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# LEVERAGING ARTIFICIAL INTELLIGENCE TO ADVANCE INCLUSIVE AND EQUITABLE QUALITY EDUCATION: OPPORTUNITIES AND CHALLENGES FOR SDG4

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**ABSTRACT**
Artificial intelligence (AI) represents a new era of technological advancements that aim to replicate human intelligence. The study aims to identify factors that influence the trust in AI driven education, to analyse the impact of AI education tools among school students. A comprehensive framework is proposed to address both cognitive and emotional trust, emphasizing the importance of AI's tangibility, transparency, reliability, and immediacy. Certainly, AI possesses the potential to bring about change human civilization, but it also represents major concerns, artificial intelligence (AI) is revolutionizing learning for students through enabling it more customized, at hand. While its implementation brings different advantages, it is imperative in order to solve drawbacks such as shareholder equity, individuality, and excessive dependence on the advancement of technology Through strategically taking into account AI, teachers could strengthen students to become innovative responsible, and balanced people who are successful functioning in a technologically dependent environment.
***Keywords*: Artificial Intelligence (AI), Human behaviour, School education**

## 1. INTRODUCTION

Artificial intelligence (AI) is transforming education by creating machines with human-like capabilities, such as learning from experience and making smart choices. Artificial Intelligence (AI) is now present in practically every aspect of our life big data, generated from digital sources, is used in predictive analytics and AI, enabling students to study anytime, anywhere, around the clock. AI also facilitates communication with students and helps businesses understand their talents. AI can perform various jobs across various industries, from simple to sophisticated. However, implementing AI in higher education institutions faces challenges such as high costs, lack of expert personnel, weak soft skills, unethical behaviour, technical disorder, and workforce displacement. While machines cannot fully replace humans, they contribute to expanding our capacities to expanding our capacities. To prevent machines from completely replacing humans, educators must instil higher-order thinking, creativity, metacognition, and human skills in students, ensuring a balance between technical and interpersonal abilities. Trust is crucial in the interaction between people and AI, as incorrect levels can lead to misuse or disuse. This study investigates the definition of trust in artificial intelligence (AI), the conditions necessary for its growth, and ways for encouraging or measuring it. It proposes a trust model inspired by interpersonal trust, built on human vulnerability and the AI model's ability to predict outcomes and discusses developing trustworthy AI. In other words, the elements of basic reasoning and external actions help to build acceptable trust.

## 2. OBJECTIVES

- To evaluate the contribution of AI technologies towards meeting the targets of SDG 4, including equitable and quality education for all

- To identify common AI tools and platforms used by young students in educational contexts.
- To explore ethical concerns such as data privacy, algorithmic bias, and dependency among students.

## 3. METHODOLOGY

This study relies on a mixed-methodologies approach, integrating quantitative and qualitative methods, to thoroughly understand AI's impact on school education. *Sample* Learners, professionals, and educational staff, Primary data was collected through personal interview approach using well-structured questionnaire from the selected research area in order to meet the research objective Stratified random sampling this approach will assure representation from diverse backgrounds of education and geographies the study is conducted in Kanchipuram district (Chennai region) i.e., Chrompet, pallavaram, Selaiyur, Tambaram To arrive at the required sample size of the research scientifically, independent samples t-test, was applied and determined that 150 samples will be the appropriate sample size at 92% confidence level with margin of error 8% for the study

