Enhancing Students Learning and Engagement: Exploring the impact of AI tools in Education

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Abstract

Advancements in technology have led to the integration of artificial intelligence (AI) tools in education, promising a shift in traditional learning methods. This paper examines how AI empowers students and improves their educational experiences by offering personalized and adaptive learning. AI tools analyze student data to provide tailored recommendations, adapting to individual progress and learning styles. This personalized approach boosts engagement and motivation, leading to better learning outcomes. The study also explores AI's role in content creation, assessment, and student support services, offering dynamic learning materials, objective evaluation, and intelligent tutoring systems. Despite the potential benefits, ethical concerns such as data privacy and algorithmic bias must be addressed. Clear guidelines and ethical frameworks are necessary for responsible AI implementation in education. Ultimately, AI tools have the potential to transform education by empowering students as active learners, but it's essential to navigate ethical considerations and ensure equitable integration in educational settings.A conclusion is reached with the assistance of 100 respondents and by the use of the Z-test, correlation, and other inferential statistics.

Introduction

In today's rapidly evolving technological landscape, the integration of artificial intelligence (AI) tools in educational environments has emerged as a promising approach to revolutionizing traditional teaching and learning methods. AI, with its ability to analyze vast amounts of data and generate intelligent insights, has the potential to empower students, enhance their educational experiences, and equip them with the skills needed to thrive in an increasingly digital world.

The traditional "one-size-fits-all" approach to education often fails to address the diverse needs, learning styles, and pace of individual students. However, AI tools offer a solution by enabling personalized and adaptive learning experiences. By leveraging AI algorithms and machine learning techniques, educational institutions can gather and analyze data on students' performance, preferences, and progress. This data-driven approach allows for the customization of learning materials, activities, and assessments, tailoring them to meet the specific requirements and abilities of each student. The integration of AI tools in education offers numerous potential benefits. Firstly, it enables personalized learning experiences that cater to the strengths, weaknesses, and interests of individual students. By providing tailored content, adaptive feedback, and targeted interventions, AI tools promote greater engagement, motivation,

and academic achievement. Moreover, AI-powered content creation tools can generate dynamic and interactive learning materials that are up-to-date and aligned with the latest educational standards and advancements.

Another area where AI tools can play a transformative role is assessment. Traditional methods of evaluation often rely on standardized tests, which may not capture the full range of a student's abilities. AI-based assessment tools, on the other hand, can analyze student responses, identify patterns, and provide more comprehensive and objective evaluations. This enables educators to gain deeper insights into students' progress, offer timely feedback, and tailor instructional strategies to address specific areas of improvement.

Furthermore, AI tools can enhance student support services by providing intelligent tutoring systems and virtual assistants. These tools can offer immediate and personalized assistance, guiding students through challenging concepts, answering their questions, and providing additional resources. This level of support contributes to a more inclusive and accessible learning environment, accommodating diverse learning styles and abilities.

However, as AI becomes increasingly integrated into educational environments, ethical considerations must be taken into account. Issues such as data privacy, algorithmic bias, and the digital divide need to be addressed to ensure equitable access to AI tools and mitigate potential risks. Establishing clear guidelines, regulations, and ethical frameworks is crucial to promoting responsible and inclusive AI adoption in education.

Literature Review

- 1. Neha Saini (2023) This paper author examines features of artificial Intelligence, introduction, definitions of AI, history, applications, growth and achievements. [1]
- 2. Christopher Collins et al., (2021)This paper aims to address concerns within the information systems (IS) research community regarding a potential lack of cumulative knowledge building in AI research. Conducting a systematic literature review covering the period from 2005 to 2020, the study identified 98 primary studies out of 1877, synthesizing key themes relevant to the field. The study seeks to provide insights that can enhance the understanding and progression of AI research within the IS domain.[2]
- 3. **Mudit Verma(2018)**This paper gives an overview of the AI technology and the scope of artificial intelligence in different areas with special reference to the use of this technology in the field of education along with its meaning, searching techniques, inventions and future.[3]
- 4. **Dubey, et al., (2022)**in this paperauthor explain the meaning, concepts, potential applications, effectiveness, and challenges of AI in the Indian education system. While AI offers numerous benefits, it also has drawbacks. Negative impacts of an AI-driven education system may include the erosion of values, threats to human civilization,

potential health risks for learners and staff, reduced employment opportunities for traditional teachers, over-reliance on technology, learning gaps, data management issues, and cybersecurity concerns.[4]

