral activity, testing functions as one of the four interrelated pillars of a comprehensive

curriculum model, alongside purpose or objectives, content or knowledge, and methodology or learning experiences (Hooper, 1971, cited in Murphy, 1985:02). In the communicative approach, assessment is not limited to measuring discrete linguistic elements but extends to evaluating learners' ability to use language meaningfully and appropriately in real-life contexts. This perspective requires a careful balance between theoretical principles of communicative competence and the practical demands of classroom implementation, underscoring the need to design assessment tools that both reflect authentic language use and support pedagogical goals. It is as essential as any other component of the curriculum in Communicative English Language Teaching. The success or shortcomings of the entire language teaching programme are often judged by how well learners demonstrate their communicative skills through assessment tasks. In this context, evaluation goes beyond testing isolated knowledge of grammar or vocabulary; it becomes a measure of learners' ability to use language fluently, accurately, and appropriately in meaningful interactions. The perceived effectiveness of assessment practices is therefore closely linked to the overall quality and credibility of the language programme. Bridging theory and practice in this area requires developing testing procedures that authentically reflect communicative competence while providing reliable evidence of learners' progress.

A language assessment, therefore, should be carefully designed to align with and fulfil the aims and objectives of a communicative syllabus. In Communicative English Language Teaching, this means that assessment is viewed as part of a potentially continuous process (Murphy, 1985:03), providing valuable feedback on learning outcomes, instructional effectiveness, the suitability of materials, and the relevance of testing procedures. Such feedback informs not only day-to-day classroom practice but also broader decisions about curriculum planning and policy. Hughes (2003:001) reinforces this perspective, noting that the impact of assessment on teaching and learning-known as backwash-can be either constructive or detrimental. In a communicative context, if a test is perceived as high stakes, preparation for it may

overshadow authentic communicative activities. When test content and techniques diverge from the communicative objectives of the course, harmful backwash is likely to occur, undermining the very skills the programme aims to develop.

There was a time when many examinations promoted a clear separation between assessment and instruction (Heaton, 1988:05). However, in contemporary Communicative English Language Teaching, it is increasingly recognized that teaching and assessment must work in close collaboration. In this approach, evaluation is no longer viewed as an isolated activity but as an integral partner in fostering communicative competence. As Davies (1968:05) observed, *“a good test is an obedient servant since it follows and apes the teaching,”* reflecting the principles and goals of instruction. At the same time, Hughes (2003:02) highlights that assessment can exert both positive and negative backwash on teaching practices. To bridge theory and practice effectively, it is essential to maintain a partnership between teaching and testing, ensuring that assessment reinforces communicative objectives rather than distorting them, and that it supports meaningful learning experiences in the classroom.

It is true that in Communicative English Language Teaching there are situations where instruction is effective and aligned with communicative goals, but assessment fails to reflect those aims, resulting in harmful backwash. Such misalignment can undermine learners’ motivation and distort classroom priorities. Heaton (1988:05) emphasizes the inherent connection between the two domains, observing that *“both testing and teaching are so closely interrelated that it is virtually impossible to work in either field without being constantly concerned with the other.”* Bridging theory and practice in communicative assessment, therefore, requires designing tests that accurately measure the skills taught and reinforce the objectives of meaningful, authentic language use, creating a constructive cycle in which teaching informs testing and testing enriches teaching.

Statement of Intent

This research aims to explore the principles, practices, and challenges of assessing language skills within Communicative English Language Teaching (CELT), with a focus on bridging the gap between theoretical frameworks and classroom realities. While communicative approaches have gained widespread acceptance for promoting authentic language use, assessment practices often lag behind, relying on traditional testing methods that fail to capture learners' ability to communicate meaningfully. This disconnect can produce harmful backwash effects, where test preparation undermines communicative learning goals.

The study intends to investigate how assessment can be designed to reflect the core principles of communicative competence-fluency, accuracy, appropriacy, and strategic interaction-while maintaining reliability and validity: It will examine existing assessment models, evaluate their alignment with CELT objectives, and identify practical constraints faced by teachers, including time limitations, resource availability, and institutional demands.

By combining a critical review of theoretical literature with field-based analysis of assessment practices, the research seeks to propose guidelines for creating effective, context-sensitive assessment tools that support communicative teaching rather than contradict it. Ultimately, this work aspires to contribute to the development of an integrated model in which testing is not an isolated act but an active partner in shaping and reinforcing communicative language development.

The table below outlines core dimensions that will guide the inquiry:

Dimension	Focus in the Study
Theoretical Foundations	Models of communicative competence and assessment principles
Assessment Methods	Performance-based tasks, portfolios, and integrated skill evaluation
Classroom Implementation	Teachers' practices, constraints, and perceptions

Backwash Effect	Impact of assessment on learning and teaching activities
Guidelines Development	Recommendations to align testing with communicative objectives

The background to Communicative Approach

Since the 1960s, English language learning and teaching have undergone significant paradigm shifts that laid the foundation for Communicative English Language Teaching (CELTE). One of the most influential transitions has been the movement from a focus on the mastery of language structures to an emphasis on the use of language for genuine communication. Earlier methods, such as the Grammar-Translation and Audio-Lingual approaches, prioritized memorization of forms and the mechanical practice of patterns. However, they often failed to equip learners with the ability to express meaning in real-life contexts.

This shift coincided with a broader reconceptualization of language itself: from perceiving it as a static set of rules to recognizing it as a dynamic tool for interaction. The traditional Contrastive Analysis Hypothesis, which emphasized predicting learner errors by comparing the target language and the native language, gradually gave way to the Interlanguage Hypothesis, acknowledging that learners develop their own evolving systems of understanding as they acquire a new language.

Perhaps most significantly, Noam Chomsky's distinction between linguistic competence and performance eventually inspired the concept of *communicative competence*, articulated by Dell Hymes. Communicative competence expanded the notion of what it means to "know" a language to include not just grammatical accuracy but also pragmatic appropriateness, sociolinguistic sensitivity, and strategic skill in managing interaction.

These theoretical shifts have profound implications for assessment. Language testing must now move beyond discrete-point tests of form and instead measure learners' ability to communicate effectively in varied contexts. Bridging theory and practice in this area remains a central challenge for contemporary language educators.

Major Shift	From	To
Language Focus	Mastery of structure	Use for communication
Conception of Language	Set of rules	Means of interaction
Learning Hypothesis	Contrastive Analysis	Interlanguage
Competence Framework	Linguistic competence	Communicative competence

Analyses The Actual Language Test

This study analyses the actual language testing practices employed in the BA, B.Sc., and B.Com first-and second-year Compulsory English courses at Aligarh Muslim University (AMU) to uncover the underlying reasons for the persistent gap between the theoretical principles of communicative assessment and their practical application. English has held a central place at AMU since the university's inception in 1875, reflecting its historical commitment to fostering proficiency in the language as both a medium of higher education and a tool for broader professional engagement. Over time, the English syllabi at AMU have generally evolved in line with prevailing ELT trends, from structural and grammar-focused syllabi to more contemporary communicative approaches.

Despite these curricular shifts, the assessment methods used in these programmes often remain traditional in design. Written examinations still emphasize grammatical accuracy, literary recall, and translation skills, with relatively limited scope for measuring learners' ability to use English communicatively in authentic contexts. Oral and performance-based assessments, which are essential to evaluating

communicative competence, are often marginal or absent due to practical constraints, including large class sizes, limited resources, and entrenched institutional practices.

This chapter seeks to highlight how such misalignments create a gulf between policy and practice. While course objectives frequently espouse the development of fluency, interactional skills, and pragmatic awareness, the high-stakes examinations privilege discrete knowledge over communicative ability, leading to negative washback on classroom teaching. By documenting and analysing the current assessment instruments and comparing them to the principles of communicative language testing, the study aims to propose context-sensitive recommendations for closing this gap. Such recommendations will support AMU's efforts to align assessment practices more closely with the goals of Communicative English Language Teaching.

Conclusion

This study has highlighted the persistent disconnect between the theoretical ideals of communicative language testing and the realities of assessment practices in English courses at the undergraduate level. While syllabi increasingly articulate communicative objectives, traditional examination formats remain entrenched, prioritizing isolated grammatical knowledge over authentic language use. As a result, assessments frequently produce negative washback, narrowing instructional focus and limiting students' opportunities to develop meaningful communicative competence. To address these challenges and foster a more balanced, learner-cantered approach, the following recommendations are proposed:

Recommendation

- I. Communicative language tests should primarily assess communicative skills rather than merely discrete aspects of language. This means the test design should embed grammar and vocabulary within realistic communicative tasks,

so that learners must draw upon linguistic knowledge naturally rather than recalling rules in isolation. The communicative purposes-such as requesting information, negotiating meaning, or expressing opinions-should be clear and central. By focusing on real-life processes of interaction, tests will more accurately reflect learners' ability to use language meaningfully and support the communicative goals of the curriculum.

- II. Students should be given opportunities to perform genuine communication during assessment, which requires the test to be context-specific. Tasks such as role plays, simulations, and problem-solving discussions enable learners to demonstrate their capacity to manage discourse rather than merely produce sentences. When assessments are grounded in realistic scenarios relevant to learners' academic or professional needs, students are more motivated and better prepared to transfer classroom learning to authentic situations. This approach ensures that the test measures not only accuracy but also fluency, appropriateness, and strategic competence.
- III. A communicative test should assess exactly what the course seeks to promote among students, reinforcing learning through positive washback. When assessment criteria are transparent, well-defined, and closely aligned with course objectives, students and teachers can focus on developing communicative abilities with confidence. Positive washback encourages sustained engagement, deeper skill development, and a shared understanding of what successful communication entails.

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Chapter : 69

Pedagogical Innovations Through Ai- Integrated Education And Cai –A Newer Approach

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Abstract

Innovative pedagogical approaches are teaching strategies that move beyond traditional methods ,emphasizing student engagement ,active learning ,and the application of knowledge in real world contexts.these approaches generally incorporate technology and digitalisation to improve the various needs of teacher educators and students in 21 st century . The integration of AI in education has the potential to transform the learning experience, making it more personalized, engaging, and effective. By embracing these technologies and developing innovative pedagogical approaches, educators can prepare students for a future where AI plays an increasingly important role. these approaches generally incorporate technology and digitalisation to improve the various needs of teacher educators and students in 21 st century . However, the paper identified several challenges, such as the need for teacher training, careful planning,and adjustment to the individual needs of students. In 21st century education, the application of technology in collaborative learning is a key factor to facilitate collaboration across geographical and cultural boundaries. The conclusion of this paper emphasizes the importance of integrating collaborative learning models in the education system to face the demands of the times.Here the New education policy NEP 2020 is a good policy and plays an important role in shaping multidisciplinary and innovative pedagogical strategies. This study makes theoretical and practical contributions in developing innovative pedagogical approaches that are relevant to the needs of 21st century learners

Keywords: Innovative teaching strategies, AI ,TEL technology-enhanced learning, experiential learning ,NEP- 2020 transformative pedagogical approaches.

Introduction: This paper leverages AI technologies to enhance learning outcomes through personalized instruction, adaptive assessments, and immersive learning experiences. By integrating AI into educational methodologies, educators can cater to diverse learning styles and pace, thereby fostering deeper engagement and understanding among students. This paradigm shift in pedagogy not only empowers educators with data-driven insights but also cultivates a collaborative learning environment where students actively participate in their educational journey. Emphasizing ethical considerations and the responsible use of AI, this approach aims to prepare students for a future shaped by technological advancements, equipping them with critical thinking skills and digital literacy essential for success in the 21st century. In 21st century education, the application of technology in collaborative learning is a key factor to facilitate collaboration across geographical and cultural boundaries. The conclusion of this paper emphasizes the importance of integrating collaborative learning models in the education system to face the demands of the times. This study makes theoretical and practical contributions in developing innovative pedagogical approaches that are relevant to the needs of 21st century learners. AI has emerged as both a beacon of opportunity and a terrain riddled with challenges. the National Education Policy (NEP) 2020 underlines the importance of experiential learning in Indian education, particularly in vocational and higher education. NEP advocates for “learning by doing,” emphasizing internships, apprenticeships, and community engagement as essential components of curriculum reform. the motto of NEP 2020 is educate encourage and enlighten students as well as teacher educators .as it aims at making the education system holistic flexible, multidisciplinary urged to the needs of 21st century and the 2030 sustainable development goals .

NEP 2020 with respect to pedagogical approaches

1. These guidelines aim to suggest innovative pedagogies and develop the linkage of Graduate Attributes, as listed in National Higher Education Qualifications Framework (NHEQF), with learning needs and pedagogical approaches to better serve towards achieving the NEP 2020 vision. 2. Pedagogy and Its importance: Pedagogy is an art of sharing knowledge which is dynamic in nature and may vary from teacher to teacher, classroom to classroom, institution to institution and platform to platform. The most critical factor in pedagogy is the constructivism Pedagogies are constantly evolving processes. An effective pedagogical approach may touch upon the following:

- Every pedagogy is different may be modified as per 21st Century learning. Pedagogy must fit the targeted audience and focus on helping students to
 - develop an understanding of the knowledge delivered and relate with real life scenarios. To provide rich classroom experiences, various tools or methods may be integrated to enhance level of interaction and discussion within the class. Different assessment tools need to be explored for higher

and inclusive productivity of the learners. Integrating ICT into assessment and evaluation.

Some of the important Key innovative pedagogical approaches are mentioned as below

Project based learning –students engage in depth projects that require them to explore the topic and apply their knowledge and demonstrate their understanding through a tangible presentation .

Flipped classroom- Another significant innovation is the use of flipped classrooms, where students first engage with instructional content online, leaving classroom time for more interactive problem-solving and application .students learn new material outside of class for eg online resources and attending workshops and then apply the gained knowledge in class through group activities and discussions .

Blended learning –it combines traditional classroom instructions with online learning tools allowing for more flexible and personalized learning experiences.

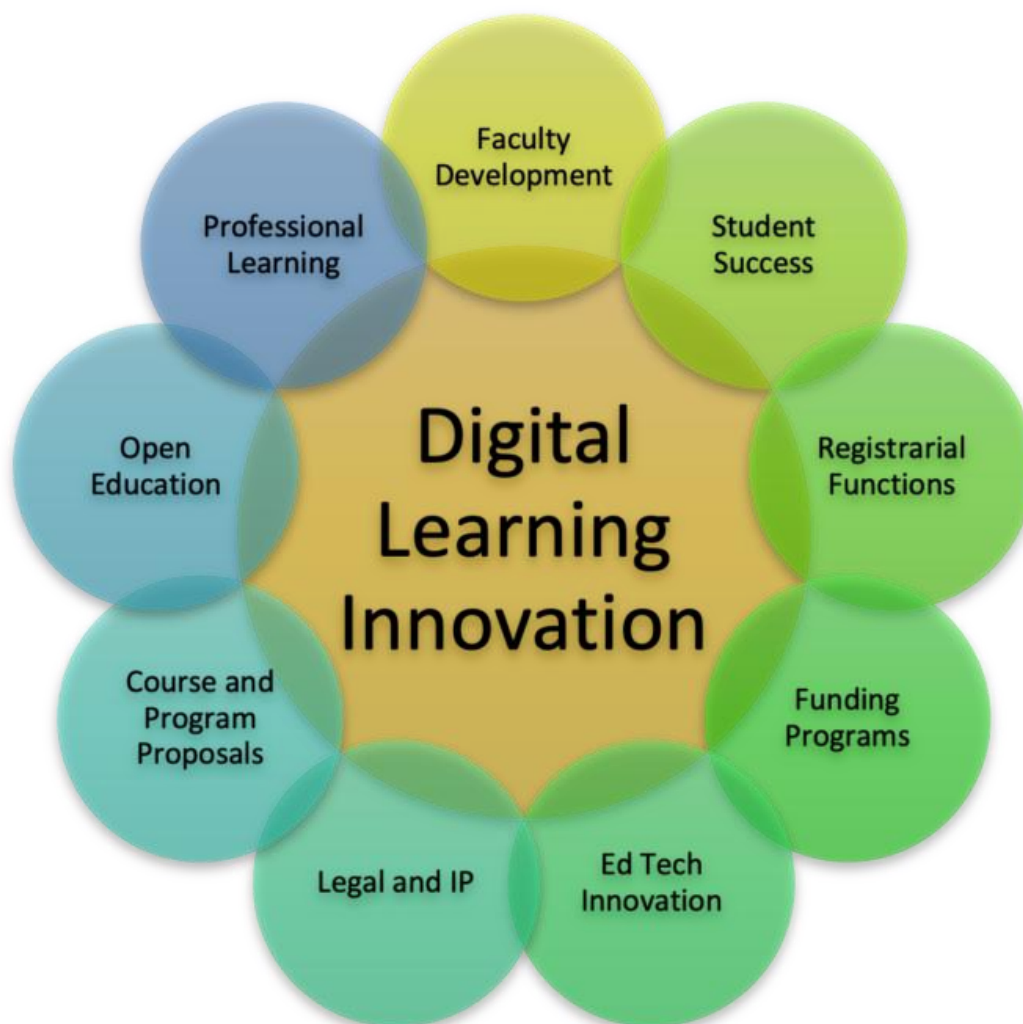
Collaborative learning— Students work together in a group foster teamwork ,communication and critical thinking skills. Innovative pedagogical approaches, particularly collaborative learning models, have been a major focus in the transformation of 21st-century education.

