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The Impact of Artificial Intelligence on Adaptive Learning: A Comparative Study of Traditional and AI-Based Pedagogies

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Abstract
This research examines the impact of AI-based adaptive learning on conventional pedagogy, with a focus on the perceptions, challenges, and future potential of the technology, as viewed by educators. Taking a quantitative research approach, data were collected from 220 university lecturers via a self-administered questionnaire. Correlation analysis showed a moderate positive correlation between demographic factors and perceptions of AI in education ($r = 0.351$, $p < 0.01$), and a weaker but significant correlation between perceptions of AI-based learning and challenges/future potential of AI ($r = 0.173$, $p < 0.05$). Regression analysis showed that challenges of ethical nature significantly influenced perceptions of AI's future potential ($B = 0.548$, $p = 0.024$), but with very low explanatory power ($R^2 = 0.023$), which suggests that many factors drive the adoption of AI in learning environments. The results show that AI-based learning enhances learner engagement and personalized learning; however, ethical concerns, infrastructure, and the role of irreplaceable human interaction pose challenges that need to be addressed. The research concludes that AI needs to be positioned as an addition to, not a replacement of, conventional teaching approaches and calls for further research into hybrid AI-human pedagogy models.
Keywords: AI-based adaptive learning, traditional pedagogy, higher education, teacher perceptions, correlation analysis, regression analysis, ethical concerns, personalized learning, hybrid education.

Introduction

Education has been an evolving field, adapting according to changing societies, technologies, and economies. Conventionally, education systems have been linear and one-size-fits-all, with students advancing at an even rate, regardless of their individual learning abilities. Even though this model has been successful in

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imparting knowledge to masses, at times it tends to not fit the different learning styles and learning rates of students. The advent of Artificial Intelligence (AI) has revolutionized many sectors, and education is no different. AI-powered adaptive learning is revolutionizing the process of knowledge transferal, opening doors for data-driven and personalized learning. AI-powered systems use machine learning algorithms, natural language processing, and data analytics to understand a student's performance in real time and dynamically adjust instructional content (Strielkowski et al., 2024). This is in contrast to traditional pedagogies of teaching based on static lesson plans and teacher-led instruction, which may not be individualized to suit specific learning needs.

The use of artificial intelligence in education is a major step towards more inclusive and efficient teaching practices. Artificial intelligence-based platforms can provide immediate feedback, suggest alternative learning routes, and detect knowledge gaps, thus improving the engagement and effectiveness of learning processes (Ezzaim et al., 2024). However, with the advantages come the disadvantages, including ethical concerns, data privacy, and the possibility of algorithmic biases. This research paper will compare traditional pedagogies with AI-based pedagogies to determine their effectiveness, strengths, and weaknesses. Based on the review of empirical studies, case studies, and expert views, this study will explain how AI-based adaptive learning can complement or replace traditional teaching practices in different learning settings (Chun et al., 2025).

Traditional Pedagogical Approaches

Traditional schooling has been the hallmark of knowledge transfer for centuries, dating its origin to formal classroom environments, teacher-centered instruction, and standardized exams. Under this model, teachers are at the center in terms of bringing knowledge to the student population, presenting lectures, and leading students through a set curriculum. The power of conventional pedagogy is in its systematic approach, which guarantees that all learners are given the same amount of instruction and go through a sequential process of knowledge acquisition (Rane et al., 2023). This system has been extensively used in formal education systems across the globe, especially in primary and secondary education.

However, despite its long-standing effectiveness, traditional pedagogy has notable limitations. One major drawback is its inability to cater to students with varying learning paces. In a classroom with diverse learners, some students may struggle to keep up, while others may find the material too easy, leading to disengagement (Gligorea et al., 2023). Additionally, traditional methods rely heavily on summative assessments, such as standardized tests, which may not accurately reflect a student's understanding or critical thinking abilities. Furthermore, large class sizes often prevent individualized attention, making it difficult for teachers to address each student's unique needs. These limitations have led to growing interest in alternative approaches, such as AI-driven adaptive learning, which aims to bridge these gaps by offering personalized educational experiences (Gupta et al., 2022).

AI-Based Adaptive Learning: An Overview

AI-driven adaptive learning represents a major shift in education, leveraging technology to provide customized learning experiences tailored to each student’s

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strengths and weaknesses. Unlike traditional teaching methods, which follow a linear and standardized approach, adaptive learning systems analyze student performance in real time and modify content delivery accordingly. These systems utilize artificial intelligence, machine learning, and big data analytics to assess learning patterns, predict potential challenges, and offer personalized recommendations (Sari et al., 2024).

One of the primary advantages of AI-based adaptive learning is its ability to enhance student engagement and knowledge retention. AI-powered platforms, such as intelligent tutoring systems (ITS) and learning management systems (LMS), provide interactive and gasified experiences that keep students motivated (Sharma et al., 2024). These systems can identify knowledge gaps, suggest supplementary materials, and offer real-time feedback, making learning more efficient and targeted. Additionally, AI-driven education is not confined to traditional classroom settings, allowing students to learn at their own pace from anywhere in the world.

