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Research Article

Exploring the Role of Artificial Intelligence in Enhancing Educational Outcomes of College Students in Erode

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ABSTRACT

The integration of Artificial Intelligence (AI) in higher education has gained significant momentum, particularly in enhancing teaching methodologies and student learning outcomes. In higher education, AI enhances personalized learning, boosts student motivation, and improves academic achievement. In the context of Arts and Science colleges in Erode, there is a growing interest in adopting AI tools such as chatbots, virtual labs, and personalized learning platforms. However, the actual impact of these technologies on students' academic performance and learning experiences remains underexplored. The integration of Artificial Intelligence in education faces several challenges in Arts and Science colleges in Erode. One major issue is the lack of awareness among students about the available AI tools and their potential academic benefits. Additionally, unequal access to AI resources across colleges hampers consistent usage. Students also exhibit varying levels of engagement with AI tools, which may affect their academic outcomes. Hence, the researchers developed a study for exploring the role of artificial intelligence in enhancing educational outcomes of college students in Erode, Tamilnadu. A descriptive research design is employed to align with the study's objectives. Both primary and secondary data sources are used to gather information. The study targets students from Arts and Science colleges in Erode, Tamil Nadu, with a sample size of 185 selected through random sampling. The necessary data is collected using a structured questionnaire that covers students' demographic profiles, AI tool usage, and their perceptions of AI's role in enhancing educational outcomes, assessed through a 5-point Likert scale. The data are organized using MS Excel and analyzed using statistical techniques such as percentage analysis, mean scores, standard deviation, and ANOVA via SPSS 26.0 software. Additionally, null hypotheses are formulated to examine significant differences in the perceived role of AI across selected independent variables. This study mentioned from analysis that maximum level of experience with AI's role in enhancing educational outcomes is perceived by the students belong to male, Science stream, studying second-year, using Virtual Labs (AI tool) and using AI tools frequently.

Keyword: Artificial Intelligence, Educational Outcomes, College Students, AI Tools Usage, Academic Performance, Technology Integration, Student Engagement.

1. INTRODUCTION

In the era of rapid technological advancement, Artificial Intelligence has emerged as a transformative force in the field of education, particularly in enhancing the academic outcomes of college students. AI-based tools and platforms are increasingly being integrated into educational settings to support teaching and learning processes, thereby personalizing education, improving student engagement, and optimizing learning efficiency. Through AI, students gain access to smart content, adaptive learning systems, virtual teaching assistants, and data-driven academic insights that help them understand complex subjects more effectively and at their own pace. These technologies not only facilitate individualized learning experiences but also foster better academic planning and performance by identifying learning gaps and recommending appropriate

resources. The role of AI in education extends beyond just content delivery; it also includes real-time feedback, intelligent tutoring systems, and predictive analytics, which empower both educators and learners. For college students, who often deal with complex and varied academic requirements, AI offers an opportunity to enhance focus, productivity, and academic success. Moreover, AI tools like virtual labs, chatbots, and AI-driven assessment platforms contribute significantly to increasing student confidence and access to learning materials regardless of time and location. With the rising digital literacy among students and the growing demand for technologically enhanced learning, the role of AI in education is becoming more central to academic strategies and institutional policies. As such, understanding its impact on students' educational outcomes is vital for shaping the future of higher education and creating more equitable and effective learning environment.

2. REVIEW OF LITERATURE

According to Pawar and Khose (2024) mentioned that Through personalized learning experiences, adaptive assessments, and tailored academic support, AI facilitates the removal of systemic barriers and ensures more equitable access to educational opportunities. Also, these advancements enable students from diverse backgrounds to receive customized learning paths that suit their individual needs, ultimately contributing to improved engagement, understanding, and academic outcomes for all learners. In case of Abou Karroum et al. (2024) pointed out that the integration of Artificial Intelligence in education offers numerous advantages, including personalized learning experiences, enhanced educator training, and greater support for students with learning difficulties. However, it also brings challenges such as the potential reduction of the educator's role, increased educational inequality, and concerns over declining creativity, critical thinking, plagiarism, and data privacy. The authors Ychieng, E., & Machi, J. M. (2024) observed that AI has the potential to revolutionize education by offering numerous benefits, such as improved effectiveness and personalized learning. By leveraging AI, students can develop critical thinking and problem-solving skills, which are essential in the twenty-first century. Furthermore, AI can provide students with unique and engaging learning experiences. However, integrating AI into education also poses risks, including potential biases and data privacy issues.