The results show that collaborative learning is effective in improving students' academic and non-academic skills, such as critical thinking, collaboration, communication, and creativity. Technology integration, teacher training, and adaptation to local contexts are key elements that must be considered for the success of this model. Thus, collaborative learning not only answers the needs of 21st century education but also provides direction for future pedagogical innovation. collaborative learning not only creates an inclusive learning environment but also helps students become adaptive learners in the digital age.

Computational learning –IT develops learning ability to solve the problems using logical and computational approaches often through tech related activities.

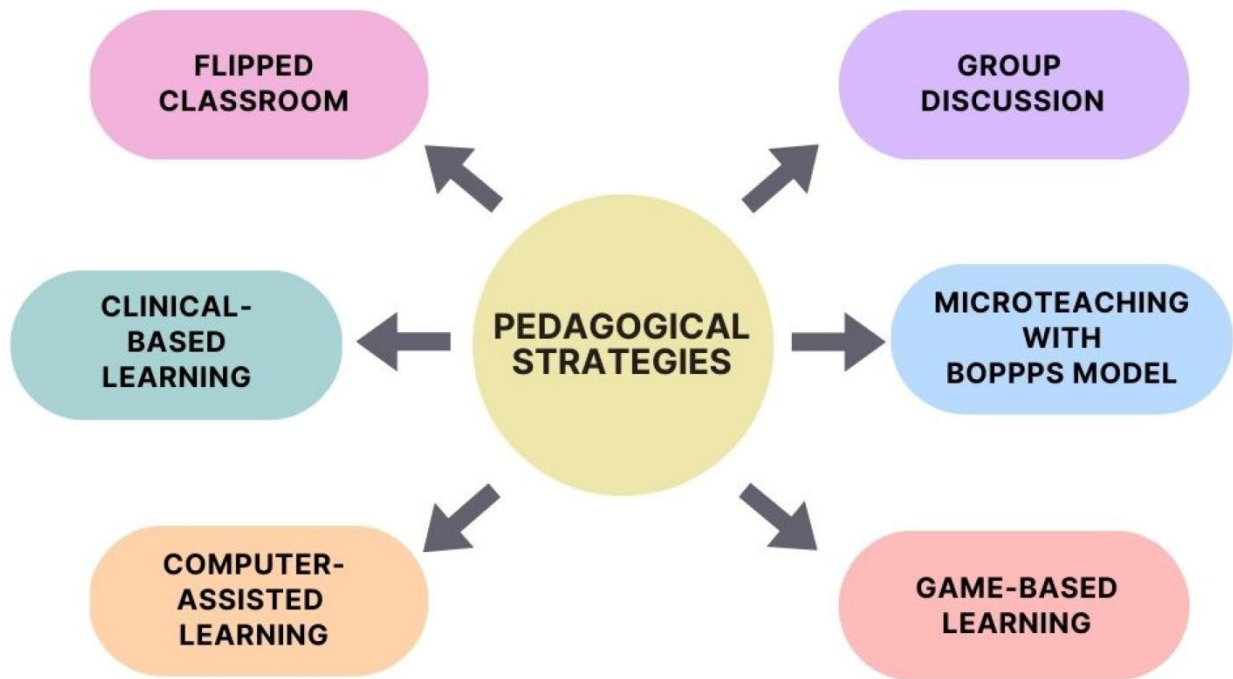
Experimental learning –It involves learning through direct experiences such as field trips, tours, ,internships ,and community service projects.

Personalised learning --Furthermore, personalized learning, supported by AI and data analytics, is beginning to transform how students learn in Indian classrooms. Personalized learning platforms allow for tailored educational experiences based on student progress and competency.



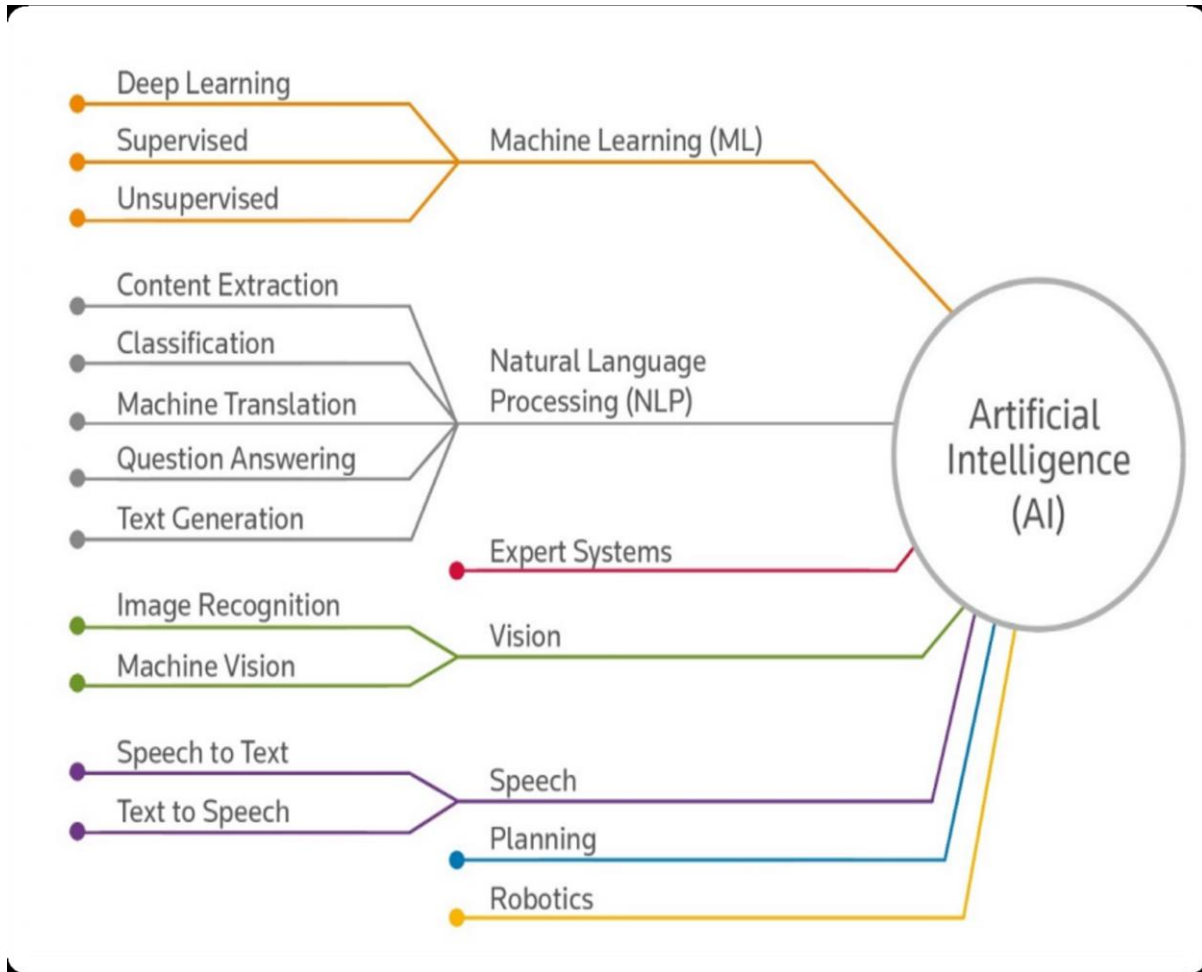
Various pedagogical and innovative aspects and strategies

NEP 2020 says that pedagogical affordances must be deployed in such a way that teaching and learning process can contribute to enhancing educational goals and purpose to improve student learning outcomes. Similarly involvement of technology and digitalization in education which can be also termed as e- learning or digital learning ,involves transforming educational content and processes into digital formats using using e books ,digital TEXTBOOK and interactive platforms .This new trend aims to modernize education by improving accessibility ,engagement and the overall learning experience. Some of the key aspects of digitalization in education are-



Transformative Pedagogy And Ai Integration

At its core, transformative pedagogy seeks to transform not only what students know but also how they engage with information. Integrating AI tools, such as Gamma.app, aligns seamlessly with this objective by offering educators advanced solutions for enhancing PowerPoint presentations. Gamma.app, an AI-driven tool, is designed to streamline the creation, design, and delivery of presentations, making the process more efficient, visually appealing, and engaging. This integration reflects a commitment to fostering an educational environment that caters to diverse learning styles and preferences.



AI IN EDUCATION--- CAI AND ENHANCED INNOVATIVE PEDAGOGY - In short we can say that purpose ,process ,place , pedagogical affordance and product framework says that pedagogical affordances must be deployed in such a way that teaching and learning process can contribute to enhancing educational goals and purpose to improve student learning outcomes Here involvement of AI powered tools and digitalization in education which can be also termed as e- learning or digital learning ,involves transforming educational content and processes into digital formats using using e books ,digital textbook and interactive platforms This new trend aims to modernize education by improving accessibility enhance students and educators engagementand create more effective TL outcomes ,real time feedback .Some of the key aspects of AI and CAI in education are

- Transforming content -like converting text book ,lectures into digital formats for easy access and modification E-library via interactive white board system
- Personalized learning - AI based learning management systems LMS and algorithms can analyze students performance data to identify individual

learning needs and educational content accordingly it encourage active participation .eg- includes adaptive learning platforms,innovative teaching and AI powered virtual tutoring systems had provide customised feedback support

- AI can automate the grading of multiple-choice and short-answer questions, freeing up teachers' time to focus on more complex tasks and providing more timely feedback to students..
 - AI-powered Tutoring Systems: -These systems can provide one-on-one support to students, offering explanations, examples, and practice problems based on their specific needs.
 - Enhanced engagement -AI can make learning more interactive and engaging through gamification ,simulations and virtual reality experiences .tools like AI powered chatbots can provide instant support and guidance keeping students motivated and on track.CAI also help to learning experiences like different learning styles and preferences.
 - Innovative pedagogical approaches -AI helps teacher educators to adopt a more student centred approach (according to NEP 2020),focussing on individual needs and personality traits and learning styles .
 - Streamlined administration - It involves simplifying and advancement of administrative process.through various methods including automation ,standardization ,communication,through hybrid mode .AI also automate administrative tasks for educators like grading papers ,scheduling classes and smart classrooms. Thus CAI and AI powered tools also assist with data analysis into student students performance as well as educators achievements and identifying areas for improvement. by bwhich ,organizations can save time reduce costs and enhance overall management efficiency.
 - Cost effectiveness -reducing printing costs transportation expenses and other traditional educational overhead
 - Utilizing digital tools
 - AI can facilitate collaboration among students by connecting them with peers and experts, providing tools for group work, and supporting communication.
- Development of Critical Thinking Skills:
- AI can be used to create simulations and scenarios that challenge students to think critically, solve problems, and make informed decision
 - AI as a Tool for Creativity.
 - AI can be used to generate ideas, create content, and provide feedback on student work, fostering creativity and innovation.
 - Ethical Considerations-As AI becomes more integrated into education, it is crucial to consider the ethical implications of its use, including issues of data privacy, bias, and equity.
 - Development of Critical Thinking Skills-- The integration of AI in education has the potential to transform the learning experience, making it more personalized, engaging, and effective.

Applications Of Ai In Educaiton

AI in Education provides Smart Content Adaptive Learning Personalized Learning Data Accumulation Virtual Facilitator Automated Grader Proctoring Chat Campus / Chatbot Tracking their academic progress, modify the course or its learning pace Robo-graders replace a part of the grading system, and human grader is always there for further assessment. The chatbot collects the students' opinion through a dialogue interface as if it is a real interviewer and look for reasons too for varied opinions. Using previous search queries,

AI in education can suggest related content for the students. AI in education can adapt quickly to individual needs and deliver personalized learning methodologies and activities driven by the learners' interests. AI-powered systems ensure the authenticity of the student to take the

exam and prevent from cheating. With the help of AI, the textbook could be split into small chunks of digestible guides, which is easy to read and understand. Balancing AI tools with traditional methods fosters critical thinking and meaningful classroom discussions, essential for comprehensive education.

Preparing Teachers for an AI-Integrated Future -as teacher educators, we must prepare future educators to navigate an ai-infused landscape. this means integrating ai literacy into teacher training programs, fostering critical discussions on the ethical implications of ai, and emphasizing that technology should augment, not replace, human teaching. ai in education is not about replacing teachers – it is about empowering them. the key lies in striking a balance: leveraging ai to enhance learning while preserving the irreplaceable human aspects of teaching. the future of education will not be ai vs. teachers; it will be ai and teachers working together to create richer, more meaningful learning experiences! while ai can assist in instruction, it cannot replace the emotional intelligence, empathy, and adaptability of a human teacher. education is not just about knowledge transfer; it is about mentorship, motivation, and social-emotional learning areas through innovative pedagogical ideas enhanced by AI. Empowering teachers is crucial for effective AI integration. training programs, such as generative ai for educators, provide the necessary resources for seamless classroom incorporation. Many platforms like UGC ,NEP ,NFLP offer personalized professional development programs recommending resources aligned with educators' goals. AI guidance for schools toolkit equips teachers to merge AI with inclusive, equitable education. these initiatives streamline teaching processes while upholding data security for students.

Conclusion

Thus AI can personalise learning pathways , provoke and guide not only students but also academicians and teacher educators Artificial Intelligence (AI) is increasingly integrated into education, impacting both computational pedagogy and innovative pedagogical approaches. AI tools can personalize learning experiences, automate administrative tasks, and provide data-driven insights for educators. This integration aims to enhance student engagement, improve learning outcomes, and prepare students for a future shaped by AI. And to improve teaching methodology. AI has brought about a paradigm shift in the landscape of the HEIs .Tools such as AI writing assistants ,automated content generation platforms and intelligent tutoring systems are increasingly being integrated into academic systems ,though these innovations pose significance challenges to the preservation of academic integrity ,but also offer transformative opportunities for teaching ,learning and research.

Finally the above discussed approaches can help the students to develop different skills like communication ,creativity ,and adaptability which are essential for successful life and here AI powered tools and computational assisted instructions can also foster innovation and creative thinking to prepare the students to face the challenges and opportunities of future .

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Chapter : 70

Remote Work in Transition: A Review Paper on Post-Pandemic Workplace Evolution

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Abstract

Remote work, once considered a flexible option, has evolved into a mainstream business model with far-reaching implications for how organizations operate. As technology advances and workforces grow increasingly digital, the future of remote work promises even greater adoption. Businesses are recognizing substantial benefits such as reduced operational costs, improved work-life balance, higher productivity levels, and access to a diverse and global talent pool. These advantages make remote work an attractive long-term strategy across sectors. However, this transformation also brings critical challenges that must be addressed to sustain performance and growth. Key concerns include the difficulty in maintaining strong team cohesion, employee engagement, and organizational culture in a virtual setting. Additionally, the rise in cyber threats makes data security and privacy essential areas of focus. Businesses must adopt robust cybersecurity frameworks and develop new management strategies to navigate these issues effectively. Overall, the successful integration of remote work practices depends on a balanced approach that maximizes benefits while proactively mitigating risks. Future research and innovation in digital collaboration tools, remote leadership, and secure infrastructure will play a pivotal role in shaping the next phase of remote work.