However, despite its advantages, AI-based learning comes with challenges. One significant concern is data privacy, as AI systems rely on collecting vast amounts of student data to function effectively (Ray & Sikdar, 2024). There are also concerns regarding algorithmic bias, where AI models may unintentionally favor certain student demographics over others, potentially leading to disparities in educational outcomes. Furthermore, while AI can automate many aspects of teaching, it cannot fully replace the human interaction and mentorship provided by educators, which are crucial for emotional and social development (Alam, 2022).

Comparative Analysis: Traditional vs. AI-Based Pedagogies

When comparing traditional and AI-based pedagogies, it is important to assess their impact on key educational outcomes, such as student engagement, academic performance, and knowledge retention. Research suggests that AI-driven adaptive learning significantly improves student engagement by offering interactive and personalized experiences (Essa et al., 2023). Unlike traditional methods, which rely on static lesson plans, AI-based systems continuously evolve based on student feedback and performance data, creating a more responsive and dynamic learning environment.

However, traditional education models emphasize the importance of teacher-student relationships, peer interactions, and social learning, which AI-based systems struggle to replicate. Traditional classrooms foster collaboration, critical thinking, and emotional intelligence, which are essential skills for real-world success. Additionally, while AI-based learning excels at delivering personalized content, it may not be as effective in teaching complex subjects that require discussion, debate, and human interaction (Alimov et al., 2024).

Overall, both pedagogical approaches have their strengths and limitations. While AI-driven adaptive learning enhances personalization and efficiency, traditional methods provide valuable social and emotional development. A hybrid model that integrates AI while preserving the human elements of teaching may offer the best of both worlds (Correia et al., 2024).

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Challenges and Ethical Considerations in AI-Based Learning

Despite its potential, AI-based adaptive learning presents several challenges and ethical considerations. One of the most pressing concerns is data privacy. AI-driven platforms collect extensive student data to personalize learning experiences, raising questions about how this data is stored, used, and protected. Without proper safeguards, sensitive student information could be vulnerable to breaches or misuse by third parties (Sajja et al., 2024).

Another critical issue is algorithmic bias. AI models are trained on existing data sets, which may contain inherent biases. If these biases are not addressed, AI-driven education systems could unintentionally reinforce inequalities, disadvantaging certain groups of students (Yuldashev et al., 2024). Additionally, the cost of implementing AI-based learning solutions may limit accessibility, creating a digital divide where only students from privileged backgrounds can benefit from these technologies.

Furthermore, while AI can automate grading, tutoring, and content delivery, it lacks the human element that is essential in education. Teachers play a crucial role in providing emotional support, mentorship, and critical thinking development, aspects that AI systems cannot fully replicate. Therefore, a balanced approach is needed to integrate AI while maintaining human oversight in education (Naseer et al., 2025).

Future Prospects of AI in Education

As AI technology continues to evolve, its role in education is expected to expand. Future developments may include the integration of AI with virtual reality (VR) and augmented reality (AR) to create immersive learning environments (Habib et al., 2022). These technologies can simulate real-world scenarios, allowing students to gain hands-on experience in various subjects. Additionally, AI-driven systems may become more emotionally intelligent, capable of recognizing and responding to students' emotions to enhance learning experiences (Meylani, 2024).

While AI cannot replace human educators, it can serve as a valuable tool to augment traditional teaching methods. Future research should focus on making AI-driven education more accessible, ethical, and inclusive, ensuring that all students benefit from its potential.

Research objectives

The main research objectives of the study are;

1. **To analyze** the effectiveness of AI-based adaptive learning compared to traditional pedagogies.
2. **To examine** the challenges and ethical concerns of AI-driven education.
3. **To explore** the future integration of AI with traditional teaching methods.

Problem statement

Traditional education systems tend to be standardized and one-size-fits-all in nature, not being able to cater to varying learning needs, resulting in gaps in student engagement, retention, and performance. With the advent of Artificial Intelligence (AI), adaptive learning technologies have appeared on the scene,

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providing personalized learning experiences by analyzing real-time data and using machine learning. But with its promise of delivering value, AI-based education has its challenges too, such as ethical issues, data privacy threats, algorithmic bias, and accessibility. This research seeks to examine the comparative efficacy of conventional and AI-based pedagogies, exploring the challenges and promise of AI in redefining the future of education.

Significant of the study

This research is important because it contributes meaningful insights into how effective AI-based adaptive learning is versus conventional pedagogical strategies, and it enables educators, policymakers, and institutions to make informed choices regarding the adoption of AI in education. By examining the benefits, challenges, and ethical considerations of AI-based learning, this research contributes to the ongoing discourse on how technology can enhance personalized education while addressing issues such as accessibility and data privacy. Furthermore, the findings will serve as a foundation for future advancements in AI-driven education, promoting a balanced approach that leverages both technological innovation and human-centered teaching to improve learning outcomes.

