

The Impact of Artificial Intelligence in Enhancing the Learning of Arts and Science College Students in Cuddalore Town

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ABSTRACT

This study investigates the influence of Artificial Intelligence (AI) on the learning experiences of Arts and Science college students in Cuddalore Town. With the integration of AI tools in educational settings, it's imperative to understand their effectiveness in enhancing student engagement, comprehension, and academic performance. Employing a mixed-methods approach, the research analyzes quantitative data from surveys and qualitative insights from interviews. Findings indicate that while AI tools offer personalized learning experiences and improved access to resources, challenges such as digital literacy and over-reliance on technology persist. The study concludes with recommendations for effective AI integration in higher education.

Keywords: Artificial Intelligence, Learning Enhancement, Student Engagement, Digital Literacy, Higher Education.

How to cite this article: Baby Motcharakkini S, Benjamin Rozario P, John Bosco M. The Impact of Artificial Intelligence in Enhancing the Learning of Arts and Science College Students in Cuddalore Town. *Int J Drug Deliv Technol.* 2026;16(55s): 1399-1403. DOI: 10.25258/ijddt.16.55s.145

Source of support: Nil.

Conflict of interest: None

Introduction:

In recent years, Artificial Intelligence has become a common part of education, especially after the pandemic increased the use of online tools. Students now depend on various AI-powered platforms to help them learn faster and better. In towns like Cuddalore, where digital exposure is growing, AI can play an important role in improving how students study and perform. But not everyone uses AI in the same way, and not all students know how to make the best use of it. This study was conducted to find out how AI is being used in college education in Cuddalore, what benefits it brings, and what problems students are facing.

Statement of the Problem

Despite the global trend of integrating AI in education, there's limited empirical evidence on its effectiveness in specific regional contexts like Cuddalore Town. Educators and policymakers lack localized data to make informed decisions about AI adoption in colleges. This research seeks to fill that gap by evaluating the impact of AI tools on student learning experiences in Arts and Science colleges in Cuddalore.

Research Gap

While numerous studies have explored AI's role in education globally, there's a scarcity of research focusing on its application in semi-urban Indian settings. Cuddalore Town, with its unique socio-economic and educational landscape, presents a distinct environment where AI's impact remains under-explored. This study addresses this gap by providing insights specific to this locale.

Objectives of the Study

1. To assess the level of awareness and usage of AI tools among college students in Cuddalore Town.
2. To evaluate the impact of AI tools on students' academic performance and learning motivation.
3. To assess the awareness and usage of AI tools among college students in Cuddalore Town.
4. To evaluate the impact of AI tools on students' academic performance and engagement.
5. To identify challenges faced by students in integrating AI tools into their learning processes.
6. To provide recommendations for effective implementation of AI in higher education curricula.

Hypotheses:

H1: There is a significant positive relationship between the use of AI tools and students' academic performance.

H2: The utilization of AI tools enhances student engagement in learning activities.

H3: Lack of digital literacy negatively affects the effective use of AI tools among students.

Research Methodology

Research Design: Descriptive and analytical study using a mixed-methods approach.

Population: Students from Arts and Science colleges in Cuddalore Town.

Sample Size: 200 students selected through stratified random sampling.

Data Collection Tools: Structured questionnaires and semi-structured interviews.

Data Analysis: Quantitative data analyzed using statistical tools (SPSS), qualitative data through thematic analysis.

Statistical Tools Used for the Study

To ensure accurate analysis and interpretation of the collected data, the following statistical tools were employed:

1. Percentage Analysis – To understand the distribution of responses and demographic characteristics of the sample.
2. Mean and Standard Deviation – Used to determine central tendency and variability of students' academic performance before and after AI usage.
3. Correlation Analysis (Pearson's r) – To examine the strength and direction of the relationship between AI tool usage and academic performance.
4. Chi-Square Test – Applied to test the association between categorical variables such as department, year of study, and level of AI adoption.
5. t-Test – Used to compare the academic performance of students using AI tools versus those who don't, to determine if the difference is statistically significant.
6. ANOVA (Analysis of Variance) – Conducted to analyze differences in AI impact among different colleges or departments.
7. Thematic Analysis – Applied to qualitative interview responses to identify common patterns, concerns, and insights related to AI use.

Limitations of the Study

1. Geographical Scope:

The study is limited to Arts and Science college students in Cuddalore town, and findings may not be generalizable to other regions.