Keywords: Remote Work, Virtual Teams, Productivity, Cost Efficiency, Talent Acquisition, Cybersecurity, Team Cohesion, Digital Workplace, Work-from-Home, Future of Work

Benefits of Remote Work for Businesses

1. Cost Reduction

Remote work helps businesses save significantly on operational expenses. Without the need for large office spaces, companies can cut down on rent, utility bills (electricity, water, internet), office furniture, maintenance, and daily consumables (like coffee, paper, stationery). These savings can be reinvested in technology, employee development, or expansion strategies.

2. Increased Productivity

Many employees report higher productivity when working remotely. This is often due to:

- Fewer workplace distractions
 - Ability to personalize their work environment
 - Flexibility to work during peak performance hours
 - Less commuting time, resulting in more energy and time for actual work
- Tools like project management software and video conferencing also help streamline tasks and communication, making teams more efficient.

3. Access to a Wider Talent Pool

With remote work, businesses are no longer limited by geographical boundaries when hiring. They can recruit skilled professionals from across the country or even globally. This expands access to top talent, specialized skill sets, and diverse perspectives, giving businesses a competitive edge in innovation and problem-solving.

4. Improved Work-Life Balance

Remote work gives employees the flexibility to manage personal responsibilities alongside work, such as childcare, health, or hobbies. This often leads to:

- Reduced stress and burnout
 - Increased job satisfaction
 - Higher employee retention
- Happier employees tend to be more committed and motivated, benefiting the organization as a whole.

5. Enhanced Flexibility

Remote work enables companies to adapt more easily to unexpected changes – like economic shifts, health crises (e.g., COVID-19), or client needs – without major disruptions. Businesses can scale teams up or down quickly, operate across different time zones, and offer flexible schedules that align with customers' availability.

Challenges and Considerations for Businesses in Remote Work

1. Communication and Collaboration

One of the biggest hurdles in remote work is ensuring smooth and consistent communication. Unlike traditional office settings where face-to-face conversations happen naturally, remote teams rely heavily on digital tools like Zoom, Slack, Microsoft Teams, and email. This can lead to:

- Miscommunication or delays in responses
- Difficulty in interpreting tone and intent
- Loss of spontaneous brainstorming and idea-sharing

To overcome this, businesses must adopt **structured communication protocols**, use collaborative project management tools (like Trello or Asana), and schedule regular check-ins to maintain alignment and accountability.

2. Cybersecurity

Remote work environments expose organizations to greater cybersecurity risks. Employees may access sensitive data using personal devices or unsecured networks, which increases vulnerabilities to:

- Data breaches
- Phishing attacks
- Malware infections

To address this, companies need to implement **robust IT policies**, including:

- VPNs (Virtual Private Networks)
- Endpoint security software
- Two-factor authentication
- Regular cybersecurity training for employees

3. Maintaining Team Cohesion

Remote workers may feel **socially isolated** or disconnected from their teams and the company's vision. Without regular in-person interaction, it can be challenging to build trust, camaraderie, and a sense of belonging. This can reduce morale and engagement. To maintain cohesion, companies should:

- Foster a strong organizational culture online
- Organize virtual team-building activities
- Hold periodic in-person meetups, where possible.

4. Performance Management

Measuring employee performance remotely can be more complex than in physical offices. Managers cannot always observe work in progress and may struggle to assess productivity fairly. This requires:

- Clearly defined goals and KPIs
- Frequent check-ins and updates
- Constructive feedback loops

Using **goal-oriented performance management systems** and output-based assessments (rather than time-based) helps maintain accountability and fairness.

5. Work-Life Boundary Blurring

Remote work often blurs the line between professional and personal life. Employees may struggle to "switch off," leading to longer working hours, digital fatigue, and burnout. This is especially true when working from home without a dedicated workspace.

To manage this, organizations should:

- Encourage flexible but structured schedules
- Promote regular breaks and time off
- Support mental well-being through wellness programs

Future Trends in Remote Work

1. Hybrid Work Models

In the future, many businesses will adopt a **hybrid work model** that blends remote work with traditional in-office presence. This model allows employees to:

- Work remotely for part of the week (for focused tasks)
- Come into the office for team meetings, brainstorming sessions, or client interactions

Benefits of hybrid models:

- Increases flexibility and employee satisfaction
- Reduces overhead costs while preserving collaboration
- Accommodates different working styles

For example, companies like Google and Microsoft have already implemented hybrid work policies to give employees more autonomy.

2. AI and Automation

Artificial Intelligence (AI) and **automation tools** will continue to transform how remote work is conducted by:

- Automating repetitive tasks like scheduling, data entry, and customer support
 - Enhancing communication through smart chatbots and AI-powered emails
 - Helping in performance monitoring and data analysis for better decision-making
- This allows employees to focus more on **creative, strategic, and human-centric tasks**, ultimately improving productivity and innovation.

3. Flexible Schedules and Work-from-Anywhere

As businesses shift focus from time-based to **outcome-based performance**, flexible scheduling is becoming the norm. Employees will have more freedom to:

- Choose work hours that suit their personal rhythms
 - Work from any location, even across borders
- This trend helps:
- Attract and retain global talent
 - Support diversity and inclusion
 - Improve work-life balance
- Companies like Airbnb and Spotify have implemented “Work from Anywhere” policies, giving employees full geographic flexibility.

4. Increased Focus on Well-being

Mental health and **employee well-being** will become central to workplace culture. Businesses are realizing that a healthy workforce leads to:

- Higher engagement and morale
 - Lower absenteeism and turnover
 - Greater loyalty and productivity
- Future strategies may include:
- Wellness programs and virtual fitness sessions
 - Mental health days or digital detox policies
 - Employee assistance programs (EAPs) and counseling support.

Conclusion

The future of remote work is **promising** and filled with opportunities. Organizations that:

- Embrace **hybrid work**
 - Integrate **AI and automation**
 - Offer **flexibility**
 - Prioritize **employee well-being**
- will be best positioned to **attract talent**, drive innovation, and remain competitive in a constantly evolving business environment.

The future of remote work presents a transformative opportunity for businesses to evolve in response to changing workforce expectations and technological advancements. By embracing hybrid work models, organizations can offer flexibility while maintaining collaboration and team dynamics. The integration of AI and automation will streamline repetitive tasks, enabling employees to focus on strategic and creative responsibilities. Flexible schedules and work-from-anywhere policies will not only enhance work-life balance but also expand access to a diverse global talent pool. Furthermore, companies that prioritize employee well-being and mental health will build more resilient, motivated, and engaged teams. Overall, by recognizing the

benefits, addressing the challenges, and staying ahead of emerging trends, businesses can create a future-ready work environment that drives long-term success.

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Chapter : 71

Development And Validation Of Criterion Test On Social Science Among IX Students In Tamil Nadu State Board Syllabus

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Abstract

This study presents the systematic development and validation of a criterion-referenced test (CRT) designed to evaluate academic achievement in Social Science among IX standard students under the Tamil Nadu State Board syllabus. Focusing on two content units - "Evolution of Humans and Society – Prehistoric Period" and "Lithosphere – II – Exogenic

Processes” - the test development followed rigorous steps including blueprinting, pilot testing, item analysis, and expert validation. Initially, a 94-item multiple-choice test was constructed. Item analysis based on difficulty and discrimination indexes led to the selection of 50 items for the final draft. The final test demonstrates strong content and face validity and is intended to serve as a reliable tool for assessing learning outcomes aligned with Bloom’s cognitive domains. The study contributes to educational measurement by offering a curriculum-specific, empirically validated assessment tool suitable for classroom and research use.

Keywords: Social Science Criterion Test, CRT standardise, Item Analysis, IX Standard Social Science, social Science Tool Validating.

Introduction:

Assessment is an essential component of the teaching-learning process. In the context of Social Science education, precise and objective measurement tools are vital to gauge students’ understanding of historical and geographical concepts. The present study aims to develop a Criterion-Referenced Test (CRT) to evaluate the academic achievement of IX standard students in Tamil Nadu State Board Syllabus on specific Social Science topics. CRTs are designed to measure student performance against a fixed set of learning standards rather than in comparison to other students. This test aligns with Bloom’s Taxonomy - targeting knowledge, understanding, and application. The selected content areas for test construction are:

- Evolution of Humans and Society – Prehistoric Period (History)
- Lithosphere – II – Exogenic Processes (Geography)

The test development involved comprehensive procedures including blueprint preparation, pilot testing, and psychometric validation to ensure content coverage and technical quality.

Methodology:

Tool Construction: A preliminary 94-item multiple-choice test was developed based on the Tamil Nādu State Board curriculum and learning objectives. The blueprint ensured balanced representation across content areas and cognitive domains:

Table - 1

Weight To The Content Of The Preliminary Draft Of The Criterion Test Tool

Content	Total (Marks)
Evolution of Humans and Society – Pre historic Period	50
Lithosphere – II Exogenic Processes	44
Total	94

Table - 2

Preliminary Draft Of The Criterion Test Tool (Bloom's Taxonomy)

OBJECTIVES	MARKS
Knowledge	19
Understanding	55
Application	20
Total	94

Table - 3

Blue Print - Two Dimensional Chart Of The Preliminary Draft Of The Crt Test

Content	Knowledge	Understanding	Application	Total (Marks)
Evolution of Humans and Society - Prehistoric Period	10 (1)	29 (1)	11 (1)	50 (1)
Lithosphere – II Exo-genetic Processes	9 (1)	26 (1)	9 (1)	44 (1)
Total	19 (1)	55 (1)	20 (1)	94 (1)

Pilot Study

The Preliminary Draft of the Criterion test Tool was prepared and it consists of 94 items. Specific instructions to the learners given and mentioning time limit, method of answering etc., were instructed. The items were presented to 50 students in IX Standard Social Science subject in the form of a test and the scores were computed. Each questions includes four responses (One response is correct and other three responses are wrong). One mark was given to each correct response and zero mark was given to each wrong response. Then, the scores were arranged in the decreasing order. Using the 50 answer sheets, item - wise analysis was done.

Item Analysis

The effectiveness of a test can be increased by the selection of items of suitable difficulty value and discrimination index. Item analysis included two different characteristics namely,

- Item difficulty and the
- Item discrimination.

Item difficulty refers to the percentage of students who answer the item correctly whereas the discrimination reflects the degree to which an item distinguishes between the High Scores and Low Scores. To select the good test items, a close analysis of all items was made. This made it possible for the elimination of certain items based on the results of the item analysis. The investigator selected items having difficulty value between 0.2 and 0.8 and discrimination index higher than 0.25. Accordingly, 50 items were selected from the 94 items. The total score of the achievement test of the final study was 50 marks.

Table-4

Diffecalty Level And Discriminative Index Of The Preliminary Draft

No Items	Concept	Difficulty Index	Discrimination Index	Interpretation
		$RH+RL/N*100$	$(RH-RL)/N/2$	
Q1	History-Unit-1 Evolution of Human and Society in Prehistoric Period	61.53846154	0.769230769	Rejected
Q2	"	73.07692308	0.538461538	Accepted
Q3	"	61.53846154	0.615384615	Accepted
Q4	"	73.07692308	0.230769231	Rejected
Q5	"	65.38461538	0.538461538	Accepted
Q6	"	69.23076923	0.615384615	Accepted
Q7	"	73.07692308	0.230769231	Rejected
Q8	"	53.84615385	0.615384615	Accepted
Q9	"	61.53846154	0.769230769	Rejected
Q10	"	73.07692303	0.230769231	Rejected
Q11	"	46.15384615	0	Rejected
Q12	"	65.38461538	0.692307692	Accepted
Q13	"	88.46153846	0.230769231	Rejected
Q14	"	69.23076923	0.615384615	Accepted
Q15	"	57.69230769	0.692307692	Accepted
Q16	"	34.61538462	0.384615385	Accepted
Q17	"	53.84615385	0.769230769	Rejected
Q18	"	61.53846154	0.769230769	Rejected
Q19	"	53.84615385	0.307692308	Accepted
Q20	"	57.69230769	0.230769231	Rejected
Q21	"	65.38461538	0.538461538	Accepted

Q22	"	69.23076923	0.615384615	Accepted
Q23	"	73.07692308	0.538461538	Accepted
Q24	"	50	0.384615385	Accepted
Q25	"	53.84615385	0.923076923	Rejected
Q26	"	61.53846154	0.769230769	Rejected
Q27	"	65.38461538	0.692307692	Accepted
Q28	"	65.38461538	0.692307692	Accepted
Q29	"	42.30769231	-0.076923077	Rejected
Q30	"	61.53846154	0.461538462	Accepted
Q31	"	80.76923077	0.384615385	Accepted
Q32	"	73.07692308	0.538461538	Accepted
Q33	"	57.69230769	0.846153846	Rejected
Q34	"	130.7692308	2.153846154	Rejected
Q35	"	61.53846154	0.769230769	Rejected
Q36	"	76.92307692	0.307692308	Accepted
Q37	"	69.23076923	0.615384615	Accepted
Q38	"	57.69230769	0.230769231	Rejected
Q39	"	65.38461538	0.692307692	Accepted
Q40	"	57.69230769	0.692307692	Accepted
Q41	"	61.53846154	0	Rejected
Q42	"	76.92307692	0.461538462	Accepted
Q43	"	65.38461538	0.692307692	Accepted
Q44	"	46.15384615	0.153846154	Rejected
Q45	"	65.38461538	0.692307692	Accepted
Q46	"	61.53846154	0.769230769	Rejected

Q47	"	76.92307692	0.461538462	Accepted
Q48	"	42.30769231	0.230769231	Rejected
Q49	"	73.07692308	0.230769231	Rejected
Q50	"	53.84615385	0.923076923	Rejected
Q51	Geography Unit-II Lithosphere-II Exogenic	34.61538462	-0.230769231	Rejected
Q52	"	61.53846154	0.769230769	Rejected
Q53	"	57.69230769	0.846153846	Rejected
Q54	"	73.07692308	0.538461538	Accepted
Q55	"	80.76923077	0.384615385	Accepted
Q56	"	57.69230769	0.230769231	Rejected
Q57	"	46.15384615	0	Rejected
Q58	"	73.07692308	0.538461538	Accepted
Q59	"	96.15384615	1.461538462	Rejected
Q60	"	65.38461538	0.230769231	Rejected
Q61	"	73.07692308	0.538461538	Accepted
Q62	"	23.07692308	-0.307692308	Rejected
Q63	"	65.38461538	0.692307692	Accepted
Q64	"	65.38461538	0.692307692	Accepted
Q65	"	57.69230769	0.846153846	Rejected
Q66	"	69.23076923	0.615384615	Accepted
Q67	"	57.69230769	0.846153846	Rejected
Q68	"	53.84615385	0.769230769	Rejected
Q69	"	80.76923077	0.384615385	Accepted
Q70	"	57.69230769	0.846153846	Rejected

Q71	"	42.30769231	0.846153846	Rejected
Q72	"	65.38461538	0.692307692	Accepted
Q73	"	65.38461538	0.692307692	Accepted
Q74	"	65.38461538	0.538461538	Accepted
Q75	"	30.76923077	-0.461538462	Rejected
Q76	"	73.07692308	0.538461538	Accepted
Q77	"	23.07692308	-0.461538462	Rejected
Q78	"	53.84615385	0.615384615	Accepted
Q79	"	61.53846154	0.615384615	Accepted
Q80	"	65.38461538	0.692307692	Accepted
Q81	"	57.69230769	0.846153846	Rejected
Q82	"	61.53846154	0.615384615	Accepted
Q83	"	26.92307692	0.230769231	Rejected
Q84	"	65.38461538	0.538461538	Accepted
Q85	"	57.69230769	0.846153846	Rejected
Q86	"	76.92307692	0.461538462	Accepted
Q87	"	46.15384615	-0.307692308	Rejected
Q88	"	57.69230769	0.538461538	Accepted
Q89	"	73.07692308	0.538461538	Accepted
Q90	"	42.30769231	0.230769231	Rejected
Q91	"	57.69230769	0.846153846	Rejected
Q92	"	57.69230769	-0.076923077	Rejected
Q93	"	53.84615385	0.769230769	Rejected
Q94	"	69.23076923	0.615384615	Accepted

Reliability And Validity Process of Achievement Test

The test items were evaluated by 3 Higher Secondary School PG Teachers and 7 High School Graduate Teachers in Social Science. Feedback was solicited on the following aspects:

- Relevance to learning outcomes/syllabus
- Clarity and language
- Content clarity
- Necessity of the item

Experts unanimously agreed on the test's alignment with these criteria, thereby establishing both content and face validity. All evaluators expressed satisfaction with the test items. Thus, face validity was confirmed. However, as there was no standardized test tool available for this specific content area, the investigator could not establish the concurrent validity of the test developed for this study.