- 5. Fayaz Ahmad, et. al., (2023)this study examines the impact of artificial intelligence (AI) on loss in decision-making, laziness, and privacy concerns among university students in Pakistan and China. Like other sectors, education also adopts AI technologies to address modern-day challenges. According to the author, the findings show that 68.9% of laziness in humans, 68.6% in personal privacy and security issues, and 27.7% in the loss of decision-making are due to the impact of artificial intelligence in Pakistani and Chinese society. From this, it was observed that human laziness is the most affected area due to AI.[5]
- 6. **Olaf Zawacki-Richter et. al.**,this study has provided an overview of the vast array of potential AI applications in higher education to support students, faculty members, and administrators. They were described in four broad areas (profiling and prediction, intelligent tutoring systems, assessment and evaluation, and adaptive systems and personalization) with 17 sub-categories. This structure, which was derived from the systematic review, contributes to the understanding and conceptualization of AIEd practice and research. [6]

Hypothesis1

H0: There is no significant difference between the uses of AI tools for education and level of education.

H1: There is significant difference between the uses of AI tools for education and level of education

Hypothesis2

H0: The mean of effectiveness of AI tool and mean of enhancing learning outcomes are not significantly different.

H1: The mean of effectiveness of AI tool and mean of enhancing learning outcomes are significantly different.

Objectives:

- 1. Assess the impact of AI tools on student empowerments: This objective involves examining whether AI tools enhance student's motivation, self-efficacy, and engagement in learning activities.
- 2. Explore the effectiveness of AI tools in personalized learning: This goal entails determining if recommendation engines, intelligent tutoring systems, or adaptive learning

systems enhanced by AI lead to better learning outcomes and tailored support for students with a range of learning demands.

- 3. Examine how AI tools can promote critical thinking and problem-solving abilities: This objective helps to examining how AI tools can be developed and incorporated into learning environments to support metacognitive techniques and higher-order thinking abilities.
- 4. Analyse the ethical ramifications of AI tools in education: This goal entails looking into matters like algorithmic bias, data privacy, fairness, and openness in the creation and application of AI tools. It might also entail finding out how students view ethical issues surrounding artificial intelligence.
- 5. Examine student attitudes and perceptions of AI tools: This goal entails determining what influences students' adoption and acceptance of AI tools as well as what obstacles or worries might prevent them from being used effectively.

Scope of the Study:

- 1. This study will help students to understand the role of AI in personalized learning environment.
- 2. This study will help teacher and research scholar how the uses of AI tools will improve student motivation, engagement and adaptive learning.
- 3. This study will help to how AI tools can empower students in different domains of knowledge
- 4. Ethical Considerations, this scope would involve examining issues such as data privacy, algorithmic bias, accessibility, and equity considerations, and exploring potential solutions or guidelines to address these concerns.
- 5. Comparative Analysis, this scope would involve examining the relative advantages and disadvantages of AI tools in empowering students compared to alternative approaches.

Research Methodology

Research Type: An Exploratory Research- Conduct exploratory research to gain a broad understanding of the topic and identify relevant factors, challenges, and potential benefits associated with the use of AI tools in education. This can involve literature reviews, expert interviews, and focus groups to explore the current landscape and gather preliminary insights.

ResearchDesign:

Quantitative research design.

Types of Data:

Primary Data: A primary data is data which is collected first time for any study. For this study only primary data is to be consider. All the data collected from the Student of Graduation and post-graduation.

Sampling Frame:

Sampling Technique: A non-probability Sampling technique is used to collect the primary data

Sampling Method: A purposive and convenience sampling methodsare used.

Sample Size: 100 Respondent.

Test Statistics:

Descriptive Statistics like Mean, Mode and Standard deviation etc., are used.