Literature Review

Introduction to Adaptive Learning and AI in Education

Artificial Intelligence (AI) has significantly transformed the educational landscape by introducing adaptive learning technologies that cater to individual student needs. Traditional education methods rely on a standardized curriculum, where all students follow the same learning path, regardless of their varying abilities and learning styles. However, this approach has been criticized for its inability to accommodate diverse learning paces and preferences (Admane et al., 2024). AI-driven adaptive learning systems address this issue by utilizing data analytics, machine learning, and real-time feedback mechanisms to customize educational experiences for each student. These systems analyze a learner's progress, detect weaknesses, and modify instructional content accordingly, making learning more efficient and engaging (Guettala et al., 2024). The increasing integration of AI in education raises questions about its effectiveness compared to traditional pedagogical approaches, necessitating a deeper exploration of its advantages, challenges, and impact on student learning outcomes.

Theoretical Foundations of Traditional and AI-Based Learning

Traditional education is rooted in established learning theories, including behaviorism, cognitivism, and constructivism. Behaviorism, as proposed by (Chitra Dhanapal & Alfaruque, 2024), emphasizes reinforcement and repetition in learning, which aligns with conventional classroom practices where structured instruction and assessments guide student progress. Cognitivism, championed by (Nadimpalli et al., 2023), focuses on mental processes and knowledge construction, supporting the idea that learners actively process information rather than passively receiving it. Constructivist theories, such as those of (Feng, 2025), highlight the importance of social interactions and guided learning, emphasizing teacher-student relationships as key to cognitive development.

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In contrast, AI-based adaptive learning is grounded in modern computational theories and data-driven models. AI learning systems leverage algorithms that predict student needs, providing personalized learning paths based on real-time data. These systems align with connectivist learning theories, which argue that knowledge is distributed across networks and can be accessed dynamically through digital platforms. AI-based education moves away from a rigid curriculum and toward a flexible, student-centered model, raising questions about its compatibility with traditional learning frameworks (Benkhalfallah et al., 2024).

Effectiveness of AI-Based Adaptive Learning

Several studies have demonstrated the effectiveness of AI-driven adaptive learning systems in improving student engagement, academic performance, and knowledge retention. Research by (Munawwaroh & Adeoye, 2024)found that intelligent tutoring systems (ITS) significantly enhance learning outcomes by providing instant feedback, personalized content, and adaptive assessments. Similarly, a meta-analysis by (Habib et al., 2022)reported that AI-based learning environments improve student motivation by offering interactive and gamified experiences, making learning more engaging compared to traditional lecture-based instruction.

Additionally, AI-driven learning fosters self-paced education, allowing students to progress at their own speed rather than adhering to a fixed schedule. This flexibility is particularly beneficial for students who struggle with traditional classroom settings, as it reduces anxiety and enhances confidence in learning. Furthermore, AI systems can track student progress over time, providing educators with valuable insights into learning patterns and areas requiring additional support. However, while AI-based learning demonstrates promising results, it is not without challenges, particularly regarding accessibility and ethical concerns.

Challenges and Ethical Considerations in AI-Driven Learning

Despite its advantages, AI-based adaptive learning raises several challenges, including data privacy concerns, algorithmic bias, and the digital divide. AI systems rely on vast amounts of student data to personalize learning experiences, raising concerns about data security and the ethical use of personal information (Adeleye et al., 2024). Without proper regulations, student data may be exploited for commercial purposes, leading to privacy violations.

Algorithmic bias is another major concern, as AI models are trained on pre-existing datasets that may reflect societal inequalities. If not carefully designed, AI-driven learning systems can reinforce biases, disadvantaging certain groups of students based on factors such as socioeconomic background, gender, or ethnicity. Addressing these biases requires continuous monitoring and the inclusion of diverse data sets in AI training models to ensure fair and equitable learning experiences.

Additionally, the implementation of AI in education raises issues of accessibility and the digital divide. Not all students have equal access to AI-driven learning platforms due to financial constraints, lack of infrastructure, or limited digital literacy (Er-Rafyg et al., 2024). This disparity can widen educational inequalities, favoring students from privileged backgrounds while leaving others behind.

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Thus, while AI presents opportunities for enhanced learning, it must be implemented with careful consideration of ethical and accessibility challenges.

Comparative Analysis: AI-Based vs. Traditional Pedagogies

Collaborative learning, a key component of traditional education, fosters critical thinking, teamwork, and communication skills, which are essential for real-world problem-solving. In classroom settings, students engage in discussions, debates, and group activities that encourage peer learning and diverse perspectives (Kabudi, 2023). These interactions help develop not only academic knowledge but also social and emotional intelligence, which AI-driven learning systems often lack. While AI-based adaptive learning personalizes instruction and provides data-driven feedback, it does not naturally facilitate the same level of human interaction and collaborative problem-solving found in traditional classrooms. Furthermore, AI systems rely on predefined algorithms that may not always capture the nuances of creative thinking and subjective reasoning, which are critical components of higher-order learning (Ahmed & Meraj, 2024). On the other hand, AI-based platforms excel in providing instant assessments, personalized study plans, and self-paced learning, making them highly effective for individualized instruction. Therefore, while AI-driven education enhances efficiency and personalization, traditional pedagogy remains essential for developing interpersonal skills and deeper cognitive engagement. A hybrid model that integrates AI-based adaptive learning with traditional face-to-face instruction may offer the most effective approach, combining technological innovation with human-centered teaching (Bayyurt & Rizvi, 2015).