Educational Significance

- Curriculum Alignment: The test is specifically designed for the Tamil Nādu State Board IX standard syllabus, ensuring relevance.
- Formative Assessment: Teachers can use the tool to identify learning gaps and plan remedial teaching.
- Research Utility: The validated tool can be used in future experimental and correlational studies in Social Science education.

The validity of a test refers to the degree to which measures what it is proposed to measure. The test items were prepared with reference to the instructional objectives relating to the content area. Thus, the content validity of the tool was established by giving the test for review to 5 Higher Secondary School PG Teachers and 5 High School Graduate teachers. All of them were satisfied with the items of the test. Thus, the face validity was established. Since, there was no standardized test tool based on this

specific area of the content, the investigator could not establish the concurrent validity of the test prepared for this study.

Tool For The Final Study

According to the Item analysis Difficulty Index the Range of above 0.80 and below 0.35, and by the Discrimination Index the Range of above 0.75 to below 0.30 Items are Deleted. After Deleting 44 Items out of 94 the investigator selected 50 Items and Finalized the Achievement Tool.

Table - 5

Blue Print Two Dimensional Chart Of The Final Draft Of The Criterion Test Tool

Content	Knowledge	Understanding	Application	Total (Marks)
Evolution of Humans and Society - Prehistoric Period	9 (1)	15 (1)	5 (1)	29 (1)
Lithosphere – II Exogenetic Processes	6 (1)	11 (1)	4 (1)	21 (1)
Total	15 (1)	26 (1)	9 (1)	50 (1)

Conclusion

The study successfully developed and validated a criterion-referenced test in Social Science for IX standard students. Using a scientific approach to item selection and validation, the tool shows strong alignment with both curriculum and cognitive learning objectives. The final 50-item MCQ test provides a reliable and valid assessment instrument that educators can adopt for classroom evaluation and academic research.

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Chapter : 72

Translation and Interpretation in a Multilingual Society

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Abstract

In today's globalized environment, multilingual societies are increasingly common, presenting both opportunities and challenges for communication. Translation and interpretation function as crucial mechanisms for bridging linguistic divides and facilitating social inclusion. This article explores the significance of translation and interpretation in multilingual contexts, emphasizing their roles in sectors such as education, healthcare, legal systems, governance, and media. It also differentiates between the two practices, examines associated ethical issues, and underscores the need for professional training and policy support. Ultimately, the study affirms that effective linguistic mediation promotes equity and mutual understanding in diverse communities.

Translation and Interpretation in a Multilingual Society

Multilingual societies, where multiple languages coexist and are used for communication, are a growing reality worldwide. In these societies, effective communication across linguistic boundaries is vital for fostering inclusivity and maintaining democratic access. Translation (written language conversion) and interpretation (oral or signed language conversion) are indispensable in ensuring that language differences do not become barriers to participation or service access.

Functional Importance

Translation and interpretation are crucial in several public sectors. In healthcare professional medical interpreters help ensure patients receive accurate information and care. In education translating textbooks and classroom instructions supports multilingual learners. In Legal System court interpreters guarantee that language differences do not hinder access to justice. In government services Translations of policies and civic documents allow for informed public participation. In media and Communication subtitling, dubbing, and multilingual reporting increase cultural exchange and information accessibility.

Challenges and Ethics

Despite their importance, translation and interpretation face practical and ethical challenges. Conveying cultural and contextual nuances is often complex. Misinterpretation or under-translation can lead to significant consequences, particularly in sensitive areas like healthcare or law. Ethical principles such as confidentiality, impartiality, and accuracy are essential for maintaining trust and fairness in these practices.

Professionalization and Policy Support

The demand for trained professionals is high in multilingual societies. Institutions and governments must invest in structured training programs and certification to ensure high-quality linguistic mediation. Professional organizations like the American Translators Association (ATA) and the International Federation of Translators (FIT) promote industry standards that enhance reliability and accountability.

Education is a fundamental right and a key driver of social and economic progress. In multilingual societies, where students come from diverse linguistic and cultural backgrounds, language can either act as a bridge or a barrier. Effective communication between educators, students, and parents from different linguistic communities requires robust translation and interpretation services. These tools are

essential to ensure inclusive, equitable, and high-quality education for all learners, regardless of their mother tongue.

The Educational Landscape in Multilingual Societies

In many multilingual countries such as India, Canada, and South Africa, classrooms are linguistically diverse. Students often speak one language at home and are taught in another at school. Without proper support, language differences can create learning gaps, lower student confidence, and hinder academic success. Translation and interpretation help mediate this gap by making educational content and communication more accessible.

Translation in the Educational Context

Translation in education primarily involves the conversion of written materials such as textbooks, curriculum guidelines, examination papers, homework instructions, and parent communications into multiple languages. This enables curriculum access, students can understand complex concepts better in their native language, especially in foundational years. Translating circulars, report cards, and school policies helps non-native-speaking parents stay informed and engaged in their child's education. Schools with access to translated materials foster a more inclusive learning environment where no student feels linguistically marginalized. Digital tools and language-learning apps have made educational translation more accessible, but the accuracy and cultural appropriateness of translations still require human expertise.

Interpretation in the Educational Context

Interpretation supports real-time verbal communication in classrooms and school settings. Interpreters help ensure that parents who do not speak the school's primary language can still engage meaningfully with teachers. Interpretation is crucial when discussing individualized education plans (IEPs) or assessments with parents. It

allows multilingual teachers or guest educators to share knowledge without language limitations.

In some contexts, peer interpretation where bilingual students help classmates understand lessons also plays a significant informal role, though it should not replace professional services.

Benefits and Challenges of Translation and Interpretation in a Multilingual Society

Promotes equity and academic success for multilingual students. Builds trust and cooperation between schools and linguistically diverse families. Encourages cultural inclusion, reducing dropout rates and improving classroom harmony. Lack of trained professionals as many schools, especially in rural areas, lack access to qualified interpreters or translators. Some educational institutions offer services selectively, often based on resources. Quality and accuracy in which poor or machine-based translation can lead to misunderstandings, especially in technical or emotional contexts.

Challenges and Ethics in Translation and Interpretation in Education

1. Linguistic and Cultural Nuances: One of the primary challenges in educational translation and interpretation lies in accurately conveying meaning across languages with different structures, idioms, and cultural references. Educational content especially in subjects like literature, history, and social sciences, often includes culturally specific metaphors or references that may not have direct equivalents in the target language. For example, an English phrase like “hitting the books” may not make sense to a Tamil-speaking student unless the interpreter understands the idiomatic meaning and provides a culturally appropriate equivalent. Misinterpretation of such nuances can lead to miscommunication, confusion, and loss of learning depth.

2. Shortage of Trained Professionals: In many multilingual societies, there is a significant lack of certified and trained translators and interpreters, particularly those who specialize in the field of education. This shortage is more pronounced in rural or under-resourced areas, where teachers or bilingual staff are informally tasked with

interpretation, often without adequate training. Untrained interpreters may omit, alter, or misunderstand critical information, which can affect learning outcomes, student evaluations, or even legal obligations in special education cases.

3. Inconsistent Policy Implementation: While national education policies in multilingual countries often acknowledge the importance of language access, implementation is inconsistent across regions and institutions. Some schools may offer comprehensive support in multiple languages, while others lack even basic translated materials. This leads to educational inequality, where students' academic progress is shaped not by ability but by the availability of language support services.

4. Technological Limitations: Machine translation tools like Google Translate are increasingly used in schools to bridge language gaps. However, these tools, while helpful, are not always accurate or context-sensitive. Especially in technical, academic, or emotionally sensitive discussions, they can produce literal translations that are misleading or inappropriate. Overreliance on technology without human oversight can diminish the quality of communication.

5. Ethical Challenges in Interpretation: Interpreters in educational settings often deal with sensitive or confidential information about students, such as learning disabilities, behavioural issues, or family circumstances. Ethical standards such as confidentiality, accuracy, impartiality, and professional boundaries must be strictly maintained. For instance, interpreters must not add personal opinions or filter information based on what they think is appropriate. Even in emotionally charged parent-teacher meetings, interpreters must relay the speaker's words faithfully and objectively. Bias, filtering, or omission can compromise trust and the integrity of communication.

6. Power Dynamics and Trust: In multilingual schools, language barriers can reinforce existing power hierarchies with dominant language speakers having more access and influence. If interpretation is poorly managed or unavailable, non-dominant language speakers may feel excluded or marginalized. Moreover, families from marginalized

linguistic backgrounds may distrust interpreters if they feel their words are not accurately conveyed or if confidentiality is not maintained. Building trust in the interpreter's role is crucial, especially in communities with historical experiences of linguistic or cultural suppression.

7. Emotional Labor and Stress for Interpreters: Interpreting in educational settings especially in special education meetings, disciplinary hearings, or discussions of trauma can place a high emotional burden on interpreters. They must remain neutral even when dealing with emotional stories, parental distress, or teacher frustration. Without proper support systems or training, interpreters may face burnout or inadvertently become emotionally involved, which may compromise ethical boundaries and their well-being.

Addressing These Challenges Ethically

To manage these challenges ethically, institutions and governments must, Develop and enforce clear ethical guidelines for educational interpreters and translators. Provide professional training and certification programs. Ensure consistent access to language services across schools. Promote cultural competence among educators and interpreters. Establish feedback and grievance systems for families and students using these services. By upholding both professionalism and ethics, translation and interpretation in education can become tools of empowerment rather than sources of inequity, professionalism and Policy Support in educational translation and interpretation

1. The Need for Professionalism: In multilingual educational settings, translation and interpretation are not merely linguistic tasks, but complex, professional services that demand cultural sensitivity, technical expertise, and ethical responsibility. The quality of these services directly impacts students' academic success, parental involvement, and equitable access to learning. Professionalism in this field refers to, formal training and certification of translators and interpreters. Adherence to ethical standards like

confidentiality, impartiality, and accuracy. Continuous professional development to keep up with terminological, pedagogical, and technological changes in education. Respect for cultural and linguistic diversity, especially in classrooms with vulnerable or marginalized language communities. Without professionalism, interpretation can become inconsistent, biased, or even harmful, leading to miscommunication, mistrust, or educational inequity.

2. Institutional Training and Capacity Building: Professional development programs for interpreters and translators in education are crucial. Educational institutions and governments should invest in Pre-service and in-service training in both language skills and education-specific content (e.g., pedagogy, child development, learning disabilities). Courses on cross-cultural communication, emotional intelligence, and handling sensitive or confidential conversations.

Certification programs through recognized institutions or professional associations (e.g., American Translators Association, National Association of Educational Translators). Additionally, teachers and administrators should receive basic training in working with interpreters, understanding their roles, and ensuring collaborative communication.

3. Role of Policy Support:

Professionalism alone is not sufficient without strong policy frameworks that institutionalize language access. Governments and educational boards must adopt inclusive language policies that, mandate translation and interpretation services in schools with linguistically diverse populations. Allocate funding and resources for hiring qualified professionals. Develop multilingual curriculum materials and open-access translation repositories. Standardize codes of ethics and operational procedures across educational institutions.

These policies should also account for local linguistic contexts. For example, in India, the National Education Policy (NEP) 2020 emphasizes mother tongue-based

education, encouraging translation of textbooks and multilingual classroom instruction during early schooling years.

4. Technology Integration with Human Oversight: While translation technology tools (like Google Translate, AI-assisted captioning, and learning apps) are growing in popularity, human oversight remains essential for quality assurance. Professional translators and interpreters must be trained to, Use digital tools efficiently and ethically. Evaluate automated outputs for accuracy and appropriateness. Contribute to building localized, context-sensitive language databases for future use. Governments should fund educational tech platforms that support multilingual learning with reliable translations, guided by certified experts.

5. Collaboration Between Stakeholders: Professionalism and policy success also rely on collaboration among government agencies that fund and regulate language services. Schools and universities that implement language access in classrooms. Professional bodies that train and certify translators and interpreters. Parent-teacher associations and NGO's that represent minority language communities and monitor service quality. Stakeholder collaboration ensures that language rights in education are upheld not just in theory, but in everyday practice.

Translation and interpretation are essential tools for ensuring inclusive and equitable education in multilingual societies. They bridge communication gaps between educators, students, and parents from diverse linguistic backgrounds, promoting academic success and social integration. While challenges such as lack of trained professionals, cultural misinterpretations, and ethical concerns persist, they can be addressed through professional training and strong policy support. By prioritizing linguistic access in education, societies uphold the right to learn and participate fully, regardless of language. As global classrooms become increasingly diverse, investing in quality translation and interpretation services is not just a support measure—it is a necessity for educational justice.

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Chapter : 73

A Study On Investors' Perception Towards Investment Avenues – With Special Reference To Salaried Investors In South Bengaluru City

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Abstract: *This study investigates the perceptions of salaried investors in South Bengaluru regarding various investment avenues. With a growing focus on wealth accumulation and financial planning, salaried individuals are increasingly looking to diversify their investments. The research explores factors influencing investment decisions, preferences for specific financial instruments (such as mutual funds, stocks, fixed deposits, real estate, and insurance), and the level of financial literacy among these investors. Data collected through surveys and interviews highlight trends, challenges, and opportunities for improving investment awareness. The study also offers insights into the impact of socio-economic factors on investment behaviour.*

Keywords: Investors' perception, Investment avenues, Salaried individuals, South Bengaluru, Financial literacy, Wealth accumulation, Investment behaviour.

1.Introduction:

Financial Management for every individual is the process of managing one's own finances to achieve financial stability, security, and success. It involves making informed decisions about earning, saving, investing, and spending money to reach personal financial goals. In order to have an effective personal financial management one should follow in Creating a budget and tracking expenses, building an emergency fund, managing debt and credit, investing for the future (e.g., retirement, education), protecting assets with insurance, tax planning and optimization,

retirement planning and estate planning. Financial products act as an investment avenue and provide the required financial security to the investors. Every individual has a tendency to save for various reasons. Savings and Investments are important and integral activities as it facilitates good return to investors and it also helps the economy of the nation. Most famous and largely preferred investment options are Stock market, Bank deposits, Gold, Real Estate, Post-Office Savings and Mutual Funds.

1.1 STOCK MARKET: A stock exchange is a place or organization for the trade of shares of listed companies. The share market makes possible to its investors to grow their small initial sums of money into large ones, and to become wealthy without taking the risk of starting a business. BSE and NSE are the leading stock exchanges in India. Apart from these two stock exchanges

there are another 22 stock exchanges are also trading shares in India. But BSE and NSE established themselves as leaders in stock exchanges.

1.2 BANK DEPOSIT: There are two essential functions which make a financial institution a bank namely, acceptance of deposits from the public and lending money. Investors can open an account with a bank and deposit their money into such accounts and certain rate of interest will be provided over such savings/ investment. This is the traditional and safest way of investment.

1.3 GOLD: Gold is the most popular precious metal, making it one of the go-to investment options for the Indian salaried class of investors. Investors generally buy gold as a way of diversifying risk, especially through the use of futures contracts and derivatives. The gold market is subject to speculation and volatility as are other markets. Buying gold is the oldest kind of investing activity, traditionally gold is treated as an investment option which provides protection in bad times of households. Here, gold is considered as an easily bought and easily liquified asset that can be relied upon to appreciate well.