In view of Vieriu and Petrea (2025) revealed that AI offers significant benefits, including personalized learning, improved academic outcomes, and enhanced student engagement. However, challenges such as over-reliance on AI, diminished critical thinking skills, data privacy risks, and academic dishonesty were also identified. Furthermore, while AI holds immense potential to enhance learning efficiency and academic performance, its successful implementation requires addressing concerns related to accuracy, cognitive disengagement, and ethical implications. The study of Al Nabhani et al. (2025) displayed that educator from various disciplines exhibited no significant differences in their evaluations of AI's influence on education, implying that this technology may be advantageous across multiple courses. Furthermore, both educators and learners anticipated that AI would deliver swifter and more efficient feedback, hence improving the educational experience and engagement within the classroom. The study advocated for the incorporation of AI into educational curricula and the establishment of training programs for educators on the appropriate utilization of this technology. The researcher Alkan (2024) revealed that AI tools such as ChatGPT, expert systems, and tutorial systems help improve student success, motivation, and retention. Also, AI-supported instruction positively impacts both language and mathematics learning. AI's ability to monitor progress and identify individual needs supports better outcomes for special needs learners. Further, growing interest from educators and students in AI integration whereas technologies like learning analytics and educational data mining offer insights to improve teaching strategies. Moreover, AI applications demonstrate strong potential in addressing the unique challenges of special education.

3. STATEMENT OF THE PROBLEM

Despite the growing adoption of AI-based platforms in higher education institutions, there remains a lack of comprehensive understanding regarding their actual impact on student learning outcomes, particularly in the context of Arts and Science colleges in Erode. While AI tools such as chatbots, virtual labs, and personalized learning systems are increasingly accessible, it is unclear how effectively students are engaging with these technologies and whether they truly contribute to improved academic performance. Moreover, the effectiveness of these tools in enhancing learning and performance is not well-established. Technological barriers, such as insufficient digital skills or infrastructure, further limit the full utilization of AI in education. The absence of empirical data on students' perceptions and the extent of AI's influence on their learning creates a gap in both academic research and practical implementation. This study aimed to explore the role of AI in enhancing educational outcomes among selected students of Arts and Science Colleges in Erode district.

4. OBJECTIVES OF THE STUDY

- To describe the profile with demographic and academic information of the selected students of Arts and Science colleges in Erode.

- To explore the role of artificial intelligence in enhancing educational outcomes of selected students in the study area.

5. HYPOTHESIS OF THE STUDY

- There is no significant difference in mean Role of artificial intelligence in enhancing educational outcomes with respect to Year of study of the students.
- There is no significant difference in mean Role of artificial intelligence in enhancing educational outcomes with respect to Type of AI tools used of the students.
- There is no significant difference in mean Role of artificial intelligence in enhancing educational outcomes with respect to Frequency of AI tools usage for learning of the students.

6. RESEARCH METHODS

This study applied a descriptive research design with a quantitative approach. Both primary and secondary data sources were utilized to gather relevant information. A structured questionnaire was administered to collect data on the profile of students and the role of Artificial Intelligence in enhancing educational outcomes among Arts and Science college students in Erode. The questionnaire incorporated a 5-point Likert scale to quantify students' perceptions of AI's impact on their learning outcomes. A total of 185 students were selected through a random sampling technique. The collected data were organized in MS Excel and analyzed using statistical tools such as percentage analysis, mean score, standard deviation, and ANOVA, with support from SPSS version 26.0.

7. RESULT AND DISCUSSION

7.1 Profile of the selected Students and Role of artificial intelligence in enhancing educational outcomes

The details about the selected students' profile including demographic and academic information and their role of artificial intelligence in enhancing educational outcomes are given in the following table.

Table 1: Profile of the students and Role of artificial intelligence in enhancing educational outcomes

No.	Variables Name	Number of Respondents	%	Mean	SD
1	**Gender**				
	• Male	106	57.3	3.72	0.56
	• Female	79	42.7	3.67	0.58
	Total	**185**	**100.0**		
2	**Stream of Study**				
	• Arts	117	63.2	3.68	0.58
	• Science	68	36.8	3.73	0.55
	Total	**185**	**100.0**		
3	**Year of Studying**				
	• I Year	63	34.1	3.62	0.56
	• II Year	87	47.0	3.85	0.49
	• III Year	35	18.9	3.45	0.66
	Total	**185**	**100.0**		
4	**Type of AI Tools Used**				
	• Chatbots	54	29.2	3.59	0.59
	• Personalized Learning Platforms	63	34.1	3.59	0.60
	• AI-based Assessment Tools	40	21.6	3.86	0.49
	• Virtual Labs	28	15.1	3.92	0.46
	Total	**185**	**100.0**		
5	**Frequency of AI Tools Usage for Learning**				
	• Daily	40	21.6	3.63	0.57
	• Frequently	73	39.5	3.75	0.54
	• Occasionally	20	10.8	3.56	0.64
	• Whenever need	52	28.1	3.73	0.57
	Total	**185**	**100.0**		

- The above table noticed that 57.3% of the students are male and 42.7% are female out of the selected respondents, indicating a higher participation of male students in the study.
- It is observed from the analysis that majority of the respondents, 63.2%, are from the Arts stream, while 36.8% belong to the Science stream, showing greater representation from Arts students.

