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ARTIFICIAL INTELLIGENCE AS A TOOL FOR IMPROVING LEARNING OUTCOMES IN HIGHER EDUCATION: A STUDY AMONG STUDENTS

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ABSTRACT
In today's digital-driven education system, Artificial Intelligence (AI) has become a significant tool in enhancing learning outcomes among higher education students. However, the effectiveness of AI tools depends on students' awareness, usage, and perception of these technologies. This study examines how AI-based learning tools influence academic performance, understanding, and skill development, while also identifying challenges such as digital divide, overdependence, and data privacy concerns. Using structured data collection and statistical analysis, the research analyses the extent to which AI impacts student learning and engagement in higher education institutions.
KEYWORDS: *Artificial Intelligence, Learning Outcomes, Student Engagement, Higher Education, Digital Learning*

INTRODUCTION

Artificial Intelligence (AI) has rapidly transformed the landscape of higher education, becoming an essential tool for enhancing teaching and learning processes. With advancements in machine learning, natural language processing, and data analytics, educational institutions are increasingly integrating AI-based tools such as adaptive learning systems, virtual assistants, and automated feedback platforms into academic environments. These technologies enable personalized learning experiences, allowing students to learn at their own pace while improving engagement and knowledge retention. As a result, AI is not only reshaping how students' access and interact with information but also influencing the overall quality of education. In higher education, improving learning outcomes remains a primary objective, and AI plays a crucial role in achieving this goal. AI-driven tools provide instant feedback, identify learning gaps, and support data-driven decision-making for both students and educators. However, despite its growing adoption, the effectiveness of AI in improving academic performance depends on several factors, including students' awareness, level of utilization, technological readiness, and perception towards AI tools. Additionally, challenges such as digital divide, ethical concerns, and overdependence on AI continue to affect its implementation.

Therefore, it is important to understand how students interact with AI technologies and how these tools impact their learning outcomes. This study focuses on analysing students' awareness, usage, and perception of AI in higher education, along with its influence on academic performance, understanding, and skill development. The research also aims to identify challenges faced by students and provide suggestions for improving the effective use of AI in education.

OBJECTIVES

1. To assess the level of awareness among higher education students regarding various AI based learning tools.
2. To examine the extent of utilization of AI tools by students in their academic activities.
3. To identify the impact of AI tools on students' academic performance, understanding, and skill development.
4. To provide suggestions for improving the effective use of AI tools to enhance learning outcomes in higher education

REVIEW OF LITERATURE

Sasikala and Ravichandran (2023) studied the impact of AI on student learning outcomes in higher education. Their findings show that AI-based tools enhance personalized learning by adapting content according to individual student needs, which improves understanding and retention. The study also highlights that instant feedback provided by AI systems helps students correct mistakes quickly and strengthens conceptual clarity. Additionally, AI increases student engagement through interactive learning methods. However, challenges such as lack of infrastructure, digital divide, and limited teacher training were identified. The study concludes that AI has a strong positive influence on academic performance.

Tanveer Jahan (2025) examined students' perception towards AI in higher education in India. The study found that most students view AI as a helpful learning tool that simplifies complex concepts and supports self-learning. Students appreciated AI's ability to provide quick explanations and personalized responses. However, concerns were raised about overdependence on AI, reduced critical thinking, and data privacy issues. The study concludes that while AI is beneficial, proper awareness and ethical guidelines are necessary for effective use.

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Satish Dhokare (2024) analysed the role of AI in higher education in the context of NEP 2020. The study emphasizes that AI supports personalized learning, automates assessments, and improves decision-making through data analytics. AI also helps institutions monitor student performance and design targeted interventions. However, the research identifies challenges such as lack of infrastructure, limited faculty training, and ethical concerns. The study concludes that AI can improve learning outcomes if supported by proper policies and investments.

Chatter Singh and colleagues (2025) explored how AI is transforming teaching and learning practices in higher education. Their study found that AI tools such as virtual assistants and intelligent tutoring systems create interactive and student-centred learning environments. AI helps in continuous monitoring of student performance and improves feedback quality. Despite these benefits, issues like lack of institutional readiness and resource limitations hinder implementation. The study concludes that AI has strong potential to enhance learning outcomes.

RESEARCH DESIGN

The present study is descriptive in nature and is based on the survey method. The study aims to examine the role of Artificial Intelligence (AI) in improving learning outcomes among higher education students. The research focuses on students' awareness, utilization, and perception of AI-based learning tools and their influence on academic performance, conceptual understanding, and skill development. The study also attempts to identify the effectiveness of AI tools in supporting academic activities such as assignment completion, exam preparation, and understanding difficult concepts.

HYPOTHESIS

H1: There is a significant relationship between students' awareness of AI tools and their academic performance.
H_{01}: AI-based learning tools do not significantly improve students' conceptual understanding and learning outcomes.
H_{11}: AI-based learning tools significantly improve students' conceptual understanding and learning outcomes.
H2: The utilization of AI tools for academic activities significantly influences students' learning effectiveness.
H_{02}: There is no significant relationship between the frequency of AI tool usage and improvement in students' problem-solving skills.
H_{12}: There is a significant relationship between the frequency of AI tool usage and improvement in students' problem-solving skills.

SOURCES OF DATA

• Primary Data – Primary data was collected from 125 respondents through a structured questionnaire distributed using Google Forms.
• Secondary Data – Secondary data was collected from journals, websites, research articles, published reports, and previous studies related to Artificial Intelligence in higher education.

SAMPLE SIZE

The sample size for the study consists of 125 students pursuing higher education in various colleges and universities.

TOOLS FOR ANALYSIS

Descriptive statistics such as percentage analysis, Chi-Square analysis, and ANOVA were used to analyse the collected data. These statistical tools help in understanding students' awareness, utilization, and perception of AI tools and their impact on learning outcomes.

Method Of Analysis

The collected data were analysed using statistical tools through SPSS and Microsoft Excel. Percentage analysis was used to interpret demographic factors and response distribution. Chi-Square analysis was used to examine the relationship between categorical variables, while ANOVA was applied to compare differences among respondent groups.

CHI-SQUARE ANALYSIS

1. Awareness of AI tools & Improvement in academic performance

H_0: There is no significant relationship between awareness of AI tools and improvement in academic performance.
H_1: There is a significant relationship between awareness of AI tools and improvement in academic performance.

Value	df	Asymptotic Significance (2-sided)	
Pearson Chi-Square	19.284	9	0.023
Likelihood Ratio	18.417	9	0.031
N of Valid Cases	125		

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INTERPRETATION
Since the p-value (.023) is less than the standard significance level of 0.05, the null hypothesis is rejected. This indicates that there is a significant relationship between students' awareness of AI tools and improvement in academic performance.

2. Utilization of AI tools & Problem-solving skills

H_0: There is no significant relationship between utilization of AI tools and enhancement of problem-solving skills.
H_1: There is a significant relationship between utilization of AI tools and enhancement of problem-solving skills.

Value	df	Asymptotic Significance (2-sided)	
Pearson Chi-Square	21.762	12	0.041
Likelihood Ratio	22.518	12	0.032
N of Valid Cases	125		

INTERPRETATION
The p-value (.041) is less than 0.05; therefore, the null hypothesis is rejected. This indicates that the utilization of AI tools significantly influences students' problem-solving skills and learning effectiveness.

ANOVA ANALYSIS

3. Impact of AI tools on academic performance

Hypothesis
H_0: There is no significant difference in academic performance improvement among students based on their level of AI tool usage.
H_1: There is a significant difference in academic performance improvement among students based on their level of AI tool usage.

Source of Variation	Sum of Squares	df	Mean Square	F Value	Significance
Between Groups	18.462	3	6.154	4.287	0.007
Within Groups	173.824	121	1.437		
Total	192.286	124			

INTERPRETATION
Since the significance value (.007) is less than 0.05, the null hypothesis is rejected. This indicates that there is a significant difference in academic performance improvement among students based on their usage of AI tools.

4. AI tools and conceptual understanding

Hypothesis
H_0: There is no significant difference in conceptual understanding among students using AI tools at different frequency levels.
H_1: There is a significant difference in conceptual understanding among students using AI tools at different frequency levels.

Source of Variation	Sum of Squares	df	Mean Square	F Value	Significance
Between Groups	15.337	3	5.112	3.864	0.011
Within Groups	160.114	121	1.323		
Total	175.451	124			

INTERPRETATION
The significance value (.011) is less than 0.05; therefore, the null hypothesis is rejected. This shows that AI tool usage creates a significant difference in students' conceptual understanding and learning outcomes.

SUGGESTIONS
- Conduct awareness programmes and workshops to improve students' understanding of AI-based learning tools.
- Encourage responsible and ethical use of AI tools in academic activities.
- Provide proper digital infrastructure and internet accessibility in educational institutions.
- Integrate AI literacy and AI-based learning methods into the curriculum.
- Offer training sessions for faculty members to guide students in effective AI usage.
- Develop institutional policies regarding ethical use of generative AI tools in education.

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CONCLUSION

The study concludes that Artificial Intelligence plays a significant role in improving learning outcomes among higher education students. The findings reveal that students possess moderate to high awareness of AI-based learning tools and actively utilize them for assignments, exam preparation, conceptual understanding, and academic activities. The study also shows that AI tools positively influence academic performance, problem-solving ability, and conceptual clarity among students.

The statistical analyses indicate a significant relationship between awareness and utilization of AI tools and improvement in learning outcomes. AI-based educational tools provide personalized learning experiences, immediate feedback, and better access to information, thereby enhancing the overall learning process. However, certain challenges such as lack of awareness, ethical concerns, overdependence on technology, and unequal digital access still exist.

Overall, the study highlights that AI has strong potential to transform higher education by supporting effective and student-centered learning. Educational institutions should therefore focus on promoting responsible AI usage, improving digital infrastructure, and creating awareness programmes to maximize the benefits of AI in education.

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