1.4 REAL ESTATE: Real estate is property consisting of land and the buildings on

it, along with its natural resources such as crops, minerals or water; immovable property of this nature; an interest vested in this also an item of real property, generally buildings or housing. Real estate is more than just buying place to live, real estate recently developed into an investment option where investors invest in property in order to appreciate it and get capital returns.

1.5 POST OFFICE SAVINGS: Post Office Savings Account is a deposit scheme under the Government of India, operational at all post offices in the country. It yields returns on your investment at a fixed interest rate which is decided by the Reserve Bank of India. Post Office Savings Scheme is beneficial for individuals who want to earn fixed returns on their investment with minimum risk.

1.6 MUTUAL FUND: Mutual funds are a type of collective investment schemes that are regulated and available to the general public and is of open-ended nature. Since it is a collective investment scheme a single mutual fund gives investors a choice of various combinations of these expenses by offering various different types of share combinations.

2. Objectives Of The Study

- To investigate the level of financial literacy and awareness among salaried investors.
- To understand the investment behaviour and preferences of salaried individuals in South Bengaluru City.
- To identify the most popular investment avenues among salaried investors in South Bengaluru City.
- To analyse the factors influencing investment decisions among salaried investors.
- To identify any challenges or barriers faced by salaried investors in South Bengaluru when it comes to making investments.

3. Research Methodolgy

3.1 Research Design: This study adopts a descriptive research design to understand the perceptions, preferences, and behavior of salaried investors in South Bengaluru.

3.2 Research Type: Descriptive Research - it is a type of research methodology that aims to describe or document the characteristics, behaviours, attitudes, opinions, or perceptions of a group or population being studied. It does not attempt to establish cause-and-effect relationships between variables or make predictions about future outcomes. Rather, it focuses on providing a detailed and an accurate representation of the data collected, which can be useful for generating hypotheses, exploring trends, and identifying patterns in the data.

3.3 Research Problem: "Despite the growing importance of investment in financial planning, salaried individuals in South Bengaluru City lack a clear understanding of investment avenues, leading to suboptimal investment decisions. This study aims to investigate the factors influencing investment perceptions and preferences among salaried investors in South Bengaluru City, and explore ways to enhance their financial literacy and investment outcomes."

3.4 Sample Size and Sampling Technique: The study focuses on 500 salaried individuals from South Bengaluru. A convenience sampling method was used to select participants from diverse sectors.

3.5 Data Collection Methods

- **Primary Data:** Surveys will be sent by preparing Google form link for the questionnaire via WhatsApp, Emails and all the other possible networks to get connected.
- **Secondary Data:** Past data of the Investors, market research reports, Published research papers, government reports, and market surveys.

3.6 Tools for Data Analysis

- **Statistical Tools:** SPSS for descriptive statistics and factor analysis.

· **Qualitative Analysis:** Content analysis of interviews.

4. Review Of Literature

Madhavi Karanam and R. Shenbagavalli, (2019), The study reveals a very high association between the profession and the investment choices. Thus, we can conclude that occupation is a major influencer with respect to risk-return perspective and the investment choice.

Jain Priyanka and Tripathi L.K. (2019), The outcomes of present study shows that any person's investment decisions are influenced by so many factors. Individual decides the aims according to his own priorities would be of great relevance to investors, financial planners, policy makers and wealth managers etc.

M. Rani Subathra and S.Bulomine Regi (2018), This paper focuses towards elements of retail investors to invest in stock market, obstacles of investment and their satisfaction after investment. Based on stratified random sampling, samples were collected. The study reveals that, post investment satisfaction is necessary for every investment mode. So, more awareness should be made among the small and medium range investors regarding investment in stock market.

Neha S Shukla, (2016), Through this research paper, an analysis has been made about investor's preference towards investment avenues and the study focused on the salaried personnel only. Savings are invested in assets depending on person's knowledge of different investment options, risk taking ability and demand of return. Savings form an important part of the economy of any nation, with the savings invested in various options available to the people, the money acts as the driver for the growth of the country. It was found that there is no relationship between education with investment while there is significant relationship between age and income.

Chaubey Dhani Pandey and Savita Tripathi, (2016), The study investigated

the influence of financial information on equity share investment decision making. The study indicates that investor's information seeking behaviour is based on their year of experience, their investment horizon and their investment intention. The study also indicated that years of experience has no significant impact on investment source choice.

5. Data Collection And Interpretation

Table 5.1 Frequency analysis of Demographic Factors

Variable (500 responses)		Frequency	Percentage
Gender	Male	340	64
	Female	260	36
Age	20-30	216	43
	31-40	122	25
	41-50	141	28
	Above 50	21	4
Educational Qualification	Graduate	256	51
	Post Graduate	244	49
Employment Level	Entry-Level Employee	305	61
	Middle-Level Employee	140	28

	Senior-Level Employee	55	11
Income Level	Below 1 Lakh Rupees	55	11
	1 to 2 Lakh Rupees	48	9
	2 to 3 Lakh Rupees	58	12
	3 to 4 Lakh Rupees	89	18
	Above 4 Lakh Rupees	250	50

Inference: The total number of responses being 500, 43% of the respondents fall under the age of 20-30. 64% of the respondents are men. 61% of the respondents are entrylevel employees. 51% of the respondents are graduates. 50% of the respondents earn above 4 lakhs per annum.

· **Anova for Age and Investment Perceptions**

H0: There is no significant influence on the perceptions of investment options among different age groups of the respondents.

H1: There is significant influence on the perceptions of investment options among different age groups of the respondents.

Table 5.2: Anova analysis for Age

Factors	AGE	F	P	Significance

	20-30 (Mean)	31-40 (Mean)	41-50 (Mean)	50 & above (Mean)	VALUE	VALUE	level
Stock market	6.67	6.44	6.00	4.67	1.881	.134	Not Significant
Bank deposits	9.52	10.35	14.50	10.17	4.633	.004	Significant**
Gold	9.41	7.56	3.09	2.89	12.133	<.001	Significant**
Real Estate	8.33	7.48	6.55	15.11	13.094	<.001	Significant**
Post Office Savings	8.00	5.76	16.05	4.50	22.300	<.001	Significant**
Mutual Funds	7.41	5.91	8.45	7.61	2.684	.048	Significant**

****The level of significance is tested at 0.05**

Inference: From table 5.2 it is inferred that age as a demographic factor has significant influence on all the investment options except stock market option. REJECT H₀ for all options except stock market. ACCEPT H₀ for investment option; "Stock Market."

· Anova for Gender and Investment Perceptions

H0: There is no significant influence on the perceptions of investment options between gender of the respondents.

H1: There is significant influence on the perceptions of investment options between gender of the respondents.

Table 5.3: Anova analysis for Gender

VARIABLES	Gender		F VALUE	P VALUE	Significanc e level
	MALE (Mean)	FEMALE(Mean)			
Stock Market	6.30	6.38	7.030	.009	Not Significant
Bank Deposits	9.50	11.41	.945	.332	Not Significant
Gold	7.02	8.09	18.301	<.001	Significant**
Real Estate	8.99	7.87	7.388	.007	Significant**
Post-office Savings	7.08	8.68	5.310	.022	Significant**
Mutual Fund	7.21	6.87	.038	.846	Not Significant

***The level of significance is tested at 0.05**

Inference: From table 5.3 it can be inferred that “Gender” as a demographic factor has significant influence on the investment options; Gold, Real Estate and Post office Savings.”, hence REJECT H₀. There is no significant influence of “Gender” as a demographic factor on Stock Market, Bank Deposits and Mutual Fund options. Hence, ACCEPT H₀.

· **Anova for Education Level and Investment Perceptions**

H₀: There is no significant influence on the perceptions of investment options among different education levels of the respondents.

H₁: There is significant influence on the perceptions of investment options among different education levels of the respondents

Table 5.4: Anova analysis for Education Level

VARIABLES	EDUCATION LEVEL		F VALUE	P VALUE	Significance Level
	Graduate (Mean)	Post graduate (Mean)			
Stock Market	6.43	6.24	.050	.698	Significant**
Bank Deposits	9.78	11.04	2.360	.126	Not Significant
Gold	7.20	7.86	.588	.444	Not Significant
Real Estate	7.45	9.52	7.814	.006	Significant**

Post-office Savings	7.63	8.04	.219	.641	Not Significant
Mutual Fund	7.63	6.45	3.747	.05	Significant**

****The level of significance is tested at 0.05**

Inference: From table 5.4 it can be inferred that “Education Level” as a demographic factor has significant influence on the investment options, Stock Market, Real Estate and Mutual fund hence REJECT H₀. There is no significant influence of “Education Level” as a demographic factor on investment options; BankDeposits, Gold, and Post office Savings. Hence ACCEPT H₀.

· Anova for Employment Level and Investment Perceptions

H₀: There is no significant influence on the perceptions of investment options among different employment levels of the respondents.

H₁: There is significant influence on the perceptions of investment options among different employment levels of the respondents.

Table 5.5: Anova Analysis for Employment Level

VARIABLES	EMPLOYMENT GRADE LEVEL	F VALUE	P VALUE	Significance level

	Entry Level Employee (Mean)	Middle Level Employee (Mean)	Senior or Executive - Level Employee (Mean)			
Stock Market	7.26	6.18	4.98	7.215	<.001	Significant**
Bank Deposits	9.14	11.47	10.93	3.432	.034	Significant**
Gold	8.09	8.37	5.17	4.641	.011	Significant**
Real Estate	7.07	8.11	11.48	11.374	<.001	Significant**
Post office Savings	6.20	9.07	8.74	4.884	.009	Significant**
Mutual Fund	7.65	6.84	6.33	1.527	.220	Not Significant

****The level of significance is tested at 0.05**

Inference: From table 5.5 it is inferred that employment level as a demographic factor has significant influence on all the investment options except mutual funds. REJECT H₀ for all options except mutual fund. ACCEPT H₀ for investment option; “mutual fund.”

· Anova for Income Level and Investment Perceptions

H₀: There is no significant influence on the perceptions of investment options among different income level of the respondents.

H₁: There is significant influence on the perceptions of investment options among different income level of the respondents.

Table 5.6: Anova Analysis for Income Level

VARIABLES	ANNUAL INCOME					F VALUE	P VALUE	Significance
	Below 1 Lakh Rupee Mean	1 to 2 Lak h Rupee Mean	2 to 3 Lak h Rupee Mean	3 to 4 Lak h Rupee Mean	Above 4 Lak h Rupee Mean			
Stock						3.178	.015	Significant
Market						7.816	<.001	t**
	7.76	7.15	5.76	6.50	5.72			

Bank	6.67	8.54	12.86	12.50	11.19	5.087	<.001	Significan
Deposits	7.86	11.08	3.86	4.79	8.34	2.703	.032	t**
Gold	8.38	6.69	5.76	10.38	8.84	5.297	<.001	Significan
Real Estate	5.62	7.77	11.38	11.08	7.24	4.314	.002	t**
Post-office								Significan
Savings	7.43	8.69	8.00	9.29	5.94			t**
Mutual Fund								Significan
								t**
								Significant**

****The level of significance is tested at 0.05**

Inference:

From table 5.6 it is inferred that “Income Level” as a demographic factor has significant influence on all the investment options, hence reject H₀.

Correlation Analysis

Relationship between Investment & Wellbeing

Correlation analysis has been applied in this research to study the

relationship between Investment and Wellbeing of the Investors and the results are Tabulated in the following Table 5.7.

H0: There is no significant relationship between investment perceptions and wellbeing of the respondents.

H1: There is significant relationship between investment perceptions and wellbeing of the respondents.

Table 5.7 Correlation Analysis Between Investment & Wellbeing

	WELLBEING
INVESTMENT	$r = .164^{**}$

****Correlation is significant at the 0.05 level.**

Interpretation

The relationship between Investment perceptions and Wellbeing of the investor is insignificant. Hence, Reject H0.

Inference There is a slightly positive relationship between investment perceptions and wellbeing of the respondents. i.e., The choice of investment of an investor will affect this overall wellbeing.

Regression Analysis

4.5.1 Regression Analysis of Impact of Investment over Wellbeing

Regression analysis is applied to understand the impact of Investment Perceptions over Wellbeing of an Investor and the results are Tabulated in Table 5.8

H0: There is no significant impact of investment over wellbeing of the respondents. H1: There is significant impact of investment over wellbeing of

the respondents. **Table 5.8 Regression Analysis of Impact of Investment over Wellbeing**

Investment	Wellbeing					
	R	R Square	Adjusted R Square	F Value	P Value	Significance level
	.164	.027	.022	5.469	.020	Significant

***Significant at 0.05 level**

Interpretation: The impact of investment choices over Wellbeing of the investor is significant. Hence Reject H₀.

Inference: Since there is a significant impact, it can be concluded that any investment decision an investor makes while choosing the right investment avenue. The choice of investment will have an impact on the wellbeing of the investors

6. Conclusion

From analysing the data collected, the demographic factors affecting the perceptions of investment options by the salaried class in South Bengaluru City have been identified. Various demographic factors such as age, gender, education level, income level, employment level, have been identified. After the analysis & interpretation of data by the researcher it is concluded that

demographic factors exert a significant influence over the perceptions of salaried class on various investment options.

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Chapter : 74

Ai-Driven Disease Diagnosis And Medicine Recommendation System

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Abstract

The integration of medical recommendations into mobile and web-based applications is revolutionizing healthcare by enabling patient diagnostics, treatment adherence, and personalized health management. This paper presents a system that leverages artificial intelligence (AI) to analyse user-provided symptoms and recommend accurate disease diagnoses and appropriate medications. By processing vast amounts of medical data using real-time analytics and machine learning models, the application provides tailored advice, improving patient outcomes and accessibility to healthcare.

Key components of this system include a symptom input interface, AI-driven disease prediction, and medicine recommendation algorithms validated through expert input and clinical data. Ethical considerations such as data privacy, bias mitigation, transparency, and informed consent are prioritized to ensure user trust and regulatory compliance with frameworks like HIPAA and GDPR.

Future advancements, including wearable device integration, expanded symptom databases, and blockchain technology for secure data management, promise to enhance the precision, security, and accessibility of such systems. By becoming more personalized, proactive, and predictive, this technology aims to transform how patients engage with medical care, offering seamless and effective healthcare solutions at their fingertips.

Introduction

A medical recommendation system is an AI-driven technology that analyzes patient data to provide personalized healthcare suggestions. These systems aim to enhance clinical decision-making by recommending treatments, medications, or diagnostic tests based on patient symptoms, medical history, and other relevant factors.

This paper introduces a system designed to diagnose diseases based on user-provided symptoms and recommend appropriate medications. The goal is to make healthcare more accessible, accurate, and efficient for individuals without requiring immediate physician intervention. The purpose of this project's recommendation system is to:

1. Provide personalized treatment advice by analyzing individual symptoms and user input.
2. Enable early detection of potential diseases to reduce complications.
3. Improve accessibility to healthcare for individuals in remote or underserved areas.

Data Sources

The project leverages diverse data sources to ensure accurate recommendations:

1. **Symptom-Disease Databases:** Datasets linking symptoms to possible diseases (e.g., ICD-10, publicly available health data).
2. **Medical Guidelines:** Evidence-based clinical guidelines for medicine recommendations.
3. **Future Integration:** Wearable devices for real-time health monitoring, enhancing the app's adaptability.

Algorithmic Approaches

The system employs a combination of machine learning and knowledge-based techniques to enhance diagnostic accuracy and treatment recommendations. Natural Language Processing (NLP) is utilized to interpret and analyze user-inputted symptoms provided in textual form, enabling the system to understand complex medical language. Classification models, such as decision trees and neural networks, are then applied to predict possible diseases based on the extracted symptoms. In addition, knowledge-based systems incorporating established medical rules and clinical guidelines are integrated to ensure accurate and reliable treatment recommendations. This hybrid approach enables the system to mimic expert-level decision-making while maintaining consistency and scalability.