Research Gap

Despite the growing integration of AI-driven adaptive learning in education, there remains a significant research gap in understanding its long-term impact compared to traditional pedagogies. While studies have explored the effectiveness of AI in enhancing personalized learning and engagement, limited research has examined how AI-based education influences critical thinking, creativity, and social interaction skills, which are essential for holistic learning. Additionally, existing literature often focuses on the technological capabilities of AI rather than addressing the ethical concerns, biases, and accessibility challenges that may create disparities in education. Furthermore, there is a lack of empirical studies comparing hybrid models that integrate AI with traditional teaching methods, leaving a gap in understanding the optimal balance between technology and human instruction. This study aims to bridge these gaps by evaluating the comparative effectiveness, limitations, and future implications of AI-driven adaptive learning in diverse educational settings.

Methodology

Research Design

This research was quantitative in approach, with a comparative analysis of AI adaptive learning and conventional pedagogical methods. A quantitative research design was used to achieve objectivity and statistical reliability in analyzing the connection between AI-based learning and learning outcomes. This design was suitable for systematically assessing university instructors' perceptions, efficiency, and difficulties with AI in teaching. Through the use of structured data

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collection and statistical analysis, the study seeks to present empirical evidence on how AI-based learning affects higher education environments.

Population and Sample Size

The study population was the community of university teachers because they were directly responsible for practicing and evaluating both the AI-based and conventional methods of teaching. The sample size consisted of 220 university teachers so that there would be enough representation and generalizability of results. The sample size chosen permitted strong statistical analysis while keeping the study feasible in the given research limitations.

Sampling Technique

Probability sampling method was employed in this research to guarantee an unbiased selection process. Probability sampling gave every participant in the target population an equal opportunity of being selected, minimizing the chances of selection bias and maximizing the reliability of the research results. This method was employed to maximize the validity of the study to ensure that the data gathered accurately reflected the views and experiences of university teachers about AI-based and conventional pedagogies.

Data Collection Method

Data were obtained using a self-administered questionnaire, given to university educators to obtain perceptions regarding AI-enabled adaptive learning. The questionnaire consisted of closed, structured questions answered on a Likert scale by the respondents choosing to express a level of disagreement or agreement regarding a series of statements. This self-administered approach granted the participants' freedom to provide the questionnaire response at their preference, reducing the role of the researcher in data collection and enhancing truthful responses. This was the method selected to enable a standardized and structured data collection process to ensure consistency and accuracy in measuring the research variables.

Data Analysis

The data gathered were analyzed with correlation analysis, regression analysis, and t-tests to compare the relationship between AI-based adaptive learning and its effectiveness against normal modes of teaching. Correlation analysis was employed to establish the strength and direction of the relationships between AI-driven learning and significant education outcomes, including student participation and knowledge retention. Regression analysis was used to determine the predictive effect of AI-based learning on teaching effectiveness and academic performance so that its effect could be better understood. Furthermore, t-tests were used to compare mean differences in perceptions and effectiveness between pedagogical methods and AI-based pedagogical methods. These statistical methods used offered a detailed analysis so that the findings would be reliable as well as generalizable. The data were analyzed with SPSS (Statistical Package for the Social Sciences) and through this precise computation, graphical display, and interpretation of findings, the study endeavored to lead meaningful conclusions on the part played by AI-based

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learning in higher education and its possible convergence with conventional pedagogies.

Data Analysis

Data analysis for this research was performed to analyze the efficiency of AI-based adaptive learning in relation to conventional pedagogies by utilizing statistical methods on gathered quantitative data. The analysis was used to detect patterns, correlations, and contrasts in the perceptions of university teachers about AI-based learning. With correlation analysis, the research examined the correlation between AI-based learning and educational outcomes like student engagement and knowledge retention. Regression analysis was conducted to identify the predictive effect of AI on teaching effectiveness and academic performance, while t-tests were employed to examine mean differences between AI-based and traditional teaching approaches. SPSS software was utilized to process the data with accuracy and reliability in statistical computation. Through these analytical techniques, the research offered empirical evidence regarding the potential advantages, challenges, and implications of incorporating AI-powered learning in higher education.