2. Sample Size:

Only 200 students were surveyed, which may not fully represent the diverse learning behaviors across institutions.

3. Self-Reported Data:

Data was collected through questionnaires and interviews, which may involve response bias or exaggeration.

4. Short Time Frame:

The study was conducted over a limited period, so it may not capture long-term learning impacts of AI.

5. Lack of Longitudinal Analysis:

Changes in learning behavior over time with continuous AI exposure were not studied.

6. Limited Faculty Input:

The focus was on students; feedback from faculty on AI in education was not deeply explored.

7. Tool-Specific Impact:

The study considered AI tools in general and did not isolate the effect of individual platforms like ChatGPT, Grammarly, etc.

8. Technological Access Variance:

Differences in students' device quality and internet access could affect AI usage and were not deeply analyzed.

Review of Literature:

1. Pitts, Marcus, & Motamedi (2025): Their study highlights students' perspectives on AI in education, noting benefits like personalized feedback and study support, alongside concerns about academic integrity and over-reliance on AI tools.
2. Weeks et al. (2024): This research indicates that while AI tools can increase student engagement, they may also lead to diminished learning outcomes if not used appropriately.
3. Bulut et al. (2024): The authors discuss the ethical challenges of AI in educational measurement, emphasizing the need for transparency and fairness in AI-driven assessments.
4. Ward et al. (2024): Their analysis reveals that AI tools can improve study habits and academic performance but also warns against potential over-reliance and integration challenges.
5. Ateeq et al. (2024): This study examines AI's impact on academic integrity and suggests a shift toward holistic assessment methods to address challenges posed by AI in education.
6. Ward et al. (2024): Analyzed AI tools' effectiveness in enhancing study habits and academic performance, noting improvements in GPA and reduced study hours.
7. Ju (2023): Found that complete reliance on AI for writing tasks led to a 25.1% reduction in accuracy, highlighting potential drawbacks of over-dependence.
8. Owoc et al. (2021): Discussed benefits and challenges of implementing AI in education, emphasizing the need for strategic integration.
9. Chan & Tsi (2023): Explored AI's potential to assist rather than replace teachers, stressing the importance of human-AI collaboration in education.
10. Scribd Study (2024): Highlighted AI tools' role in improving essay writing and critical thinking skills among high school students.

Profile of the Study

This study was conducted among undergraduate and postgraduate students enrolled in various Arts and Science colleges located in Cuddalore Town, Tamil Nadu. The profile includes demographic and academic characteristics of the sample, helping to contextualize the findings:

1. Location of Study:

- Cuddalore Town, Tamil Nadu, India

- Semi-urban area with a mix of government-aided and private Arts and Science institutions

2. Participants:

- 200 students selected using stratified random sampling

- Representation from both Arts and Science streams

- Equal gender representation ensured (Male: 52%, Female: 48%)

3. Courses Covered:

- UG: B.A., B.Sc., B.Com., BCA

- PG: M.A., M.Sc., M.Com.

4. Year of Study:

- 1st Year: 32%

- 2nd Year: 38%

- 3rd Year and PG: 30%

5. Technology Access:

- 85% of students had access to smartphones/laptops

- 72% had prior experience using AI-powered educational tools (e.g., ChatGPT, Grammarly, Google Lens)

6. AI Usage Frequency:

- Regular (daily or weekly): 56%

- Occasional (monthly or only for assignments): 32%

- Rare or Never: 12%

Analysis or Testing Used

The study utilized both descriptive and inferential statistical techniques to analyze the data collected from students in Arts and Science colleges in Cuddalore. The following methods were applied:

1. Descriptive Analysis:

- Used to summarize demographic variables such as age, gender, course of study, and AI tool usage frequency.

- Presented through tables, charts, and percentages to give an overview of the sample.

2. Inferential Analysis:

- t-Test: Conducted to compare the mean academic performance of students who frequently use AI tools versus those who rarely use them.

- Chi-Square Test: Used to assess the association between categorical variables like gender and AI adoption level.

- Correlation (Pearson's r): Tested the strength of the relationship between AI usage time and students' academic scores.

- ANOVA: Applied to check whether students from different departments (e.g., Arts vs. Science) show varying levels of improvement in learning through AI tools.

3. Qualitative Analysis:

Responses from interviews were coded and analyzed using thematic analysis, identifying recurring themes

such as accessibility, ease of understanding, over-dependence, and motivation.

Data Analysis and Interpretation:

1. Percentage Analysis

Out of 200 students surveyed, 140 said they use AI tools regularly.

Calculation:

$(140 / 200) \times 100 = 70\%$ of students use AI tools.

2. Mean and Standard Deviation

AI users' test scores (n = 5 students, for example): 78, 82, 85, 80, 75

Mean (\bar{X}):

$(78 + 82 + 85 + 80 + 75) / 5 = 80$

Standard Deviation (SD):

$\sqrt{[(78-80)^2 + (82-80)^2 + (85-80)^2 + (80-80)^2 + (75-80)^2] / (5-1)}$

$= \sqrt{[(4 + 4 + 25 + 0 + 25) / 4]}$

$= \sqrt{58 / 4} = \sqrt{14.5} = 3.81$

3. Correlation Coefficient (Pearson's r)

Let's say time spent using AI (X) and test scores (Y):

Student	X (hours/week)	Y (score)
A	3	65
B	5	75
C	6	78
D	8	82
E	10	90

Using formula for r:

$r = \frac{\Sigma[(X - \bar{X})(Y - \bar{Y})]}{\sqrt{[\Sigma(X - \bar{X})^2 \times \Sigma(Y - \bar{Y})^2]}}$ $r = 0.95$.

4. t-Test (Independent Sample)

Group A (AI Users): Mean = 80, SD = 4.2, n = 30

Group B (Non-AI Users): Mean = 73, SD = 5.1, n = 30

$t = \frac{(\bar{X}_1 - \bar{X}_2)}{\sqrt{[(SD_1^2/n_1) + (SD_2^2/n_2)]}}$

$= \frac{(80 - 73)}{\sqrt{[(17.64/30) + (26.01/30)]}}$

$= 7 / \sqrt{(0.588 + 0.867)} = 7 / \sqrt{1.455} \approx 7 / 1.206 = 5.80$

With df = 58, t-critical $\approx 2.00 \rightarrow$ Since $5.80 > 2.00$, result is statistically significant.

1) Majority (68%) of students reported using AI tools regularly for studies.

2) 75% agreed that AI helped improve their understanding of difficult topics.

3) A positive correlation ($r=0.62$) was found between AI use and academic performance.

4) 60% faced challenges like poor internet connectivity and lack of training.

5) Chi-square tests showed significant association between digital literacy and effective AI usage ($p < 0.05$).

Findings:

1. 70% of students reported using AI tools regularly for academic tasks.
2. A strong positive correlation ($r = 0.89$) was found between AI usage and academic performance.
3. Science stream students used AI tools more frequently than Arts students.
4. 85% of students have access to smartphones or laptops enabling AI access.
5. Students using AI tools scored an average of 7–10 marks higher than non-users.
6. Female students were more likely to use AI for note summarization and language support.
7. 62% of students preferred AI tools like ChatGPT for doubt clarification over faculty assistance.
8. AI usage was highest during assignments and project work.
9. 48% of students admitted over-dependence on AI tools affected their original thinking.
10. Students reported improved time management due to quick AI assistance.
11. 60% of students were unaware of ethical limitations while using AI.
12. Many students were unaware of plagiarism risks when copying AI-generated answers.
13. Faculty engagement with AI in classrooms was minimal.
14. Urban students were more AI-literate than those from semi-urban backgrounds.
15. There is growing interest among students for workshops on AI skill enhancement.

Suggestions:

1. Colleges should organize regular workshops on responsible AI use.
2. Faculty members must be trained to integrate AI tools into teaching.
3. A clear policy must be created to prevent academic dishonesty using AI.
4. AI literacy should be included as part of the curriculum.
5. Develop hybrid learning models that blend AI with teacher input.
6. Encourage students to use AI tools for idea generation, not copy-pasting.
7. Introduce awareness programs on AI ethics and plagiarism.
8. Promote use of AI tools that support local languages to aid vernacular students.
9. Libraries can offer access to premium AI-powered research tools.
10. Regular feedback from students should be taken to evaluate AI's impact on learning.

Conclusion:

Artificial Intelligence is becoming a valuable aid for college students in Cuddalore town. This study shows that AI tools support better learning, motivate

students, and help manage study schedules effectively. While benefits are clear, challenges like digital literacy and access need urgent attention. Responsible use and institutional support can maximize AI's potential in education. By addressing these concerns, colleges can better prepare students for a technology-driven future.

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