Benefits

The system offers several significant advantages that enhance the overall user experience and healthcare delivery. One of the key benefits is the provision of personalized recommendations, where diagnoses and treatment options are tailored specifically to each user's unique symptoms and health profile. This ensures that users receive relevant and individualized medical guidance. Additionally, the system features a user-friendly interface available on both mobile and web platforms, making it accessible and easy to navigate even for individuals with limited technical knowledge.

Its design also emphasizes accessibility, particularly for people residing in remote or underserved areas where access to healthcare professionals may be limited. By offering reliable medical insights at their fingertips, the system empowers users to take proactive steps toward managing their health. It encourages timely medical consultations by alerting users to potential health concerns based on intelligent system-generated insights, ultimately promoting early intervention and improved health outcomes.

Challenges

Developing such a system involves several critical challenges, all of which are systematically addressed during the project's implementation to ensure its effectiveness and reliability. One of the foremost challenges is data quality, as the accuracy and comprehensiveness of symptom-to-disease mappings are essential for generating reliable diagnoses. This requires careful curation and validation of medical datasets to reflect real-world scenarios accurately. Privacy concerns also play a major role, given the sensitive nature of health-related information. To address this, robust data protection measures, including encryption and secure storage protocols, are implemented to safeguard user confidentiality and comply with relevant privacy regulations. Another important aspect is system interpretability—ensuring that the recommendations and insights provided by the system are clearly communicated and easily understood by users, regardless of their medical or technical background. Additionally, achieving high model accuracy is crucial, as the system must minimize the risk of false positives or negatives in diagnosis. This requires fine-tuning the machine learning models and incorporating feedback loops to improve predictive performance over time, ultimately building user trust and ensuring safe healthcare guidance.

Evolution of the System

This project represents a significant step forward in the evolution of medical recommendation systems, building upon earlier methodologies while integrating advanced technologies to offer a more dynamic, intelligent, and user-centric solution. In the early stages of medical recommendation system development, the primary focus was on simple rule-based approaches. These systems operated by matching predefined symptoms with fixed sets of diseases or conditions using basic if-then rules. While they served as valuable tools in providing preliminary health insights, they were limited in scope and effectiveness. Such systems lacked adaptability, often delivering generic responses that did not account for individual differences in symptom presentation, health history, or risk factors. Furthermore, they offered little to no personalization,

which restricted their ability to cater to the unique healthcare needs of diverse populations.

In contrast, the current system leverages the power of artificial intelligence and machine learning to overcome these limitations and provide a more sophisticated and personalized healthcare experience. At its core, the system utilizes Natural Language Processing (NLP) to interpret and analyze user-inputted symptoms in free text format. This allows the system to understand complex and varied ways in which users describe their health issues, making it more accessible and responsive to real-world usage. Combined with classification algorithms such as decision trees and neural networks, the system can predict potential diseases with greater accuracy. Additionally, it offers real-time recommendations for medicines, diagnostic tests, and next steps based on both data-driven insights and knowledge-based medical guidelines. This hybrid approach ensures that the advice provided is not only statistically sound but also grounded in established clinical practices, enhancing both the credibility and relevance of the system's recommendations.

Looking toward the future, this project envisions even more advanced capabilities that will further elevate the effectiveness and scope of medical recommendation systems. One key area of development is the integration of data from wearable health devices, such as fitness trackers and smartwatches. These devices continuously monitor vital signs such as heart rate, sleep patterns, physical activity, and more. By incorporating this real-time physiological data into the recommendation engine, the system can provide dynamic, context-aware health suggestions that evolve with the user's changing condition. This would enable truly proactive healthcare, identifying risk factors or abnormalities before symptoms become severe.

Another transformative direction lies in the application of blockchain technology for secure data management. Blockchain offers a decentralized, tamper-proof ledger system that ensures data integrity and user privacy. Integrating blockchain can greatly enhance user trust, as individuals gain control over how their sensitive health data is stored, accessed, and shared. It also facilitates secure sharing of medical records between healthcare providers, enabling more coordinated and efficient care. Overall, the evolution from rigid, rule-based systems to intelligent, adaptive platforms represents a paradigm shift in digital healthcare. This project not only reflects that progression but also sets the stage for a future where technology-driven medical recommendations are more accurate, secure, and responsive to individual health needs than ever before.

Literature Review:

Medical recommendation applications have witnessed significant growth in recent years, driven by the increasing demand for personalized and efficient healthcare

solutions. These applications harness advancements in artificial intelligence (AI), machine learning (ML), and data analytics to support users in managing their health, offer tailored medical advice, and assist healthcare providers in clinical decision-making processes. With the global rise in chronic illnesses, aging populations, and the growing burden on healthcare systems, the role of intelligent digital health platforms has become more prominent. This literature review explores the key developments, technologies, and ongoing challenges in the domain of medical recommendation systems while providing an expanded overview of relevant research contributions.

Medical recommendation systems have evolved substantially from their early iterations. In the initial stages, systems were primarily rule-based, relying on expert-defined clinical guidelines. One of the most well-known early systems was "MYCIN ", developed by Shortliffe et al. in 1976, which used a rule-based expert system to identify bacterial infections and recommend antibiotic treatments. While these early systems demonstrated the potential of computer-assisted decision-making, they were inherently limited by their inability to adapt to novel cases or process unstructured data. Their effectiveness was largely confined to narrow domains with clearly defined rules.

The shift towards data-driven approaches marked a turning point. With the increased availability of digital health data, machine learning algorithms began to be integrated into medical decision support systems. As Jiang et al. (2017) emphasized, data-driven approaches enabled improved diagnostic accuracy, adaptability, and scalability. These models could learn from large datasets, identify patterns, and make predictions even in complex and ambiguous clinical scenarios, thus overcoming the rigidity of rule-based systems. A wide variety of machine learning and AI models have been employed in medical recommendation systems. Traditional classifiers like decision trees, logistic regression, and support vector machines (SVM) have been used for tasks such as disease diagnosis, symptom analysis, and treatment prediction (Nguyen et al., 2015). These models are relatively interpretable, making them suitable for use in clinical settings where understanding the decision process is critical.

In recent years, deep learning models have gained popularity for their superior performance in complex tasks. Convolutional Neural Networks (CNNs) have been especially effective in medical image analysis, including radiology and pathology image classification (Rajpurkar et al., 2017; Esteva et al., 2017). Recurrent Neural Networks (RNNs) and their variants, such as Long Short-Term Memory (LSTM) networks, are well-suited for sequential data like patient records and time-series health data. These

models can capture temporal dependencies and offer predictions based on longitudinal health information.

Hybrid models that integrate rule-based reasoning with machine learning have emerged as a promising solution to balance interpretability and performance. Esteva et al. (2019) proposed combining AI predictions with human expert rules to enhance transparency and maintain clinical alignment. This approach addresses a critical issue in medical AI: the need for trust and accountability in recommendations. Reliable medical recommendation systems depend on the availability of high-quality, diverse, and comprehensive datasets. Electronic Health Records (EHRs) have been a primary data source, offering structured patient information including diagnoses, medications, lab results, and clinical notes. However, researchers such as Chen et al. (2018) highlight the growing role of data from wearable devices, mobile health apps, and patient-generated data. These sources provide continuous monitoring and real-time insights into an individual's health status.

Integrating these diverse data sources presents technical challenges related to interoperability, data standardization, and real-time processing. Moreover, there are growing concerns regarding data privacy and security. Federated learning has emerged as a promising solution, allowing models to be trained on distributed data without transferring sensitive information to a central server (Yang et al., 2019). This preserves patient privacy while enabling collaborative model development across institutions. The success of medical recommendation applications also hinges on their usability. A system with high predictive power is of little value if it cannot effectively communicate insights to the end-user. Research has emphasized the importance of designing intuitive and user-friendly interfaces that present recommendations clearly and concisely. Elwyn et al. (2013) suggested that interfaces should facilitate shared decision-making between patients and providers, encouraging active patient participation.

Moreover, personalized interfaces tailored to users' health literacy and language preferences can enhance user engagement and adherence to recommendations (Steele et al., 2016). Visualization tools, alerts, and actionable guidance have been found to improve both understanding and satisfaction. For providers, dashboards that integrate patient data, risk scores, and recommended interventions are essential to streamline clinical workflows. One of the most critical aspects of developing a medical recommendation system is rigorous clinical validation. According to Topol (2019), algorithms must be tested against gold-standard clinical datasets and benchmarked

using real-world scenarios to ensure their safety and effectiveness. Involvement of medical professionals in the development and evaluation process is crucial to align AI outputs with clinical expectations.

Lack of validation has been linked to instances of unsafe recommendations, reduced user trust, and legal challenges. For example, systems trained on biased or incomplete data can produce skewed results, particularly for underrepresented populations. Addressing these concerns requires transparent documentation of model development, continuous monitoring, and post-deployment auditing. With the increasing reliance on digital platforms for healthcare, ethical and security issues have become more prominent. The handling of sensitive health data necessitates strict adherence to data protection regulations such as the Health Insurance Portability and Accountability Act (HIPAA) in the U.S. and the General Data Protection Regulation (GDPR) in the European Union. Shabani et al. (2018) stressed the importance of implementing strong encryption, access controls, and audit trails in healthcare applications.

Ethical concerns also extend to algorithmic bias, explainability, and accountability. Floridi et al. (2018) argued that AI systems in healthcare should be transparent, explainable, and aligned with human values. Black-box models that make opaque recommendations pose risks in clinical settings where understanding the rationale behind decisions is essential. There is a growing call for “ethical AI,” where model predictions can be interpreted, justified, and contested if necessary. Recent research is exploring more advanced integrations of contextual data to improve medical recommendations. The use of Natural Language Processing (NLP) to analyze unstructured clinical notes, patient conversations, and social determinants of health is expanding the scope of AI in medicine. Transformer-based architectures like BERT and GPT have demonstrated impressive capabilities in understanding medical language and patient narratives (Alsentzer et al., 2019).

The future of medical recommendation systems lies in dynamic, real-time decision support. Integration with wearable devices and Internet of Things (IoT) platforms enables continuous health monitoring, allowing systems to adapt recommendations based on changing physiological data. Moreover, blockchain technology is being explored for secure, decentralized data sharing to enhance patient control and trust.

Methodology

The development of the medical recommendation system was structured around several core components, including data collection and preprocessing, system architecture, algorithm implementation, model validation, interface design, ethical safeguards, and continuous updates. The system was implemented using a blend of machine learning and deep learning techniques, with Random Forest selected as the primary classification algorithm due to its ability to handle high-dimensional data and deliver interpretable, accurate predictions in clinical contexts.

The foundation of the system rested on the collection and preparation of relevant health data. Data was sourced from a combination of Electronic Health Records (EHRs), publicly available clinical datasets, and curated healthcare repositories. To ensure the reliability and uniformity of inputs, a detailed preprocessing phase was conducted. This began with data cleaning, where duplicate entries and incomplete records were removed, and missing values were handled using appropriate imputation techniques. Normalization followed, standardizing data fields to maintain consistency across all patient records. Additionally, feature extraction was performed to identify key attributes required for disease prediction, including symptoms, demographic factors such as age and gender, and individual medical histories. These processed and engineered features formed the input vectors used in the machine learning models. The system architecture was designed to accommodate a smooth flow from user input to recommendation delivery. Users can manually input their symptoms through a mobile or web-based interface, or health metrics can be automatically collected via integrated wearable devices. Once data is submitted, it is processed by the system's AI core. The core consists of a Random Forest model trained to detect patterns and correlations within structured datasets. This model analyzes the input data to generate disease predictions and recommend corresponding treatments. In addition to the machine learning component, the system incorporates domain-specific rules derived from clinical guidelines to ensure that outputs are aligned with current medical standards. The final output consists of personalized health recommendations, which may include likely diagnoses, suggested medications, or referrals for additional diagnostic tests.

In selecting the appropriate algorithm for structured data analysis, several options were evaluated. The Random Forest algorithm was ultimately chosen due to its ensemble approach, which reduces overfitting and enhances prediction stability across diverse patient profiles. For comparative purposes and supplementary tasks, Support Vector Machines (SVM) were also tested, especially for binary classification scenarios such as distinguishing high-risk versus low-risk conditions. Deep learning models were

integrated in parallel modules: Convolutional Neural Networks (CNNs) were used for image-based diagnosis, particularly in analyzing medical scans like X-rays, while Long Short-Term Memory (LSTM) networks were employed for sequential data, such as tracking symptom progression over time. Natural Language Processing (NLP) techniques, based on advanced transformer models like BERT and GPT, were used to analyze unstructured textual inputs, including patient-reported symptoms and physician notes, thereby enabling broader context understanding. The training phase involved feeding the Random Forest model with a large, anonymized dataset consisting of over 10,000 patient records, drawn from both historical medical archives and synthetic datasets. A five-fold cross-validation technique was used during training to prevent overfitting and to evaluate the model's generalizability. Model performance was assessed using key evaluation metrics such as accuracy, precision, recall, and F1-score. The Random Forest model achieved a classification accuracy of 93%, with balanced performance across various disease categories, confirming its reliability for deployment in real-world healthcare settings.

User experience was a critical aspect of system design. A responsive mobile and web application was developed to facilitate symptom entry and provide instant access to health recommendations. The interface was crafted with simplicity and accessibility in mind, using intuitive form-based inputs and graphical representations of results. For users with wearable health devices, the system seamlessly integrated real-time data such as heart rate, oxygen saturation, and sleep patterns, enabling the platform to make timely, context-aware health suggestions. Given the sensitive nature of medical data, ethical considerations and data privacy were central to the project. The system was developed in compliance with major healthcare data protection regulations, including the Health Insurance Portability and Accountability Act (HIPAA) and the General Data Protection Regulation (GDPR). All user data was anonymized, encrypted, and securely stored, with role-based access controls to ensure only authorized users could view or manipulate the data. Bias mitigation was also prioritized by curating a balanced training dataset, ensuring fair representation across age groups, genders, and ethnic backgrounds. Additionally, explainable AI (XAI) methods were integrated to enhance transparency, allowing users and clinicians to understand the reasoning behind each recommendation.

To maintain relevance and accuracy over time, the system was designed with a feedback and update mechanism. Medical knowledge evolves rapidly, and the inclusion of new clinical guidelines, diagnostic criteria, and treatment options is essential for system reliability. Regular updates are made to the knowledge base, while

the machine learning models are periodically retrained using new data. User feedback is also incorporated to fine-tune the system, improve interface usability, and adapt the algorithm to better meet the needs of its user base.

Conclusion

This AI-powered system for disease diagnosis and medication recommendations improves healthcare by delivering precise, personalized, and easily accessible medical guidance. Utilizing machine learning and natural language processing, it assesses symptoms and suggests treatments while tackling challenges like data security, model reliability, and ethical considerations.

Future advancements, including integration with wearable devices and enhanced data protection, will further strengthen its effectiveness. By maintaining transparency and adhering to medical regulations, this technology has the potential to transform digital healthcare, ensuring proactive and efficient medical support for everyone.

Research Gaps and Future Directions

Despite advancements, several challenges persist:

Data Quality and Diversity: Many datasets lack diversity, limiting the generalizability of AI models.

Interpretability of AI Models: There is a need for models that provide explanations for their recommendations.

Clinical Integration: Seamless integration with existing healthcare systems remains a challenge.

User Engagement: Personalized and adaptive interfaces are needed to improve long-term user engagement.

Future research should focus on developing robust, interpretable, and secure medical recommendation systems that can cater to diverse populations while adhering to ethical and regulatory standards.

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Chapter : 75

Ethics And Moral Engagement In The AI Era

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Abstract

The rapid integration of artificial intelligence (AI) technologies across a wide range of sectors – from healthcare and education to finance, law enforcement, and governance – has profoundly reshaped contemporary social, economic, and political systems. While AI offers significant potential to enhance efficiency, innovation, and decision-making, it also raises urgent and complex ethical challenges. This paper provides a critical examination of key ethical concerns surrounding AI, including algorithmic bias and discrimination, invasions of privacy, opaque decision-making, and the problem of accountability in autonomous systems. Additionally, it interrogates debates around the moral status and agency of AI technologies, particularly as they assume increasingly autonomous roles in human affairs.