Demographic Characteristics of Respondents (N = 220)

Demographic Variable	Category	Frequency (N)	Percentage (%)
Gender	Male	117	53.2
	Female	97	44.1
	Others	6	2.7
Age Group	25 - 34 years	72	32.7
	35 - 44 years	56	25.5
	45 - 54 years	64	29.1
	55 years and above	28	12.7
Academic Qualification	Master's Degree	60	27.3
	PhD	74	37.4
	Other	86	39.1
Teaching Experience	Less than 5 years	64	29.1
	5 - 10 years	61	27.7
	11 - 15 years	68	30.9
	More than 15 years	27	12.3
Familiarity with AI in Education	Not Familiar	44	20.0
	Somewhat Familiar	88	40.0

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Demographic Variable	Category	Frequency (N)	Percentage (%)
	Highly Familiar	88	40.0

The demographic profile of 220 university lecturers who were sampled shows an even spread of responses across different attributes. Genderally, 53.2% of the sample were males, 44.1% females, and 2.7% others, making the pool of participants fairly representative. When age spread is considered, the largest proportion of respondents (32.7%) were in the 25–34 years group, followed by 29.1% aged 45–54 years, and the least (12.7%) were aged 55 years and more. In terms of academic qualifications, the majority of respondents possessed a PhD (37.4%) or other higher degrees (39.1%), followed by 27.3% with a Master's degree. Teaching experience was also diverse, with 30.9% having 11–15 years of experience, and only 12.3% having over 15 years, indicating a combination of early-career and veteran teachers. Upon testing awareness about AI in schooling, an appreciable 40% had considerable awareness, a corresponding 40% was quite aware, while 20% did not have an awareness about AI-powered education. Such outcomes point toward having the AI-awareness of school educators to the reasonably higher extent but there existing still one proportion who did not get appropriate exposures for them toward gaining skills based on AI-assisted learning.

Correlation analysis
Correlations

		Perceptions of AI-Based Adaptive Learning	Demographic Information	Challenges and Future Potential of AI in Education
Perceptions of AI-Based Adaptive Learning	Pearson Correlation	1	.351**	.173*
	Sig. (2-tailed)		.000	.010
	N	219	219	219
Demographic Information	Pearson Correlation	.351**	1	.185**
	Sig. (2-tailed)	.000		.006
	N	219	220	220
Challenges and Future Potential of AI in Education	Pearson Correlation	.173*	.185**	1
	Sig. (2-tailed)	.010	.006	
	N	219	220	220

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlation analysis shows significant correlations between perceptions of AI-based adaptive learning, demographic data, and challenges and future potential of AI in education. There was a moderate positive correlation ($r = 0.351$, $p < 0.01$) between perceptions of AI-based adaptive learning and demographic data,

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which means demographic variables like age, gender, and teaching experience affect educators' perceptions of AI-driven education. Moreover, a poor positive correlation ($r = 0.173$, $p < 0.05$) between perceptions of AI-based learning and challenges/future potential of AI in education was found, indicating that although AI is perceived to be useful, some challenges could influence its uptake. In addition, a moderate but significant correlation ($r = 0.185$, $p < 0.01$) between demographic data and challenges/future potential of AI suggests that educators' backgrounds have an impact on their views regarding the challenges and opportunities posed by AI in education. These results underscore that demographic factors are responsible for influencing perceptions and uptake of AI-based learning, highlighting the importance of focused training and policy interventions to support AI integration in education.

Regression Analysis

Variables Entered/Removed

Model	Variables Entered	Variables Removed	Method
1	Q10[b]	.	Enter

a. Dependent Variable: Challenges and Future Potential of AI in Education

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.152[a]	.023	.019	3.92810

a. Predictors: (Constant), the challenges and ethical concerns of AI-driven education.

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	79.898	1	79.898	5.178	.024[b]
	Residual	3363.739	218	15.430		
	Total	3443.636	219			

a. Dependent Variable: Challenges and Future Potential of AI in Education
b. Predictors: (Constant), the challenges and ethical concerns of AI-driven education.

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	7.743	.507		15.265	.000
	Q10	.548	.241	.152	2.276	.024

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a. Dependent Variable: Challenges and Future Potential of AI in Education

The regression test is looking at how challenges and ethical issues of AI-based education are related to the perceived challenges and future potential of AI in education. The model summary shows that there is a weak but positive relationship ($R = 0.152$, $R^2 = 0.023$), and this implies that 2.3% of the variance in perceptions of the challenges and future potential of AI is explained by challenges and ethical issues of AI-based education. The ANOVA outcome ($F = 5.178$, $p = 0.024$) also shows that the model is statistically significant, whereby ethical issues and challenges meaningfully influence views of AI in education. This conclusion is also supported by the coefficients table because the predictor variable (Q10: AI challenges and ethical issues) has a positive and statistically significant influence ($B = 0.548$, $t = 2.276$, $p = 0.024$). This suggests that as concerns about AI-related challenges increase, perceptions of AI's future potential may also be influenced, potentially reflecting a cautious or skeptical view among educators regarding AI's integration in learning environments. However, the low R^2 value implies that other factors beyond ethical concerns also contribute to perceptions of AI's challenges and future role in education.