Spearman Rank Correlation, Chi-Square test and Z-test are used to test the Hypothesis and to draw the conclusion.

Data Analysis and Interpretation:

The responses collected were coded and tabulated as follows to draw meaningful conclusions:

a) Gender

Male	Female
40	60



Interpretation:

Data collected from BBA-III year and MBA-II year, were 60% female respondents and 40% male respondents.

b) Educational Qualification

Graduate	Post-Graduate
63	37



Interpretation:

According to data available from respondents 63% belongs to graduation and 37% belongs to post graduation.

Very Effective	Effective	Neutral	Ineffective	Very Ineffective
23	39	37	01	0
23%	39%	37%	1%	0%
Mean	3.8		Mode	4
SD	0.77		Var	0.60

c) Effectiveness of AI tools compared to traditional methods:

Interpretation:

The majority of respondents (62%) find AI tools to be either effective or very effective compared to traditional methods. However, there is a sizable portion (37%) that remains neutral on the effectiveness of AI tools. Only a very small percentage (1%) finds AI tools to be ineffective.

The mean and mode indicate that the overall perception leans towards effectiveness, though therelatively high standard deviation suggests some variability in opinions. Overall, it seems that while many perceive

AI tools as effective, there are also significant numbers who are either undecided or perceive them neutrally.

1. Likert Scale Values

Attitude	Very Ineffective	Ineffective	Neutral	Effective	Very Effective
Range	1-1.8	1.81-2.6	2.61-3.40	3.41-4.2	4.2-5
Scale	1	2	3	4	5

2. Likert Scale Values

Attitude	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Range	1-1.8	1.81-2.6	2.61-3.40	3.41-4.2	4.2-5
Scale	1	2	3	4	5

d) How AI tools can address diverse learning needs:

Very Effective	Effective	Neutral	Ineffective	Very Ineffective
22	42	33	1	2
22%	42%	33%	1%	2%
Mean	3.8		Mode	4
SD	0.86		Var	0.73

Interpretation:

The majority of respondents (42%) rated AI tools as "Effective" in addressing diverse learning needs. This indicates that a significant portion of the participants found AI tools to be helpful in catering to the diverse learning requirements of individuals.

Only 1% of respondents rated AI tools as "Ineffective," and 2% rated them as "Very Ineffective." This indicates that the overall negative feedback is minimal.

The mean score of 3.8 and the mode of 4 indicate that, on average, respondents perceived AI tools to be moderately effective in addressingdiverse learning needs. The data's standard deviation (0.86) and variance (0.73) suggest some variation in theresponses but generally indicate a moderate level of agreement among the participants.

e) AI technologies have enormous potential to empower learners. Do you agree with this?

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
15	49	33	2	1
15%	49%	33%	2%	1%

Mean	3.75	Mode	4
SD	0.77	Var	0.58

Interpretation: The mean value is **3.75**, which falls between "Agree" and "Neutral" on the scale. This suggests that, on average, respondents lean towards agreeing that AI technologies have enormous potential to empower learners.

Mode: The **mode is 4**, indicating that the most common response among respondents is "Agree". Standard Deviation (SD): With a standard deviation of 0.77, there is some variability in the responses around the mean. However, it's not excessively high, indicating a degree of agreement among respondents.

Variance (Var): The variance of 0.58 indicates the spread of responses from the mean. A lower variance suggests that responses are closer to the mean, indicating less variability.

The data suggests that a significant majority of respondents agree that AI technologies have the potential to empower learners. While there is some variability in responses, particularly with a few respondents leaning towards neutrality or disagreement, the overall trend is towards agreement. Therefore, it can be concluded that there is a prevailing belief in the potential of AI technologies to empower learners among the surveyed individuals.

f) Do you believe that AI tools can enhance the learning experience?

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
19	56	22	3	0
19%	56%	22%	3%	0%
Mean	3.91		Mode	4
SD	0.72		Var	0.50

According to the statistics, there is a strong tendency to agree with the claim that utilizing AI technologies can boost academic achievement, result in higher grades, and speed up and enhance learning. With a mean score of 3.91, the respondents are mostly leaning in the direction of agreement. According to the mode of 4, "Agree" appears to be the most often given response by the participants. According to the statistics, there is a resounding consensus among respondents that the use of AI tools can enhance learning efficiency and academic success.

g) Is by using AI tools your academic performance improves, higher grades, faster and more efficient learning.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
17	46	30	6	1
17%	46%	30%	6%	1%
Mean	3.72		Mode	4
SD	0.85		Var	0.70

The mean score of 3.72 suggests that, on average, respondents are leaning towards agreement that using AI tools can improve academic performance, leadto higher grades, and facilitate faster and more efficient learning. The variance of 0.70 indicates moderate variability among the responses, implying that there is some diversity in opinions regarding the statement.

Overall, the majority of respondents either agreed or strongly agreed with the statement, indicating a general belief in the potential of AI tools to enhance academic performance.

Testing of Hypothesis:

Hypothesis1

Question Statement	Mean	Standard Deviation	Sample Size
Uses of AI tools for Educational Purpose			
Graduate	3.52	1.52	37
Post-Graduate	2.62	1.38	63
Z-Score	2.903	Significant Value	+/-2.576
Level of Significance	1%	Significant P-value	0.01
P-Value	0.0017	Two tail test	

Since the calculated Z-value (2.903) beyond the standard range of -2.576 to +2.576. This means that we don't have enough evidence to accept the null hypothesis and it is conclude that there is a statistically significant difference between the means of the two groups at the 5% level of significance.

Hypothesis2

Correlation Coefficient:

The coefficient of Rank Correlation between effective implementation of AI tools in educational settings and improved learning outcomes and academic achievement is 0.999. A rank correlation coefficient of 0.999 indicates a very strong positive relationship between the effective implementation of AI tools in educational settings and improved learning outcomes and academic achievement.

Such a high correlation coefficient suggests that the relationship between these variables is not only statistically significant but also practically meaningful. It implies that changes in the implementation of AI tools in educational settings are strongly associated with changes in learning outcomes and academic achievement.

Question Statement	Mean	Standard Deviation	Sample Size
Effectiveness of AI tools compared to	3.8	0.77	100
traditional methods(X1)			
Do you believe that AI tools can enhance	3.91	0.72	100
the learning experience(X2)			
Calculated Value		Standard Value	
Z-Score	1.043	Significant Value	+/-1.96

Level of Significance	5%	Significant P-value	0.05
P-Value	0.1492	Two tail test	

Since the calculated Z-value (1.043) falls within the range of -1.96 to +1.96. This means that we do not have enough evidence to reject the null hypothesis and it conclude that there is a statistically no significant difference between the means of the two groups at the 5% level of significance.

Conclusion:

- Given that the Z-Score is higher than the significant value (+2.576), it may be inferred that graduate and post-graduate students employ AI tools for learning in significantly different ways. This conclusion is further supported by the P-value being less than the significance level, which suggests that this difference is probably a real effect rather than the result of random chance.
- 2. On the basis of Z-score it is found that there is no significant difference in the mean value of effectiveness of AI tool and it enhance the learning outcomes. Which show that the effective implementation of AI tools will lead to the positive impact on learning outcomes.

Suggestion:

- 1. In order to use AI tools for research and education, graduate and post-graduate students should collaborate with one another. To take advantage of the variety of viewpoints and areas of competence within the academic community, encourage interdisciplinary collaboration.
- 2. Give graduate and post-graduate students thorough training and assistance so they may use AI tools in their academic pursuits. Provide online tools, courses, and workshops to help them become more knowledgeable about and adept at utilising AI technologies.
- 3. To acquire more detailed input from students about their experiences using AI tools in the classroom, conduct focused surveys or questionnaires. Inquire about the particular AI tools utilised, the how they were included into the curriculum, and any perceived advantages or difficulties that came with using them.
- 4. Execute pilot projects or experimental programmes to see if certain AI tools can improve the educational process. To assess the effects of these interventions over time, gather information on student satisfaction, performance, and engagement.

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