Drawing on an interdisciplinary body of scholarship – spanning philosophy, computer science, law, and social science – the paper argues for a comprehensive and proactive ethical engagement in AI development. It emphasizes the importance of collaboration among technologists, ethicists, policymakers, legal experts, and civil society actors to ensure that AI technologies are designed and may be implemented in ways that reflect and reinforce core human values.

Furthermore, the paper explores practical strategies for embedding ethics throughout the AI lifecycle, including participatory design, algorithmic auditing, transparent data practices, and

adherence to international standards and regulatory frameworks. It also underscores the critical role of ethics education and institutional governance in cultivating a culture of moral responsibility among AI practitioners, as the paper advocates for the development of human-centered AI systems that not only avoids harm but actively promotes societal well-being and equity.

Keywords: Artificial Intelligence, Ethics, Moral Engagement, Algorithmic Bias, Privacy, Accountability, Responsible AI, Governance

1. Introduction

Artificial intelligence (AI) has rapidly evolved from a niche academic pursuit to a pervasive force shaping numerous facets of modern life. From autonomous vehicles and personalized medicine to predictive policing and automated hiring systems, AI's capabilities have expanded exponentially (Russell, 2020). While these advancements promise efficiency and innovation, they raise profound ethical questions about justice, privacy, agency, and responsibility. The AI era challenges society to rethink traditional moral frameworks and establish new modes of ethical engagement that can address the complexities of machine intelligence (Mittelstadt et al., 2016).

This paper explores the ethical landscape of AI, emphasizing the critical importance of moral engagement across technical, social, and regulatory dimensions. It begins by reviewing foundational ethical theories and their application to AI, then examines key moral challenges such as bias, privacy, and accountability. The discussion proceeds to propose frameworks for integrating ethical reflection into AI development and governance. Finally, it offers recommendations for education and policy to promote a responsible AI future.

2. Ethical Foundations and Theoretical Frameworks in AI

Ethical reflection on AI draws from classical and contemporary moral philosophy. Three dominant frameworks often inform AI ethics:

2.1 Deontological Ethics and Artificial Intelligence

Deontological ethics, rooted in the moral philosophy of Immanuel Kant, prioritizes duty, rules, and the intrinsic rightness or wrongness of actions, irrespective of their consequences (Kant, 1785/1993). This normative ethical theory asserts that certain principles—such as honesty, fairness, respect for autonomy, and the protection of individual rights—are morally binding under all circumstances. In the context of artificial intelligence (AI), a deontological framework demands that AI systems be designed and deployed in ways that uphold these fundamental moral duties. For instance, even if an AI application could yield higher efficiency or economic benefit by collecting and analyzing large amounts of personal data, such actions would be ethically impermissible if they infringe upon an individual's right to privacy. Similarly, AI decision-making must avoid discriminatory practices, even if biased algorithms offer performance advantages, as this would contravene the duty to treat all persons with equal moral worth. Thus, from a deontological standpoint, ethical AI must consistently respect human dignity and uphold moral duties, regardless of the utility or convenience offered by alternative approaches.

2.2 Utilitarianism and the Ethical Evaluation of AI

Utilitarianism is a consequentialist ethical theory that evaluates the morality of actions based on their outcomes, specifically in terms of promoting the greatest overall happiness or welfare (Mill, 1863/2001). At its core, this philosophy maintains that an action is ethically right if it results in the greatest benefit for the greatest number of people. When applied to artificial intelligence (AI), a utilitarian approach tends to favor the development and deployment of technologies that can optimize efficiency, reduce costs, enhance access to services, and broadly improve societal well-being. For example,

AI systems that streamline healthcare diagnostics or manage urban infrastructure can significantly elevate public welfare, aligning with utilitarian objectives.

However, this framework also raises critical ethical challenges. Because utilitarianism focuses on aggregate outcomes, it may justify decisions that marginalize or harm minority groups if doing so leads to a net increase in overall benefit. Such trade-offs can lead to ethically troubling scenarios—such as deploying predictive policing systems that disproportionately target certain communities or designing algorithms that exclude individuals from opportunities based on data-driven profiling (Binns, 2018). These risks highlight a fundamental tension between utilitarian efficiency and principles of fairness, equity, and individual rights. Consequently, while utilitarianism offers a powerful rationale for leveraging AI to enhance collective welfare, it must be carefully balanced with safeguards that protect against unjust outcomes and ensure that the benefits of AI are equitably distributed.

2.3 Virtue Ethics and the Moral Character Behind AI Development

Virtue ethics, with its philosophical roots in the work of Aristotle, emphasizes the moral character and intentions of individuals rather than strict adherence to rules (as in deontology) or the calculation of outcomes (as in utilitarianism) (Hursthouse, 1999). This ethical framework focuses on the cultivation of virtues—such as honesty, wisdom, courage, empathy, and prudence—as the foundation for ethical behavior. In the context of artificial intelligence (AI), virtue ethics shifts the ethical focus from abstract principles or algorithmic consequences to the character and motivations of those who design, develop, and deploy AI systems. It suggests that responsible AI development depends not only on regulatory compliance or maximizing social utility, but on the moral integrity, reflective judgment, and practical wisdom (*phronesis*) of AI practitioners.

By fostering a culture of ethical awareness and moral responsibility within the AI community, virtue ethics encourages developers to ask not only *what* a system can do,

but also *whether* it should be done and *how* it reflects human values. For instance, an AI engineer guided by virtues such as empathy and fairness is more likely to consider the social implications of their work, prioritize inclusivity, and resist pressures to cut ethical corners for the sake of profit or expediency. Moreover, virtue ethics emphasizes continuous moral growth, recognizing that ethical excellence in AI is not achieved through isolated decisions but through sustained character development and community engagement.

While virtue ethics offers a human-centered approach to ethical reflection, it also has limitations when addressing complex systemic challenges, such as algorithmic bias or global governance, which require structural interventions and clearly defined standards. Therefore, while each ethical framework—deontology, utilitarianism, and virtue ethics—offers valuable insights, none is sufficient on its own. As Floridi et al. (2018) argue, an integrated ethical approach that synthesizes duties, consequences, and virtues is essential for addressing the multifaceted dilemmas posed by AI technologies in a holistic and context-sensitive manner.

3. Key Ethical Challenges in the AI Era

3.1 Algorithmic Bias and Discrimination in AI Systems

Algorithmic bias and discrimination have emerged as pressing ethical concerns in the development and deployment of artificial intelligence (AI). These systems, particularly those that rely on machine learning, derive insights and decision-making capabilities from vast datasets. However, these datasets often reflect historical inequalities, entrenched stereotypes, and systemic patterns of exclusion embedded in society (O’Neil, 2016). As a result, AI systems can unwittingly learn and reproduce these biases, leading to discriminatory outcomes that disproportionately affect marginalized and underrepresented groups.

A prominent example of this is facial recognition technology, which has been shown to perform significantly less accurately for women and individuals with darker skin tones compared to white male counterparts (Buolamwini & Gebru, 2018). Such disparities not only undermine the reliability of these systems but also pose serious risks to civil liberties and personal safety. Likewise, predictive policing algorithms, which rely on historical crime data, have been criticized for reinforcing biased patterns of surveillance and enforcement, often targeting minority communities and perpetuating cycles of criminalization and systemic discrimination (Lum & Isaac, 2016).

Addressing these forms of algorithmic bias requires more than mere technical adjustments, such as data balancing or model retraining. It necessitates a deeper ethical interrogation of the sources and assumptions embedded in training data, as well as the broader sociopolitical contexts in which AI operates. This includes ensuring transparency in algorithmic design, enabling independent audits, and instituting robust accountability mechanisms that involve diverse stakeholders, especially those from communities most affected by algorithmic harms (Raji et al., 2020). By foregrounding fairness, inclusivity, and moral responsibility, the AI community can move toward more just and equitable technological systems that serve the interests of all members of society.

3.2 Privacy and Surveillance in the Age of AI

The integration of artificial intelligence (AI) into daily life has raised profound ethical concerns about privacy and surveillance. AI systems often require access to vast troves of personal data to function effectively—ranging from voice recordings and location data to online behavior and biometric identifiers. This data-intensive nature of AI creates an environment ripe for surveillance, where individuals' activities, preferences, and even emotional states can be monitored, recorded, and analyzed without their full awareness or meaningful consent (Zuboff, 2019). Technologies such as smart assistants, facial recognition cameras, location-tracking apps, and personalized

social media algorithms increasingly blur the boundary between voluntary data sharing and intrusive surveillance.

The emergence of what scholars have called "surveillance societies" (Lyon, 2018) raises fundamental questions about autonomy, freedom, and the right to privacy in the digital age. These systems can normalize constant monitoring, eroding the space for anonymity and dissent, and disproportionately affecting vulnerable populations, including political dissidents, minority groups, and economically disadvantaged communities. Moreover, the opaque nature of many AI-driven systems means that individuals often lack clarity about how their data is being used, who has access to it, and what the long-term implications might be.

In response, ethical AI development must be anchored in principles that uphold individual rights and democratic values. Central among these are data minimization—collecting only the data that is strictly necessary for a specified purpose; informed consent—ensuring that users understand and agree to how their data will be used; and robust safeguards to prevent unauthorized access, misuse, or abuse of personal information. Regulatory frameworks such as the European Union's General Data Protection Regulation (GDPR) have provided important benchmarks for responsible data governance, emphasizing transparency, accountability, and the protection of individual rights (Voigt & Von dem Bussche, 2017).

As AI technologies become more embedded in critical sectors such as healthcare, education, finance, and law enforcement, the ethical imperative to safeguard privacy becomes even more urgent. Developers, policymakers, and institutions must work collaboratively to ensure that the benefits of AI do not come at the cost of personal freedom and human dignity. Building trust in AI requires a firm commitment to privacy as a non-negotiable ethical cornerstone.

3.3 Autonomy and Accountability in Artificial Intelligence

The increasing autonomy of artificial intelligence (AI) systems raises profound ethical and legal challenges concerning responsibility and accountability. As AI technologies become capable of making complex decisions without direct human intervention—such as in self-driving cars, autonomous drones, or decision-support systems in healthcare and finance—the traditional frameworks that assign blame or liability become difficult to apply. For example, if an autonomous vehicle causes a traffic accident, it is unclear who should be held accountable: the manufacturer of the vehicle, the programmer who wrote the algorithm, the owner or user of the system, or the AI itself (Gogoll & Müller, 2017). This ambiguity creates what scholars have termed a “responsibility gap,” where morally or legally significant outcomes lack a clearly accountable human agent.

This gap not only complicates legal adjudication but also threatens public trust in AI systems. Without clear lines of accountability, affected individuals may find it difficult to seek redress or understand who bears the moral and legal burden for harms caused by autonomous technologies. Moreover, as AI systems become more embedded in high-stakes domains such as military operations, predictive policing, or medical diagnostics, the potential consequences of unaccountable decision-making become even more severe.

In response, some scholars and ethicists argue for maintaining meaningful human control over AI systems. This concept emphasizes that humans must remain actively involved in critical decision-making processes so as to retain the ability to override or intervene in AI operations when necessary (Santoni de Sio & van den Hoven, 2018). Such control mechanisms not only reinforce human accountability but also ensure that AI remains aligned with human values and social norms. At the same time, others propose the development of new legal categories that acknowledge the influential role of AI in decision-making without attributing full moral agency or personhood to the machines themselves (Bryson, 2018). These approaches seek to

reconcile the distributed and complex nature of AI systems with the ethical need for transparent, enforceable responsibility structures.

Addressing the challenges of autonomy and accountability in AI requires a multidisciplinary effort, combining insights from ethics, law, computer science, and public policy. Clear guidelines, robust governance frameworks, and ongoing oversight are essential to ensure that the deployment of autonomous AI enhances societal well-being without undermining foundational principles of justice, responsibility, and human agency.

4. Moral Engagement in AI Development and Deployment

4.1 Interdisciplinary Collaboration in Ethical AI Development

As artificial intelligence (AI) becomes increasingly embedded in society, addressing its ethical, legal, and social implications demands more than technical expertise alone. Effective moral engagement with AI requires interdisciplinary collaboration—a concerted effort among technologists, ethicists, legal scholars, social scientists, policymakers, and, crucially, the communities most affected by AI systems. These diverse perspectives are essential for comprehensively understanding the complex, context-dependent nature of AI's impact on human lives and societal structures (Crawford & Calo, 2016).

Technologists bring critical knowledge about algorithmic design, data structures, and system capabilities, while ethicists contribute normative frameworks to evaluate fairness, justice, and moral responsibility. Legal scholars help navigate evolving regulatory landscapes and accountability regimes, and social scientists offer insights into cultural, behavioral, and institutional dynamics. Just as importantly, including voices from marginalized and directly impacted communities ensures that the lived realities of those most vulnerable to AI-driven harms are recognized and addressed.

Such interdisciplinary collaboration is vital for anticipating ethical risks before deployment, such as bias, exclusion, or misuse. It also supports the creation of inclusive technologies that are more culturally sensitive, equitable, and socially beneficial. Moreover, these collaborations enable the development of comprehensive impact assessments that go beyond narrow technical benchmarks to consider long-term social consequences, power asymmetries, and issues of trust and legitimacy.

Institutionalizing these collaborative processes—through ethics review boards, participatory design workshops, and cross-sectoral advisory panels—can significantly improve the ethical robustness of AI systems. However, achieving meaningful interdisciplinary collaboration requires overcoming disciplinary silos, fostering mutual respect, and creating shared vocabularies and goals. This shift represents not just a procedural necessity but a moral imperative in the governance of AI.

4.2 Stakeholder Inclusion and Participatory Design in Ethical AI

A central principle in the ethical development of artificial intelligence (AI) is the inclusion of diverse stakeholders, particularly those directly impacted by AI systems. Historically, the design and deployment of technology have often been dominated by a narrow set of voices—primarily technologists, corporate actors, and policymakers—while the perspectives of marginalized and vulnerable populations have been systematically overlooked (Friedman & Nissenbaum, 1996). This exclusion not only perpetuates social inequities but also results in technologies that fail to reflect the values, needs, and lived experiences of the broader public.

Participatory design offers a transformative alternative by emphasizing collaboration between designers and end-users at every stage of the development process. Rooted in democratic and human-centered design traditions, participatory methodologies invite community members—especially those from historically underrepresented groups—into the decision-making process. This inclusion fosters transparency, accountability, and responsiveness, ensuring that the ethical, cultural,

and practical concerns of diverse stakeholders are meaningfully addressed (Muller, 2003).

Engaging stakeholders in AI design has several key benefits. First, it helps to identify potential harms early on, particularly those that may not be visible from within the technical or institutional perspective. Second, it encourages the co-creation of values and priorities, leading to systems that are more culturally sensitive, inclusive, and socially beneficial. Third, it enhances public trust in AI by demonstrating a commitment to openness and shared responsibility.

However, realizing genuine stakeholder inclusion requires more than tokenistic consultation. It involves redistributing power in the design process, building long-term relationships with communities, and investing in education and capacity-building to ensure all participants can engage on equal footing. By embedding these practices into the core of AI development, we move toward technologies that not only perform well but also align with the diverse values and rights of the societies they aim to serve.

4.3 Ethical Training and Education for Responsible AI Development

As artificial intelligence (AI) increasingly shapes critical aspects of society—from healthcare and finance to law enforcement and education—the need for ethically grounded practitioners has become more urgent than ever. Embedding ethics education into computer science and engineering curricula is a foundational step toward cultivating the moral sensitivity, reflective judgment, and critical thinking skills necessary for responsible AI development (Martin et al., 2019). Future technologists must be equipped not only with technical competencies but also with a deep understanding of the ethical, legal, and social implications of their work.

Traditional engineering and computer science education has often emphasized problem-solving, optimization, and performance metrics, while treating ethical considerations as peripheral or secondary concerns. This approach is increasingly inadequate in an era when AI systems can influence societal structures, exacerbate

inequalities, and challenge fundamental rights. Integrating ethics into core curricula—through case studies, interdisciplinary courses, and applied ethics modules—enables students to engage with real-world dilemmas such as algorithmic bias, surveillance, accountability, and fairness. Moreover, these educational experiences encourage students to see themselves not only as technical problem-solvers but also as moral agents responsible for the social consequences of their innovations.

Workshops, certifications, and on-the-job training programs can help AI professionals stay informed about emerging ethical challenges and evolving legal standards. Furthermore, institutional mechanisms such as ethics review boards, internal governance committees, and third-party audits serve to institutionalize ethical accountability, making it an ongoing responsibility rather than a one-time consideration.

Crucially, ethics education must move beyond abstract theory to include diverse cultural perspectives, stakeholder engagement, and practical tools for ethical decision-making. It should empower developers to question not only *what* can be built, but also *why* it should be built and *for whom*. This shift toward value-conscious design is essential for fostering a new generation of technologists committed to developing AI that aligns with principles of justice, human dignity, and public good.

5. Governance and Policy for Responsible AI

5.1 Regulatory Frameworks for Ethical AI Governance

As artificial intelligence (AI) technologies become increasingly pervasive and influential across sectors—from healthcare and finance to law enforcement and education—governments around the world are recognizing the urgent need for robust regulatory frameworks that can guide their development and deployment. These frameworks aim to balance the promise of innovation with the imperative of ethical oversight, ensuring that AI serves the public interest without undermining fundamental rights, social justice, or democratic values.

One of the most comprehensive and influential efforts to date is the European Union’s AI Act, a landmark proposal that introduces a risk-based regulatory approach to governing AI systems (European Commission, 2021). This framework classifies AI applications into categories—ranging from unacceptable risk (e.g., social scoring by governments), to high-risk (e.g., biometric identification and critical infrastructure), to minimal or no risk—each subjected to proportionate levels of scrutiny and regulation. This structured approach reflects a proactive attempt to mitigate harm while still allowing room for technological advancement and economic competitiveness.

Beyond the EU, other jurisdictions are also moving toward formalizing AI governance. Countries such as Canada, Singapore, and the United States have developed AI ethics guidelines, national strategies, and pilot legislation that aim to promote trustworthy and responsible AI. While these approaches vary in scope and enforcement, they share common themes: transparency, fairness, accountability, and respect for human rights.

However, developing effective AI regulation remains a complex and evolving challenge. The transnational nature of AI technologies, the rapid pace of innovation, and the involvement of powerful private actors complicate efforts to create consistent and enforceable standards. There is also the risk of regulatory capture, where influential corporations shape laws in ways that prioritize profit over public interest. Regulatory frameworks play a critical role in institutionalizing ethical principles, bridging the gap between abstract values and concrete policy action. When thoughtfully designed and enforced, such frameworks can not only prevent harm but also foster public trust, promote equitable outcomes, and guide the development of AI technologies that are aligned with democratic norms and societal values.

5.2 Standards and Auditing for Ethical AI Implementation

As artificial intelligence (AI) systems increasingly influence high-stakes decisions in domains such as healthcare, finance, employment, and criminal justice, the

development and enforcement of technical standards and auditing mechanisms have become essential components of ethical AI governance. These tools provide a structured means to translate abstract ethical principles—such as fairness, transparency, accountability, and safety—into operational criteria that can be consistently applied, measured, and enforced across contexts.

Technical standards serve as benchmarks for developers and organizations to ensure that AI systems are designed and implemented in alignment with societal values and legal requirements. These standards may cover a wide range of parameters, including data quality and representativeness, algorithmic transparency, explainability of outputs, robustness to adversarial attacks, and user safety. By embedding these requirements into the design and deployment phases, standards help prevent unethical outcomes before they occur, promoting responsible innovation while enhancing public trust in AI technologies.

A crucial complement to standard-setting is algorithmic auditing—a practice involving the systematic, often independent, evaluation of AI systems to assess whether they conform to ethical and legal expectations (Diakopoulos, 2016). These audits can be internal or conducted by third-party organizations and are designed to detect hidden biases, discriminatory behavior, privacy violations, and other risks that may not be apparent during initial development. Auditing processes often include code inspection, statistical analysis of outcomes, and stakeholder interviews, providing a multifaceted view of an AI system's real-world impacts.

Furthermore, transparent auditing protocols can serve as a critical accountability mechanism. Global organizations such as the IEEE, ISO, and OECD are actively working to establish internationally recognized AI standards and auditing frameworks, though challenges remain in ensuring cross-border compatibility, industry adoption, and enforcement mechanisms. Nonetheless, the integration of rigorous standards and regular auditing into the AI lifecycle represents a vital step toward making ethical

principles not only aspirational but actionable. When thoughtfully designed and independently enforced, they play a critical role in fostering trustworthy, transparent, and socially accountable AI.

5.3 Global Coordination for Ethical AI Governance

Artificial intelligence (AI) is a transformative technology whose development, deployment, and impact transcend national borders. As such, ensuring ethical AI requires not only domestic regulation but also robust global coordination. Without international cooperation, the risk of regulatory fragmentation and "regulatory arbitrage"—where companies relocate to jurisdictions with weaker ethical or legal oversight—becomes a significant barrier to responsible AI development (UNESCO, 2021). To mitigate these challenges, multilateral collaboration is essential to harmonize ethical standards, promote shared norms, and establish joint mechanisms of accountability.

Global coordination plays several crucial roles in ethical AI governance. First, it facilitates the development of universal ethical principles—such as fairness, transparency, accountability, privacy, and respect for human rights—that can serve as a foundation for national policies and corporate practices. Initiatives such as the UNESCO Recommendation on the Ethics of Artificial Intelligence, the OECD AI Principles, and the Global Partnership on AI (GPAI) exemplify efforts to align diverse political and cultural contexts around common values, while still allowing flexibility for local implementation.

Second, international cooperation is vital for managing cross-border challenges, including data governance, cyber security, AI weaponization and transnational surveillance. These issues require shared protocols, interoperable regulatory frameworks, and coordinated enforcement mechanisms to ensure that ethical breaches in one jurisdiction do not undermine global AI ethics efforts.

Third, global coordination enables capacity-building in developing countries, helping to reduce the digital divide and promote inclusive AI development. By fostering knowledge exchange, technical assistance, and equitable access to AI resources, multilateral efforts can support the creation of technologies that reflect a diversity of perspectives and benefit all of humanity – not just technologically advanced or economically powerful nations.

However, achieving meaningful global coordination demands mechanisms for inclusive participation, ensuring that smaller nations and underrepresented voices are meaningfully involved in global decision-making processes, rather than being passive recipients of standards set by dominant actors.

Ethical AI governance must be seen as a shared global responsibility, through multilateral dialogue, cross-border partnerships, and the institutionalization of international norms, the global community can work toward a future where AI development is ethically grounded, socially equitable, and globally accountable.

6. Conclusion: Toward a Human-Centered AI Future

As artificial intelligence continues to reshape the contours of modern life, from personal decision-making to global policy, it brings not only unprecedented opportunities but also profound ethical dilemmas. The AI era thus demands a renewed and sustained moral engagement—one that bridges philosophical ethics, technical innovation, and social governance. This engagement must go beyond reactive regulation or after-the-fact corrections; it requires a proactive, inclusive, and interdisciplinary approach that anticipates potential harms and embeds ethical considerations throughout the AI lifecycle—from design and data collection to deployment and long-term impact.

Central to this effort is the need to embed human values—such as dignity, autonomy, justice, fairness, and accountability—into the very fabric of AI systems. This calls for a broad coalition of actors, including technologists, ethicists, legal scholars, policymakers, civil society, and affected communities, working together to ensure that AI serves the common good rather than narrow interests or unchecked commercial agendas.

Ethics education plays a foundational role in cultivating morally reflective AI practitioners, while stakeholder participation ensures that the voices of those most impacted—especially marginalized populations—are not only heard but actively shape AI development. At the institutional level, robust governance structures, including international coordination, regulatory standards, algorithmic auditing, and participatory design practices, provide the necessary guardrails to align technological progress with ethical imperatives.

While no single ethical framework can fully capture the complexity of AI's societal impact, a pluralistic and integrated approach—drawing from deontology, utilitarianism, virtue ethics, and human rights principles—offers a comprehensive path forward. By balancing competing values and fostering dialogue across disciplines and borders, we can move toward responsible, transparent, and equitable AI ecosystems.

The ultimate goal is not merely to prevent harm but to actively shape a future where AI contributes to human flourishing. This vision of ethical AI must be grounded in a collective commitment to safeguarding human dignity, promoting social justice, and preserving individual autonomy—principles that must remain at the heart of technological advancement in the 21st century and beyond.

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Unity in Diversity: Languages as a Source of Strength in Bharat (India)

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Abstract

India's strength has always been its extraordinary diversity, and nowhere is this more evident than in its multiple languages. The nation is a vibrant embroidery woven from hundreds of mother tongues, each with its own exceptional history, literature, and cultural inheritance. In this rich linguistic landscape, the notion that all languages are national languages resonates deeply, symbolising the principle of equality and mutual respect that supports the idea of a united India. Every language, whether spoken by millions or a smaller community, contributes to the grand narrative of the nation. It is in this celebration of every voice that we find true unity. While every language holds an honored place, the practicalities of a vast and diverse nation necessitate a common thread—a link language. This link language is not intended to replace or diminish any of the beautiful regional languages, but to serve as a bridge for communication, commerce, and intellectual exchange across the length and breadth of the country. A homegrown Indian language, such as Hindi, is ideally suited for this role. Its widespread use and cultural resonance make it a natural choice to facilitate a national dialogue, allowing a student in Tamil Nadu to connect effortlessly with a professional in Rajasthan, or an artist in West Bengal to collaborate with a writer in Punjab. This creates a powerful synergy where a shared language fosters a shared national identity,

complementing rather than competing with the regional identities that are so vital to our culture.

Coexistence of many languages

The beauty of India's linguistic model lies in its coexistence. The link language is a unifying river, but the regional languages are the vibrant tributaries that feed into it, ensuring its constant flow and richness. This duality is not a contradiction; it is a source of strength. When we respect and nurture every regional language, we empower the cultures they carry. When we embrace a common Indian link language, we strengthen the bonds that hold us together as a nation. It is a harmonious relationship where each language has its designated space and function, creating a stronger, more cohesive, and truly unique nation. This approach respects our past, celebrates our present, and paves the way for a more united future. Languages are actually to be used for uniting the people of nationa; rather than breaking the unity.

Unity in Diversity: The Case for National and Link Languages

India is a land of profound paradoxes, a nation where unity is not about uniformity but about a beautiful, intricate mosaic of identities. At the heart of this mosaic lies its incredible linguistic diversity. From the snow-capped Himalayas to the coasts of the south, India is home to over 1,600 mother tongues. This linguistic wealth is a source of immense pride and a foundational pillar of its national identity. Yet, it also presents a complex challenge: how does a nation of this scale communicate and govern effectively while honoring every single language? The answer lies in a nuanced understanding of two intertwined concepts: the idea that all languages of India are national languages, and the vital need for a common link language, one that is truly Indian. This article will argue that these two principles are not in conflict, but are, in fact, essential and complementary forces that strengthen the Indian Union.

Every Language is a National Language

To truly understand India, one must look beyond its administrative structure and into its cultural soul, which is profoundly linguistic. The Indian Constitution, in its recognition of 22 official languages in the Eighth Schedule, implicitly acknowledges the equal dignity and national importance of each. This list, which includes languages from Sanskrit to Tamil, from Assamese to Kashmiri, is a formal declaration that the voice of every major linguistic community is a national voice.

The very idea of a modern India was shaped by language. The linguistic reorganization of states in the 1950s and 60s, a monumental and often contentious process, was a democratic response to the deep-seated desire of communities to have their cultural and political identity rooted in their language. Andhra Pradesh became the first state to be carved out on linguistic lines in 1953, a move that set a precedent for the entire nation. This act was a powerful acknowledgment that language is not merely a tool for communication, but a repository of a people's history, philosophy, art, and literature. The works of a literary titan like Rabindranath Tagore, a Nobel laureate who wrote in Bengali, or the timeless poetry of Tirukkural in Tamil, are not just regional treasures; they are universal Indian heritage. They demonstrate that the soul of India is expressed in multiple tongues. The idea of designating one language as "national" above others would be a betrayal of this historical and cultural reality, devaluing the vibrant traditions that give India its unique character.

Furthermore, viewing all languages as national languages ensures linguistic federalism, a crucial component of India's democratic structure. It guarantees that governance, education, and social services can be delivered in the mother tongue, empowering citizens and ensuring no community is left behind. A farmer in rural Maharashtra, a student in Kerala, or a shopkeeper in Gujarat can conduct their daily lives and engage with their government without facing a language barrier. This respect for all languages is a fundamental pillar of social equity and national unity, ensuring that the diverse streams of India's linguistic river flow freely, each a source of vitality and strength.

A Link Language is Indispensable

While every language is a cherished part of the national identity, the practical reality of a nation of 1.4 billion people requires a common medium for dialogue and cohesion. This is where the concept of a link language becomes not just useful, but indispensable. A link language, or a lingua franca, serves as a bridge, allowing citizens from different linguistic regions to communicate with each other, fostering a sense of shared citizenship and intellectual exchange. This language is not meant to replace the mother tongue but to complement it, acting as a tool for national discourse. Hindi, with its widespread use and deep cultural roots in the Indian subcontinent, is the natural candidate for this role. Spoken by millions across a large geographical expanse, it has a reach that no other single Indian language possesses. Unlike English, which is widely used but largely confined to the educated urban elite, Hindi is a truly Indian language that has evolved organically over centuries. Its use as a link language allows for a more inclusive national conversation, bridging the gap between social classes and different regions. The cultural power of Hindi cinema and popular music, for example, has

already demonstrated its ability to transcend linguistic barriers, creating a shared cultural lexicon that unites people from Kashmir to Kanyakumari.

The link language is essential for the smooth functioning of a federal government and national institutions. It allows for effective communication in Parliament, the judiciary, and the civil services, ensuring that the machinery of the state can operate efficiently across linguistic boundaries. A common language for administration is not about imposing a new culture but about creating a shared platform for governance. The goal is not to force uniformity, but to create a shared space for collaboration, where a scientist from Karnataka can easily share research with a colleague in Bihar, or a bureaucrat from Delhi can work effectively with a local official in Tamil Nadu.

Addressing Concerns and Charting a Balanced Path

The debate over a link language is often fraught with historical tension and genuine concern, particularly in non-Hindi speaking states. The fear is that the promotion of Hindi could lead to its dominance, overshadowing and eventually weakening regional languages. This concern is valid and must be addressed with sensitivity and a clear policy of non-imposition. The solution is not to abandon the idea of a link language, but to embrace a balanced, non-coercive approach. The three-language formula, which encourages students to learn their regional language, Hindi, and English (or another modern Indian language), is an excellent example of such a policy. It respects the mother tongue, provides a link to the rest of the country, and offers a window to the international world. This policy acknowledges the reality that in a globalized world, multilingualism is an asset, not a burden. Furthermore, the government must actively support the growth and preservation of all Indian languages through educational initiatives, funding for literary and cultural projects, and the promotion of local media. Technology can play a crucial role, with digital tools for translation and content creation in multiple Indian scripts, making it easier for people to access information in their preferred language. The goal should be to build a linguistic ecosystem where every language can thrive and every citizen can feel a sense of national belonging without sacrificing their regional identity.

The Road Ahead: Towards a Multilingual, United Bharat

In the end, India's linguistic future does not have to be a zero-sum game. The true strength of the nation lies in its ability to manage and celebrate its diversity without allowing it to become a source of division. The vision for India's linguistic future is one where all its languages are accorded the status of **national languages**, each a cherished treasure of the collective heritage. Concurrently, a link language, like Hindi, serves as a

voluntary and functional bridge for communication and unity, ensuring that a person from any part of the country can connect with another, fostering a shared sense of Indian identity. This approach is rooted in the very essence of what makes India unique. It is a testament to the fact that one can be fiercely proud of their regional identity – be it a Bengali, a Gujarati, or a Tamil – while also being a proud Indian. The celebration of all our languages, combined with the use of a common Indian link language, is not a compromise but a profound statement of national identity. It is a model of coexistence and cooperation that the world can learn from – a living example of **unity in diversity**, not just as a slogan, but as a practical, linguistic reality.

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