## 4. LITERATURE REVIEW

Anita Williams Woolley & Ella Glikson (2020) investigated the impact of Building Emotional Trust in AI, also the role of AI's tangibility, transparency, trustworthiness, and behaviours in creating psychological confidence, as well as the impact of AI's humans in order for nurturing emotional trust. Jiahui Huang, Salmiza Saleh & Yufei Liu (*2021*) observed the Various applications of artificial intelligence in learning, particularly dynamic teaching and learning, testing, possibly and virtual learning spaces have been examined applying empirical review. The rapid growth of scientific improvements impacts teacher and a student technique, and even education, resulting in positive effects on strengthening the teachers' skills & children' standards of education. Adhan Kholis & Riza Laras Amyatun, (2023) highlighted AI tools like Quill Bot help students improve their writing skills normality test using the Kolmogorov-Smirnov method in SPSS pointed out the two sets of the pre- and post-test samples exhibited significance values of 0.200, which is greater than 0.05. null hypothesis (Ho) results negative, alternative hypothesis (H1) supported the t-test indicated an enormous result enhancement (Sig. 0.000) of 25.35 points, supporting the Quill Bot AI's favourable impact upon writing the study concludes as received positive feedback from teachers and students. Yunxin Du (2024) investigated the impact of artificial intelligence on people's daily life by considering AI growth and implementation f or the betterment of mankind, this investigation applies statistical techniques for examining AI's impact on individuals in their jobs, schooling, and ordinary life using SPSS 20.0 software the data is collected from questionnaire, the result was positively correlated with attitudes towards avoiding AI substitution.

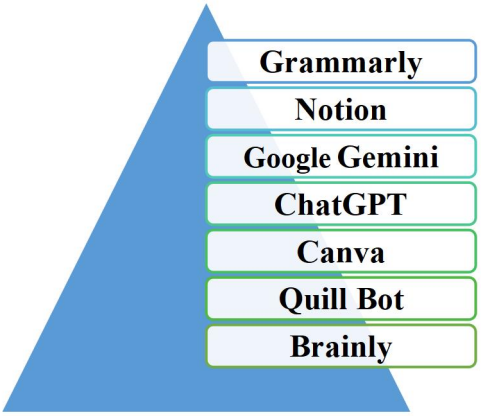
## 5. AI IN EDUCATION FOR SUSTAINABLE DEVELOPMENT

Artificial intelligence (AI) is an efficient approach to enhance imaginative skill sets in their education. Several individuals have acknowledged AI in this decade, and it is utilized in a variety of sectors, including one which includes education. Relating AI in training in order SDG 4 (Quality Education) means coordinating AI technology alongside the target to offer high-quality education to all learners and fostering endless possibilities

for education for all. Ke Zhang a, Ayse Begum Aslan (2021) examined that role of AIED in research and technological applications through empirical analysis also they state that AI was implemented in various field of study such as medicine, arts, sports, automobiles, language learning and engineering across 16 states of USA Improvements in artificial intelligence offer novel opportunities for learning due to its many innovations, options, and operations. For optimal use of AI in higher learning, it's important to narrow the distance across technology advancements and instructional uses. Yu Zhang, Ruizhi Chen, Jing Huang (2024) investigated that impact of AI in job structure, using empirical analysis of regression method the growing importance of machine intelligence affects the current state of the job marketplace within a certain extent. Towards terms of volume, the increasing availability of the field of artificial intelligence has contributed in the removal of several existing careers, particularly those requiring minimal skills and significant predictability.

## 6. AI TOOLS IN EDUCATION

AI in education is the utilization of computational intelligence tools to improve training in school, learning, and management operations. AI in education is the application of computational intelligence tools to improve instruction in education, learning, and administrative operations. It comprises resources such as configurable instructional systems, virtual teaching assistants, automated rating, training in languages, mobile applications, and employee composition, all of which aim to customize education. Maximize effectiveness and improve student accomplishment.




Hind Aljuaid (2024) investigated the Impact of Artificial Intelligence Tools on Academic Writing Instruction in Higher Education, AI tools like Quill Bot, AI Writer, and Typeset can recreate original phrases or sentences by changing the sentence structure or replacing words with synonyms. Aristomenis M. Macris, Dimitrios A. Georgakellos (2006) examined technological potential be used for a global human development for environmental training materials, based on an ontology by using empirical analysis A working model of the ecological contamination taxonomy and 3 autonomous classroom situations have been created. The training strategy teaches students about global environmental challenges, their interconnectedness, and the importance of considering other perspectives before making a choice or judgment.

