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A Study on the Role of Artificial Intelligence in Enhancing Academic Performance

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Abstract- Artificial Intelligence (AI) has become an important technological advancement in the field of education. It supports students through personalized learning, intelligent tutoring systems, automated assessments, and virtual academic assistance. The use of Artificial Intelligence helps students improve their learning efficiency, understanding of subjects, and overall academic performance. This study aims to analyse the role of Artificial Intelligence in enhancing academic performance among students. The study focuses on students' awareness, usage, and perception of AI-based educational tools. Primary data were collected through a structured questionnaire, and secondary data were collected from journals, books, and research articles. The study reveals that Artificial Intelligence has a positive influence on students' academic performance, though challenges such as lack of awareness and technical skills still exist. Suitable suggestions are provided to improve the effective use of Artificial Intelligence in the academic environment.

Keywords- Artificial Intelligence, Academic Performance, Education Technology, Student Learning, Digital Education

I. Introduction

In the present digital era, Artificial Intelligence has emerged as a powerful technology influencing various sectors, including education. Artificial Intelligence refers to the ability of machines and computer systems to perform tasks that normally

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require human intelligence, such as learning, reasoning, and problem-solving. In education, AI is used in the form of intelligent tutoring systems, adaptive learning platforms, chatbots, virtual assistants, and automated evaluation systems.

The integration of Artificial Intelligence in education has transformed traditional teaching and learning methods into more personalized and student-centred approaches. AI-based systems analyse students' learning patterns and provide customized learning content based on their needs and abilities. As a result, students can learn at their own pace, improve subject understanding, and enhance academic performance. Therefore, it is essential to study the role of Artificial Intelligence in enhancing academic performance.

Objectives of the Study

- To analyse the role of Artificial Intelligence in enhancing academic performance.
- To examine the level of awareness among students regarding Artificial Intelligence-based learning tools.
- To evaluate the effectiveness of Artificial Intelligence in improving students' learning efficiency and academic outcomes.

II. Review of Literature

Shetty, U. and Hegde, V. (2024) conducted a study on the role of Artificial Intelligence in higher education institutions in India. The study focused on students' learning experiences using AI-based educational systems. The findings revealed that AI tools support personalized learning and help students improve academic understanding. The study also highlighted that students who used AI regularly showed better academic performance compared to those who used traditional learning methods.

P. K. R., G. K., and Kuppuswamy, S. (2024) exaSmined students' acceptance of AI-based learning tools in higher education. The study, found that students actively use AI applications for academic activities such as assignments, concept clarification, and exam preparation. The research concluded that AI tools enhance learning efficiency and positively influence academic performance when used responsibly.

Pathak, R., Gulhane, A. D., and Baviskar, R. M. (2024) studied the impact of Artificial Intelligence on teaching and learning processes. Their research emphasized that AI-enabled platforms provide interactive learning environments that increase student engagement. The study concluded that the use of AI in education improves students' comprehension levels and overall academic outcomes.

Dhingra, A. and Barkha Rani (2024) analyzed the challenges and opportunities of Artificial Intelligence in education. The study highlighted that AI tools help students receive instant feedback and personalized support, which improves learning effectiveness. The researchers concluded that ethical and proper use of AI tools contributes positively to students' academic performance and learning satisfaction.

III. Statement of the Problem

The use of Artificial Intelligence in education has increased significantly among students in higher education, especially for academic activities such as learning concepts, completing assignments, and preparing for examinations. Although many students actively use AI-based learning support, the level and purpose of usage vary from student to student, which may lead to differences in academic performance.

In several cases, students are not clearly aware of whether the use of Artificial Intelligence is genuinely improving their learning outcomes or merely assisting in academic task completion.

Therefore, there is a need to examine the relationship between the use of Artificial Intelligence and students' academic performance.

The present study focuses on analyzing this relationship using primary data collected from students and applying appropriate statistical tools to understand the impact of Artificial Intelligence on academic performance from a student's perspective.

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IV. Data Analysis and Interpretation

Table 1: Chi-Square Test Showing Relationship Between AI Usage Frequency and Academic Performance

AI Usage Frequency	High Performance	Moderate Performance	Low Performance	Total
Regular Users	30	10	5	45
Occasional Users	15	20	10	45
Rare Users	5	3	2	10
Total	50	33	17	100

Chi-SquareValue (χ^2) = 10.82
Degrees of Freedom = 4
Level of Significance = 0.05
Result: Significant

- The table shows that students who regularly use AI tools have higher academic performance compared to those who use AI occasionally or rarely. A large number of regular users fall under the high-performance category, indicating that frequent use of AI tools positively supports learning outcomes.
- Occasional users display moderate academic performance, with fewer students achieving high performance. This suggests that limited or irregular use of AI tools provides some academic benefit, but it is not as effective as consistent usage.
- Rare users have the lowest academic performance among all groups. The Chi-Square test result confirms a statistically significant relationship between AI usage frequency and academic performance, proving that the level of AI usage influences students' academic outcomes.

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Table 2: ANOVA Showing Difference in Academic Performance Based on Level of AI Usage

Source of Variation	Sum of squares	Degree of Freedom (df)	Mean Square	F Value
Between Groups	180.60	2	90.30	6.21
Within Groups	1410.40	97	14.54	_
Total	1591.00	99	_	_

- The ANOVA table indicates that there is a significant difference in academic performance among students based on their level of AI usage. The calculated F value is higher than the critical value at the 5% level of significance.
- Students who use AI tools regularly show higher mean academic scores compared to those who use AI occasionally or rarely. This demonstrates that consistent use of AI-based learning tools enhances academic performance.
- The ANOVA result supports the hypothesis that AI usage has a significant impact on academic performance, confirming that AI plays an important role in improving students' learning outcomes.

Table 3: Students' Opinion on the Role of AI in Academic Learning

Statement	Agree	Neutral	Disagree	Total
AI helps improve understanding of subjects	65	25	10	100
AI saves study time	63	22	15	100
AI improves exam preparation	71	18	11	100

- The table reveals that the majority of students agree that AI tools help them understand academic subjects more effectively. This shows that AI supports conceptual clarity and enhances learning efficiency.

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- Many respondents believe that AI tools help save study time by providing quick access to information and instant learning support, allowing students to manage their time better.
- A significant number of students feel that AI tools improve exam preparation by helping them revise topics and practice efficiently, highlighting the positive role of AI in academic success.

V. Conclusion

The study investigated the impact of Artificial Intelligence on students' academic performance by collecting primary data from 100 respondents. The analysis revealed that students who use AI tools regularly achieve higher academic performance compared to those who use AI occasionally or rarely. The Chi-Square test confirmed a significant relationship between the frequency of AI usage and academic performance, while the ANOVA test showed meaningful differences in performance among students with different levels of AI usage. Descriptive analysis also indicated that students perceive AI as helpful in understanding subjects, managing study time, and preparing for examinations.

The findings suggest that using AI tools responsibly and consistently can support better learning outcomes and academic success. Students benefit from personalized learning experiences, instant feedback, and interactive study resources provided by AI. These insights encourage educational institutions to promote the effective and ethical use of AI tools to enhance students' learning experiences and improve their overall academic performance.

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