- From the analysis, it is indicated that the highest percentage of respondents 47.0%, are from the second year, followed by 34.1% from the first year, and 18.9% from the third year, indicating more second-year student participation.
- It is mentioned from the analysis that 34.1% of the students use Personalized Learning Platforms, which is the most used AI tool category, followed by Chatbots at 29.2%, AI-based Assessment Tools at 21.6%, and Virtual Labs at 15.1%, showing a varied usage of AI tools among students.
- The analysis displayed that 39.5% of the students use AI tools frequently, followed by 28.1% who use them whenever needed, 21.6% on a daily basis, and 10.8% occasionally, indicting that frequent usage is more common among students.

7.2 Role of artificial intelligence in enhancing educational outcomes of Students

Artificial intelligence plays a significant role in enhancing educational outcomes by offering personalized learning experiences and improving access to academic resources also it enables students to understand complex concepts more effectively and supports continuous, self-paced learning. This study has framed eight statements related the role of artificial intelligence in enhancing educational outcomes of students and given in the following table.

Table 2: Role of Artificial Intelligence in Enhancing Educational Outcomes

S. No	Factors	Mean Score	SD
1	AI tools have improved my understanding of complex subjects	3.90	1.33
2	My academic performance has improved after using AI technologies	3.79	1.10
3	The availability of AI resources in my college is sufficient for academic support	3.80	1.17
4	I find learning with AI-based platforms more engaging than traditional methods	3.64	1.25
5	The integration of AI in education will be essential for future academic success	3.42	1.08
6	I feel confident using AI tools to support my academic learning	3.64	1.31
7	AI applications have made it easier to access educational content anytime	3.89	1.11
8	AI-based personalized learning helps me learn at my own pace	3.51	1.14

It is displayed from the analysis that the highest mean score is recorded for the statement 'AI tools have improved my understanding of complex subjects' (Mean = 3.90), followed closely by 'AI applications have made it easier to access educational content anytime' (Mean = 3.89). This indicates that students perceive AI as highly effective in simplifying complex topics and providing flexible access to learning materials. On the other hand, the lowest mean score is noted for 'The integration of AI in education will be essential for future academic success' (Mean = 3.42), and 'AI-based personalized learning helps me learn at my own pace' (Mean = 3.51). This suggests a relatively lower agreement among students regarding AI's role in long-term academic planning and personalized learning benefits. Overall, students recognize the immediate utility of AI in learning more than its broader or future potential.

Testing of Hypothesis (ANOVA)

7.3 Relationship between Profile and Role of artificial intelligence in enhancing educational outcomes of students

This section has tested the relationship between the selected variables and role of artificial intelligence in enhancing educational outcomes of students. In order to analyse the relationship between selected independent variables of the students and their role of artificial intelligence in enhancing educational outcomes, hypotheses have been developed and examined by approaching ANOVA.

Year of Study and Role of Artificial Intelligence in Enhancing Educational Outcomes

H_0 : There is no significant difference in mean Role of artificial intelligence in enhancing educational outcomes with respect to Year of study of the students.

Table 3: Year of Study and Role of Artificial Intelligence in Enhancing Educational Outcomes

	Sum of Squares	df	Mean Square	F	'p' value
Between Groups	4.586	2	2.293	7.615	0.001*
Within Groups	54.804	182	0.301		
Total	59.390	184			

Note : * – Significant at 1% level

From the above table, it is showed that the 'p' value is lesser than 0.05 (p = 0.001), hence the null hypothesis is rejected. Hence, there is a significant difference in mean role of artificial intelligence in enhancing educational outcomes with respect to the year of study of the students.

Type of AI Tools Used and Role of Artificial Intelligence in Enhancing Educational Outcomes

H_0 : There is no significant difference in mean Role of artificial intelligence in enhancing educational outcomes with respect to Type of AI tools used of the students.