## 7. RESULTS AND DISCUSSIONS

The study of artificial intelligence (AI) is becoming a hot topic in the contemporary technological world. From automated vehicles to virtual assistants, AI is changing the way we live and work. The demographic characteristics of the sample respondents are provided in the first section of the data analysis.

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Table 1

| Category | (N) | (%) |
|---|---|---|
| AI Users | 92 | 61.40% |
| Non-users | 58 | 38.60% |
| **Total** | 150 | 100% |

Levene's Test for Equality of Variances F = 0.45, Sig. = 0.50 → Equal variances assumed T-test for Equality of Means, t (81) = 3.87, p = 0.0002 Since p < 0.05, we reject the null hypothesis. This means that the use of AI-based learning tools significantly improves students' academic performance compared to those who do not use them.

| Exam Score (%) | Users (Expected) | Non-users (Expected) |
|---|---|---|
| Below 60 | 10.43 | 6.57 |
| 60–69 | 24.53 | 15.47 |
| 70–79 | 39.25 | 24.75 |
| 80 and above | 17.79 | 11.21 |

Chi-square statistic ($\chi^2$): 16.46, Degrees of freedom (df): 3, P-value: 0.00091 Since p = 0.00091 < 0.05, we reject the null hypothesis. This means there is a statistically significant association between exam score categories and whether someone is a user or non-user Figure1: Classification AI tools usage used by students

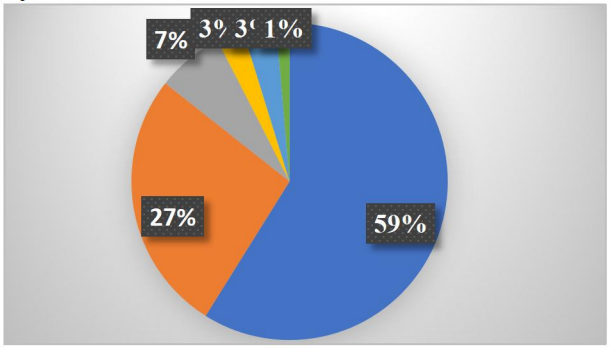



Fig 1 depicts the status of the respondents based widespread use of ChatGPT or ai chatbots 86 responses which is 59%, Moderate Use of AI Writing Assistants like Grammarly 39 responses with 27%, Limited Use of Plagiarism Checkers 10 responses with 7%, Low Adoption of AI-based Research Tools 4 responses and Virtual Tutors 5 responses with 3% each and Minimal Use of Other Tools 2 responses with 1%. Students heavily rely on general-purpose AI tools — especially ChatGPT — for academic support. Writing assistance tools like Grammarly are moderately used, while more specialized or institutional tools like plagiarism checkers and research assistants see much less engagement. This trend highlights a strong preference for AI tools that are flexible, easy to use, and immediately helpful in everyday study tasks. Figure2: Classification Exam score distribution by AI use between AI users & non-users

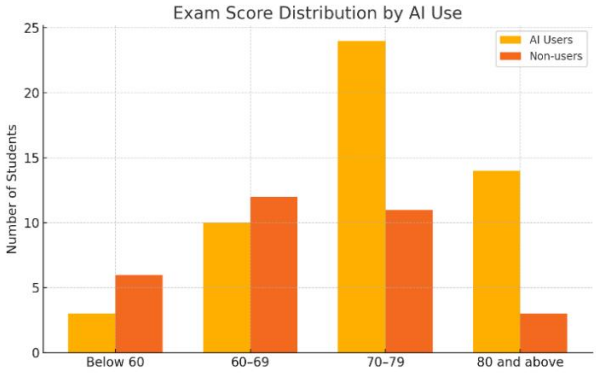
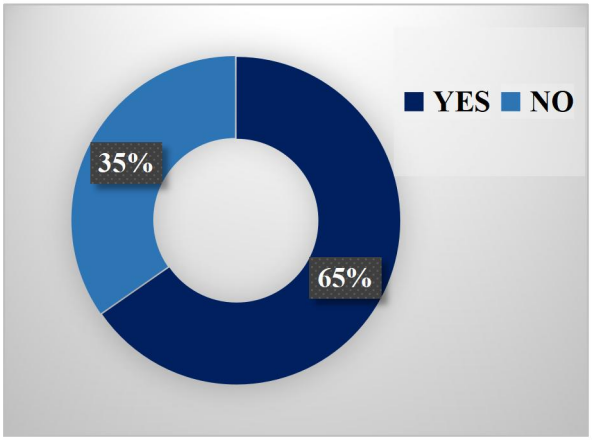