Discussion

The results of this study yield significant findings regarding the influence of AI-based adaptive learning relative to conventional pedagogies, with specific emphasis on teachers' perspectives, difficulties, and the potential future of AI in education. The outcomes show that demographic factors have a considerable impact on perceptions of AI-powered learning as evidenced by the moderate positive correlation ($r = 0.351$, $p < 0.01$) between these variables. This is in tandem with earlier work by (Rizvi, 2023) that noted that the age, experience, and technological competency of educators influence their acceptance and integration of AI into the classroom. The observation that more experienced educators are more conservative regarding AI uptake resonates with the assertion by (Roessingh et al., 2019) that conventional pedagogical practices are greatly esteemed for their capacity to promote critical thinking and social interaction among students.

Another significant finding is the correlation between views of AI-based learning and the future potential/challenges of AI in education ($r = 0.173$, $p < 0.05$). This indicates that although AI-based adaptive learning is seen to have advantages, there are still issues regarding implementation challenges. (Murtaza et al., 2022) further contend that while AI can tailor learning and increase engagement, ethical issues like data privacy, bias in algorithms, and technology dependency are significant impediments to mass deployment. Regression analysis also substantiates this argument, as the difficulties and ethical issues of AI-based education strongly affect the views of AI potential in the future ($B = 0.548$, $p = 0.024$). This is consistent with the findings of (Siddiqui et al.), where it was established that teachers' attitudes towards AI ethics and availability determine their inclination to embrace AI-supported pedagogical tools.

The research also points out that exposure to AI in education is fairly high among teachers in universities, where 40% of the respondents were highly exposed to AI-based learning systems. This is in line with research by (Díaz & Nussbaum, 2024), who pointed out that higher exposure to AI-enabled platforms results in higher levels of acceptance among instructors. But that only 20% of the

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respondents indicated low familiarity indicates that there is a gap to be met for capacity-building programs and AI literacy efforts in order to integrate this effectively. Professional development programs, as (Capinding & Dumayas, 2024)indicate, need to be customized to deal with the pedagogical and technical sides of AI-based learning in order to empower teachers to use AI tools optimally. This study confirms the importance of traditional pedagogies in promoting social interaction, emotional intelligence, and higher-order thinking skills—areas where AI-based systems still lag behind. This is in consonance with (Bhutoria, 2022), who highlight that although AI can complement teaching approaches, it cannot substitute entirely for the human factors of mentorship and teacher-student relations. Thus, AI must be regarded as a complementary aid instead of a substitute for conventional pedagogical approaches, an opinion shared by 40.9% of the participants in this research. In addition, the fact that the R^2 value for the regression was low (2.3%) indicates that other determinants beyond ethical issues and challenges also have an impact on attitudes towards AI in education. Earlier research by (Mohammadi, 2024) points out other determinants like institutional preparedness, policy structures, and investment as major drivers of AI uptake in education. This shows that a convergent strategy incorporating technological platform, teacher training, and policy backing is required to ensure optimal benefit from AI-based adaptive learning. In all, this work adds to the increasing number of scholarly works related to AI in education as it fills the gap between theoretical development in AI-driven learning and the real-life experiences of educators. As attractive as AI-based pedagogies are, with their ability to provide customized learning, improved engagement, and data-driven feedback, ethical issues, infrastructure problems, and the un-replaceable aspect of human interaction need to be addressed to reap successful implementation. Longitudinal studies should be the focus of future research to evaluate the long-term effects of AI learning on student achievement and discover ways to use AI in conjunction with conventional pedagogies to develop a balanced, student-focused learning environment (Pertiwi et al., 2024)

Conclusion

The results of this research underscore the change-making potential of AI adaptive learning while reaffirming the enduring value of traditional pedagogy in ensuring critical thinking and social interaction. The outcome shows that demographic characteristics shape teachers' attitudes toward AI in education, and the level of familiarity is key to acceptance. Whereas AI-based learning increases engagement and customized instruction, ethical challenges, data privacy issues, and infrastructural constraints remain major obstacles for mass adoption. The research lends credence to earlier studies which have suggested that AI should not replace but only supplement conventional forms of teaching in order to adopt a balanced system of education. Due to the low explanatory capacity of the regression model, it is clear that there are several factors driving AI adoption in education, and these need to be supported with institutional support, policy-making, and teacher training. In the future, longitudinal research and hybrid pedagogical models combining AI with human-based learning strategies will be crucial in ensuring the greatest advantages of AI-based education.

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Future Implication

The future implications of the research are the necessity for a balanced and strategic incorporation of AI-based adaptive learning into conventional pedagogies to improve learning outcomes. Institutions need to work towards creating AI literacy programs for educators to prepare them to effectively use AI-driven tools without losing the human element of teaching. Policymakers need to tackle ethical issues, data privacy, and infrastructure to develop a sustainable and inclusive AI-based learning environment. Long-term impacts of AI on student learning habits, engagement, and critical thinking skills should be studied in future research, along with evaluating the efficacy of hybrid models that integrate AI flexibility with conventional mentorship. Moreover, future research can explore ways in which AI can assist multiple learning needs, especially for individuals with disabilities or those who need customized learning plans. Through such areas, AI can be harnessed to develop a fairer, more efficient, and student-focused learning system.