Table 4: Type of AI Tools Used and Role of Artificial Intelligence in Enhancing Educational Outcomes

	Sum of Squares	df	Mean Square	F	'p' value
Between Groups	3.858	3	1.286	4.191	0.007*
Within Groups	55.532	181	0.307		
Total	59.390	184			

Note : * – Significant at 1% level

From the above table, it is measured that the 'p' value is lesser than 0.05 (p = 0.007), hence the null hypothesis is rejected. So, there is a significant difference in mean role of artificial intelligence in enhancing educational outcomes with respect to the type of AI tools used of the students.

Frequency of AI Tools Usage for Learning and Role of Artificial Intelligence in Enhancing Educational Outcomes

H_0 : There is no significant difference in mean Role of artificial intelligence in enhancing educational outcomes with respect to Frequency of AI tools usage for learning of the students.

Table 5: Frequency of AI Tools Usage for Learning and Role of Artificial Intelligence in Enhancing Educational Outcomes

	Sum of Squares	df	Mean Square	F	'p' value
Between Groups	0.845	3	0.282	0.871	0.457^{NS}
Within Groups	58.545	181	0.323		
Total	59.390	184			

Note : NS – Not Significant

From the above table, it is proved that the 'p' value is greater than 0.05 (p = 0.457), hence the null hypothesis is accepted. Thus, there is no significant difference in Mean role of artificial intelligence in enhancing educational outcomes with respect to the Frequency of AI tools usage for learning of the students.

8. FINDINGS

- It is justified from the analysis that most of the students are male students (57.3%). Also, the maximum level of experience with AI's role in enhancing educational outcomes is perceived by male students (Mean = 3.72).
- From the analysis, it is illustrated that most of the students are from the Arts stream (63.2%). Further, the maximum level of experience with AI's role in enhancing educational outcomes is perceived by students of Science stream (Mean = 3.73).
- It is confirmed from the analysis that most of the students are second-year students (47.0%). Additionally, the maximum level of experience with AI's role in enhancing educational outcomes is perceived by second-year students (Mean = 3.85).
- It is assessed from the analysis that most of the students use Personalized Learning Platforms (34.1%). Also, the maximum level of experience with AI's role in enhancing educational outcomes is perceived by students using Virtual Labs (Mean = 3.92).
- It is evaluated from the analysis that most of the respondents use AI tools frequently (39.5%). Also, the maximum level of experience with AI's role in enhancing educational outcomes is perceived by those who use AI tools frequently (Mean = 3.75).
- It is observed from the mean score analysis that highest is recorded for the statement 'AI tools have improved my understanding of complex subjects' (Mean = 3.90), followed closely by 'AI applications have made it easier to access educational content anytime' (Mean = 3.89) which indicates that students perceive AI as highly effective in simplifying complex topics and providing flexible access to learning materials.
- It is mentioned from the Anova test that there is a significant difference in mean role of artificial intelligence in enhancing educational outcomes with respect to the year of study of the students.
- From the 'F' test analysis, it is inferred that there is a significant difference in mean role of artificial intelligence in enhancing educational outcomes with respect to the type of AI tools used of the students.
- The Anova test confirmed that there is no significant difference in Mean role of artificial intelligence in enhancing educational outcomes with respect to the Frequency of AI tools usage for learning of the students.

9. SUGGESTIONS

- The findings indicated that high level of experience with AI's role in enhancing educational outcomes is perceived by male students. Hence, it is suggested that female students should be encouraged through awareness and hands-on workshops to explore the benefits of AI in their academic journey.
- This study observed that maximum level of experience with AI's role in enhancing educational outcomes is perceived by students of Science stream. So, introducing interdisciplinary AI applications may improve overall adoption and impact across all academic streams.
- It is mentioned that high level of experience with AI's role in enhancing educational outcomes is perceived by second-year students. Therefore, structured AI training at the beginning of college life may help all students gain early and consistent benefits.
- It is justified from the study that maximum level of experience with AI's role in enhancing educational outcomes is perceived by students using Virtual Labs. Thus, colleges can invest in more virtual infrastructure to make advanced AI-based labs widely available.

10. CONCLUSION

This study aimed to explore the role of artificial intelligence in enhancing educational outcomes of college students in Erode, Tamilnadu. This study observed that there is a significant difference in mean role of artificial intelligence in enhancing educational outcomes with respect to the year of study and type of AI tools used by the students. It is depicted that student frequently using gain more from AI tools, suggesting that promoting regular usage through academic incentives and integration into the curriculum could benefit all learners. So, Arts and Science colleges may provide scheduled AI tool-based assignments or practice tasks to foster consistent engagement. To further enhance educational outcomes, institutions can provide targeted AI-based resources and training sessions especially tailored for all students to sustain their engagement.

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