Fig 2 reflects the grouped bar chart showing the exam score distribution by AI use AI Users have higher representation in the upper score ranges (70–79 and 80+). Non-users are more represented in the lower score ranges (Below 60 and 60–69). Figure 3 exemplifies respondents' assertion on whether AI opens up inclusivity in educational sector



Majority Belief in Equal Access 65.3% of respondents (*98 out of 150*) believe that all students have equal access to AI tools and technology this shows that individuals have a positive perspective about digital equity. Significant Minority Disagrees 34.7% (*52 out of 150*) do not believe in equal access. This underscores a major concern with respect to the gap in technology, or the disparate sharing of AI technologies.

**8. SUSTAINABLE DIGITAL LEARNING THROUGH ETHICAL AI**

Artificial intelligence (AI) has the capacity to greatly speed up achievements with regard to Sustainable Development Goal 4 by elevating access, strengthening learning results, fostering equitable educational opportunities, and adjusting coaching and management processes

**9. INCLUSIVE & SUSTAINABLE AI EDUCATION**

Inclusive Education Artificial Intelligence techniques (such as speech-to-text and picture recognition) enable learners with impairments to have access to educational content. Addresses fairness by serving varied educational demands. Despite the vast majority of those who participated claim AI connectivity is equitable, that that more than one-third disagreed implies that a gap in access persist and needs to be handled through particular legislation variation in accessibility due to socioeconomic factors, infrastructures or policies, which promotes innovation distribution, particularly in rural areas, marginalized, or economically disadvantaged populations.

**10. ETHICAL CONCERNS IN AI-DRIVEN EDUCATION**

The use of artificial intelligence (AI) opens up fresh possibilities for customized learning, effectiveness and inclusivity, fortunately these positive effects are accompanied by many of them ethical decisions that require being encompassed in order to assure that artificial intelligence helps promote egalitarian, comprehensive, and ecologically sound learning that are compatible with SDG 4 privacy of information, technological discrimination, and learner reliance are all significant concerns. Sampling of data and transfer without authorization Inadequate informed cooperation, especially with adolescents. Insufficient safeguarding of data regulations or registration. Artificial intelligence algorithms will only be equally accurate as the information used to train them. Discrimination or insufficient information can lead to disproportionate results in school. Learners, educators, and engineers may not completely comprehend the way recommendations are reached. Considerations involve Zero clarity in AI-generated outcomes Trouble pinpointing who bears responsibility for missteps or unfavourable consequences.

**11. TRUST REMAINS A CENTRAL ISSUE IN AI-DRIVEN EDUCATION.**

The absence of openness concerning the way artificial neural networks reach selections such as evaluations suggestions, or criticism, can lead to distrust and pushback. This development has been predicted to widen disparities with regard to and career prospects over time. To build confidence, which is divided both individuals and organizations has to concentrate on ethical structure, accountability, and comprehensive safety of information mechanisms of action. supporting AI-based teacher training. Personalizing and scaling education via artificial intelligence.

## 12. CONCLUSION

The impact of artificial intelligence (AI) on human behaviour can be classified into various aspects, such as personalization, decision-making, social interactions with others, and moral issues. The aim of this study identifies the contribution of AI to SDG 4 in quality education .AI-driven education tools a theoretical basis for understanding the studies indicate that upcoming research should focus on gaining a deeper understanding of the factors. By consolidating and combining the investigation's findings, this study has created a framework for future investigations that will fill gaps in understanding and policy instruments of this topic

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