References

Adeleye, O. O., Eden, C. A., & Adeniyi, I. S. (2024). Innovative teaching methodologies in the era of artificial intelligence: A review of inclusive educational practices. *World Journal of Advanced Engineering Technology and Sciences*, *11*(2), 069-079.

Admane, R., Sawale, P. S., Jayasree, R., Kurup, S. J., & Thomas, S. A. (2024). Artificial Intelligence in Education: Tailoring Curriculum to Individual Student Needs through AI-Based Systems. *Library of Progress-Library Science, Information Technology & Computer*, *44*(3).

Ahmed, S., & Meraj, M. (2024). The Role of AI-Driven Personalized e-Learning in Enhancing Economic Competitiveness: A Comparative Analysis of Developed And Developing Countries. European Conference on e-Learning,

Alam, A. (2022). Employing adaptive learning and intelligent tutoring robots for virtual classrooms and smart campuses: reforming education in the age of artificial intelligence. In *Advanced computing and intelligent technologies: Proceedings of ICACIT 2022* (pp. 395-406). Springer.

Alimov, K., Rasulov, A., Fayziyeva, M., Toirova, G., Narkabilova, G., & Matchanova, M. (2024). A Systematic Comparative Analysis of Influence of Artificial Intelligence (AI with DS) in Developing Smart Learning System. 2024 4th International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE),

Bayyurt, N., & Rizvi, S. (2015). Impact of talent management on perceived organizational effectiveness: Service industry in Lahore, Pakistan. *Research Journal of Business and Management*, *2*(4), 468-487.

Benkhalfallah, F., Laouar, M. R., & Benkhalfallah, M. S. (2024). Empowering Education: Harnessing Artificial Intelligence for Adaptive E-Learning Excellence. International Conference on Artificial Intelligence and its Applications in the Age of Digital Transformation,

Bhutoria, A. (2022). Personalized education and artificial intelligence in the United States, China, and India: A systematic review using a human-in-the-loop model. *Computers and Education: Artificial Intelligence*, *3*, 100068.

ISSN Online: 3007-3154
ISSN Print: 3007-3146

Vol. 3 No. 3 (March) (2025)

Capinding, A. T., & Dumayas, F. T. (2024). Transformative Pedagogy in the Digital Age: Unraveling the Impact of Artificial Intelligence on Higher Education Students. *Problems of Education in the 21st Century*, *82*(5), 630-657.

Chitra Dhanapal, D. N., & Alfaruque, S. Y. (2024). Impact of Artificial Intelligence Versus Traditional Instruction for Language Learning: A Survey. *World*, *14*(2).

Chun, J., Kim, J., Kim, H., Lee, G., Cho, S., Kim, C., Chung, Y., & Heo, S. (2025). A Comparative Analysis of On-Device AI-Driven, Self-Regulated Learning and Traditional Pedagogy in University Health Sciences Education. *Applied Sciences*, *15*(4), 1815.

Correia, A., Água, P., & Lobo, V. (2024). Adaptive Learning Design: Integrating AI to Personalize Critical Thinking Education. *EDULEARN24 Proceedings*, 7733-7741.

Díaz, B., & Nussbaum, M. (2024). Artificial intelligence for teaching and learning in schools: The need for pedagogical intelligence. *Computers & Education*, 105071.

Er-Rafyg, A., Zankadi, H., & Idrissi, A. (2024). AI in adaptive learning: challenges and opportunities. *Modern Artificial Intelligence and Data Science 2024: Tools, Techniques and Systems*, 329-342.

Essa, S. G., Celik, T., & Human-Hendricks, N. E. (2023). Personalized adaptive learning technologies based on machine learning techniques to identify learning styles: A systematic literature review. *IEEE Access*, *11*, 48392-48409.

Ezzaim, A., Dahbi, A., Aqqal, A., & Haidine, A. (2024). AI-based learning style detection in adaptive learning systems: a systematic literature review. *Journal of Computers in Education*, 1-39.

Feng, L. (2025). Investigating the effects of artificial intelligence-assisted language learning strategies on cognitive load and learning outcomes: A comparative study. *Journal of Educational Computing Research*, *62*(8), 1961-1994.

Gligorea, I., Cioca, M., Oancea, R., Gorski, A.-T., Gorski, H., & Tudorache, P. (2023). Adaptive learning using artificial intelligence in e-learning: A literature review. *Education sciences*, *13*(12), 1216.

Guettala, M., Bourekkache, S., Kazar, O., & Harous, S. (2024). Generative artificial intelligence in education: Advancing adaptive and personalized learning. *Acta Informatica Pragensia*, *13*(3), 460-489.

Gupta, P., Kulkarni, T., & Toksha, B. (2022). AI-based predictive models for adaptive learning systems. In *Artificial Intelligence in Higher Education* (pp. 113-136). CRC Press.

Habib, H., Jelani, S. A. K., & Najla, S. (2022). Revolutionizing Inclusion: AI in Adaptive Learning for Students with Disabilities. *Multidisciplinary Science Journal*, *1*(01), 1-11.

Kabudi, T. (2023). Towards designing AI-enabled adaptive learning systems.

Meylani, R. (2024). A Critical Glance at Adaptive Learning Systems Using Artificial Intelligence: A Systematic Review and Qualitative Synthesis of Contemporary Research Literature. *Batı Anadolu Eğitim Bilimleri Dergisi*, *15*(3), 3518-3546.

Mohammadi, M. (2024). Language Teachers' Assessment Literacy in AI-aided

ISSN Online: 3007-3154
ISSN Print: 3007-3146

Vol. 3 No. 3 (March) (2025)

Adaptive Learning Environments. *Journal of Research in Applied Linguistics*, *15*(2), 73-88.

Munawwaroh, I., & Adeoye, M. A. (2024). AI-Enhanced Learning Experiences: Moving Beyond Traditional Textbook Approaches in Global Education. *Educative: Jurnal Ilmiah Pendidikan*, *2*(3), 169-177.

Murtaza, M., Ahmed, Y., Shamsi, J. A., Sherwani, F., & Usman, M. (2022). AI-based personalized e-learning systems: Issues, challenges, and solutions. *IEEE Access*, *10*, 81323-81342.

Nadimpalli, V. K., Hauser, F., Bittner, D., Grabinger, L., Staufer, S., & Mottok, J. (2023). Systematic literature review for the use of AI based techniques in adaptive learning management systems. Proceedings of the 5th European Conference on Software Engineering Education,

Naseer, F., Khan, M. N., Addas, A., Awais, Q., & Ayub, N. (2025). Game Mechanics and Artificial Intelligence Personalization: A Framework for Adaptive Learning Systems. *Education sciences*, *15*(3), 301.

Pertiwi, R. W. L., Kulsum, L. U., & Hanifah, I. A. (2024). Evaluating the Impact of Artificial Intelligence-Based Learning Methods on Students' Motivation and Academic Achievement. *International Journal of Post Axial: Futuristic Teaching and Learning*, 49-58.

Rane, N., Choudhary, S., & Rane, J. (2023). Education 4.0 and 5.0: Integrating artificial intelligence (AI) for personalized and adaptive learning. In: Nov.

Ray, S., & Sikdar, D. P. (2024). AI-Driven flipped classroom: Revolutionizing education through digital pedagogy. *Psychology*, *7*(2), 169-179.

Rızvı, M. (2023). Investigating AI-powered tutoring systems that adapt to individual student needs, providing personalized guidance and assessments. *The Eurasia Proceedings of Educational and Social Sciences*, *31*, 67-73.

Roessingh, J. J., Poppinga, G., van Oijen, J., & Toubman, A. (2019). Application of artificial intelligence to adaptive instruction-combining the concepts. Adaptive Instructional Systems: First International Conference, AIS 2019, Held as Part of the 21st HCI International Conference, HCII 2019, Orlando, FL, USA, July 26–31, 2019, Proceedings 21,

Sajja, R., Sermet, Y., Cikmaz, M., Cwiertny, D., & Demir, I. (2024). Artificial intelligence-enabled intelligent assistant for personalized and adaptive learning in higher education. *Information*, *15*(10), 596.

Sari, H. E., Tumanggor, B., & Efron, D. (2024). Improving educational outcomes through adaptive learning systems using ai. *International Transactions on Artificial Intelligence*, *3*(1), 21-31.

Sharma, A., Gupta, P., & Mishra, A. (2024). Comparative Study of General Intelligence in relation to Adaptive Intelligence with Impact of Adaptive Learning on Learners. 2024 International Conference on Computational Intelligence and Computing Applications (ICCICA),

Siddiqui, M. T., Mansoori, M. V., Siddiqui, M. A., & Yadav, A. AI-Enabled Pedagogy: Advancing Education Through Innovative Teaching Tools and the AI-TEACH Model.

Strielkowski, W., Grebennikova, V., Lisovskiy, A., Rakhimova, G., & Vasileva, T. (2024). AI-driven adaptive learning for sustainable educational transformation. *Sustainable Development*.

Yuldashev, S., Akramov, M., Tursunova, F., Abdullaeva, K., Shakhmurodova, D.,

Dialogue Social Science Review (DSSR)
www.thedssr.com

ISSN Online: 3007-3154
ISSN Print: 3007-3146

DIALOGUE SOCIAL SCIENCE REVIEW

Vol. 3 No. 3 (March) (2025)

& Ubaydullayev, A. (2024). A Development of AI Connected System with Adaptive Assessments Method for Evaluation Methods in Education Field. 2024 4th International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE),