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Evolution to Revolution: Transformative Benefits of AI in Education

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ABSTRACT

Based on the qualitative research design, this study adopted a descriptive approach to investigate the transformative benefits AI offers to education. Aligned with the aim and objective of the study, the participants, comprising educators from public and private educational institutions in Pakistan, were selected by applying a purposive sampling technique. Data collection was facilitated using a designated online questionnaire. Thematic analysis enabled to recognition and categorization of patterns and themes in responses, gaining an in-depth understanding of the transformative benefits of AI in education. The results revealed that educators generally consider AI as a transformative tool that enhances teaching effectiveness, increases learner engagement, and improves learning outcomes. AI is regarded as supporting flexible learning, personalized feedback, problem-solving, creativity, and innovative teaching methods. AI is widely acknowledged as a complementary support system that empowers teachers, improves learners' academic outcomes, and reinforces contemporary education. This study recommends organized capacity-building trainings for educators, formation for policy for AI adoption, and investments in infrastructure for successful embracement of AI in education.

Keywords: AI in education; Teacher adoption of AI; role of AI in education; benefits of AI in education; teachers' perception of AI in education.

INTRODUCTION:

Artificial intelligence has redefined education. It has reshaped the teaching and learning processes. AI is transforming every aspect of traditional teaching (Ahmed,

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Soomro, & Syeda, 2024). AI has the potential to address challenges, increase engagement, and enhance learning experiences. AI in education has the potential to tackle the challenges of global educational systems (Chirag Bharadwaj, 2025) ("Artificial Intelligence in Education," 2024). Since the scope and extent of AI use in education are increasing significantly, and AI technologies are continuously evolving, it is crucial to investigate the prospects of AI in the educational field.

Research Aim and Objective:

With a focus on artificial intelligence's core strength in the modern teaching landscape, this study aims to critically explore the transformative benefits of AI in education by investigating its role in enhancing teaching effectiveness, supporting personalized learning, and improving student performance.

Research Questions:

Does AI enhance or hinder teaching effectiveness?
How do AI tools improve teaching?
How does AI support personalized learning?
What is the role of AI in enhancing student learning outcomes?
What is the role of AI in modern teaching?
What are the biggest strengths of using AI in education?

Scope of the study:

With a particular emphasis on the main strength of AI in effective teaching, personalized education, and enhanced learning, this study aims to explore the transformative benefits of AI in modern education. Concentrated on the educators' perceptions, the study gains in-depth insights into the AI technologies' uses and understanding, and the experiences of the educators. The scope covers AI technologies' adoption from primary to higher education levels and their contribution to teaching quality, learners' engagement, and learning experiences. Using thematic analysis, the insights are aimed at informing educators, policymakers, and scholars regarding the evolving role of artificial intelligence in shaping modern education.

LITERATURE REVIEW:

Historical Evolution of AI in Education

Computer-Assisted Instruction (CAI)

PLATO, the first generalized computer-assisted instruction system, was developed by the University of Illinois, United States in 1960. PLATO functioned for four decades. PLATO laid down the concepts of multi-user computing, inclusive of discussion forums, message boards, email, chatrooms, instant messaging, picture languages, online testing, remote screen sharing, and multiplayer video games. Plato offered coursework from elementary through university subjects, inclusive of Latin, chemistry, education, music, Esperanto, and basic mathematics ("PLATO (Computer System)," n.d.).

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Intelligent Tutoring Systems (ITS)

An intelligent tutoring system is a computer system that mimics human tutors to offer instant and customized instruction or feedback to learners (Trajkovski & Hayes, 2025). Intelligent tutoring systems emerged in the 1970s. ITS are heavily influenced by cognitive psychology and reasoning techniques. The first ever real intelligent tutoring system was SCHOLAR, developed by Carbonell in 1970 supported natural language processing, followed by SOPHIE (1975), and BUGGY and DEBUGGY (1977-78). The design of ITS emphasized rule-based systems, expert models, and misconception diagnosis. These systems shaped the theoretical and technical basis for modern intelligent tutoring systems.

Web-based Education

With the advent of the Internet and the World Wide Web in the 1990s, ITS became increasingly web-based, enabling real-time and remote access. Web 2.0 technologies facilitated collaborative learning, peer interaction, and social learning environments (Ahmed, Burdi, & Abbasi, 2024). Machine learning techniques also began to play a key role in optimizing instructional delivery and learner assessment.

Generative AI and Natural Language Processing

The third and most transformative phase emerged in the 2010s with the development of Generative AI, particularly large language models like GPT (Generative Pre-trained Transformer), which enabled machines to understand and respond to human-like language. These systems are capable of producing diverse educational content, including text, speech, images, and code, and they support highly interactive, context-aware learning experiences (Jackson Abraham Emerson, 2024). The release of ChatGPT by OpenAI in 2022 showed the mainstream integration of AI into education by allowing students and teachers to engage in natural language-based interactions for tutoring, content generation, and problem-solving (History of Using AI in Education, 2024).

Toward a Dynamic and Personalized Learning Environment

As AI continues to evolve through improvements in computational power, access to big data, and advances in deep learning, it has transitioned from static, rule-based systems to dynamic, generative, and personalized educational platforms. This ongoing evolution reflects AI's increasing capability to address pedagogical challenges, foster engagement, and enhance learning outcomes across diverse educational environments (Hardman, 2023).

Strengths and Advantages of AI in Education:

Artificial intelligence technologies have several benefits in education.

Access to a large amount of data

AI facilitates access to immense amounts of knowledge in various ways. AI presents and describes information in different ways (Ahmed, Soomro, et al., 2024). Teachers make use of AI to prepare for lessons in a more efficient manner (Ahmed, Burdi, & Abbasi, 2024).

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Personalized Education

AI creates personalized lesson plans and materials based on the course ("Generative AI Tools for Teaching and Learning," 2024). AI creates content suitable for individual requirements (Ahmed, Soomro, et al., 2024) (Ahmed, Burdi, et al., 2024) (Pavitra M, 2024).

AI analytics continually monitors the progress of students and offers helpful insights to enable educators to make better decisions, given the insights in analyzing students' performance and making changes in teaching strategies accordingly (Ahmed, Soomro, et al., 2024) (Ahmed, Burdi, et al., 2024) (Niklas Vernersson, 2024).

Automation of tasks

AI automates routine work, routine things like marking and grading exercises, attendance recording, report generation, etc., are carried out by AI in an automatic manner (Ahmed, Soomro, et al., 2024) (Chirag Bharadwaj, 2025) (Ahmed, Burdi, et al., 2024).

Time Saving

AI not only facilitates and simplifies teachers' work, and saves time to pay more attention to teaching (Ahmed, Soomro, et al., 2024) (Pavitra M, 2024) (Niklas Vernersson, 2024). AI has a large capacity to enhance the quality of education on all levels. Enhances time and cost efficiency, and provides global access to quality educational materials (Ahmed, Soomro, et al., 2024) (Kamalov, Santandreu Calonge, & Gurrib, 2023).

MATERIALS AND METHODS:

Research Design:

A qualitative cross-sectional research design with a descriptive research method was adopted to investigate the current status of educational systems for integrating AI technologies into teaching, and the future of AI-integrated teaching from the perspective of educators.

Population and Sample:

The population for the study consisted of educators in Pakistan serving at universities, degree awarding institutes, schools, and colleges. A purposive sampling technique was applied to select the sample of the study.

Data Collection and Analysis:

Data was gathered through a carefully designed questionnaire available in Google Forms. The QDA Miner 6 data analysis tool was utilized to analyze the responses for thematic analysis to explore and categorize patterns and recurrent themes in responses.

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RESULTS AND DISCUSSION:

Table 1. Demographic profile of respondents (N=51)

Category	Group	Frequency	Percentage
Gender	Male	47	92.16%
	Female	4	7.84%
Age Group	Up to 30	19	37.3%
	31-40	20	39.2%
	Above 40	12	23.5%
Academic Qualification	BS/MA/MSc	24	47.06%
	MS/M.Phil.	22	43.14%
	Ph.D.	5	9.80%
Teaching Experience	16 years or above	11	21.56%
	6 to 15 years	18	35.28%
	Up to 5 years	22	43.16%

The analysis of the demographic characteristics of the respondents (N=51) reveals that:

For gender distribution, male respondents (92.16%) dominate the sample over female respondents (7.84%). The age distribution of the responding educators reveals a fairly balanced depiction of respondents' age groups; the age group of 31 to 41 years accounted for 39.2%, up of 30 years accounted for 37.3%, and above 40 years accounted for 23.5%.

For academic qualifications distribution, the group of BS/MA/MSc degrees holds nearly half of the sample representation (47.06%), followed by the group of MS/M.Phil. (43.14%), and Ph.D. (9.80%).

For teaching experience, the group with up to 5 years of experience constituted the majority of the respondents (43.16%), followed by the experience group of 6 to 15 years (35.28%), and the experience group with 16 or above years of experience (21.56%).

The demographic profile exhibits a diverse representation of educators with varying qualifications and teaching experiences, presenting a comprehensive perspective on AI integration into education.

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Does AI enhance or hinder teaching effectiveness?

Table 2. Statistics on perceived AI impact on enhancing or hindering teaching effectiveness

Themes	Sub Themes	Frequency	Percentage
Enhancing Teaching Effectiveness	Personalized Learning and Resources	16	31.37%
	Saving Time and Increasing Efficiency	14	27.45%
	Providing Quick and Easy Access to Knowledge	12	23.53%
	Making Learning Engaging and Creative	5	9.80%
	Breaking Down Complex Questions	4	7.84%
	Automated Administrative Tasks	4	7.84%
	Utilization of Different Perspectives	3	5.88%
Hindering Teaching Effectiveness	Over-reliance and Reduction of Critical Thinking	7	13.73%
	Reduced Literature Engagement	4	7.84%
	Undermining Creative Problem Solving	3	5.88%
	Decreased Personal Interaction	3	5.88%
	Reduced Authenticity and Dependence on AI	2	3.92%
Neutral or Mixed Views	Mixed Benefits and Drawbacks	5	9.80%
	Neither Enhancing nor Hindering	4	7.84%

The analysis of the perceived impact of AI on teaching effectiveness indicates that the impact of AI on teaching effectiveness is multifaceted; however, AI is perceived as enhancing teaching effectiveness by the majority of respondents. Notably, AI is perceived as effective in enhancing teaching for personalized education, cited by 31.37% of respondents, time saving, and increasing efficiency (27.45%), and for providing quick and easy access to knowledge (23.53%). Despite the positive benefits, AI is perceived to hinder teaching effectiveness, notably raising concern for users' over-reliance and reduction of critical thinking (13.73%), and less engagement with literature (7.84%). Besides, a smaller cumulative group also expressed neutral or

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mixed views (17.64%).

The insights suggest that AI is largely perceived as a transformative tool that enhances teaching effectiveness. Moreover, its adoption is not without challenges. The existence of neutral or mixed views further indicates that some educators remain cautious, recognizing both the opportunities and limitations of AI (Ahmed, Abro, Ashfaque Tago, & Nadeem, 2025).

How does AI improve teaching?

Table 3. Statistics on Perceived AI Impact on Teaching Improvement

Themes	Sub Themes	Frequency	Percentage
Improved Teaching	Increased Knowledge and Access to Information	16	31.37%
	Time-saving and Efficiency	13	25.49%
	Problem Solving and Doubt Clarification	9	17.65%
	Personalization and Real-time Feedback	6	11.76%
	Creativity and Innovation	5	9.80%
	Communication and Idea Generation with AI	3	5.88%
Neutral or Uncertain	No clear improvement / No idea	7	13.73%

The statistics on the perceived impact of AI on teaching improvement show remarkable positive perception for improvement in teaching in different aspects, particularly for increased knowledge and access to information (31.37%), efficiency (25.49%), problem solving and clarification (17.65%), personalization and real time communication (11.76%), and creativity and innovation (9.80%). Despite a marginal 13.73% respondents expressed neutral or uncertain views.

These highly positive perceptions of educators for AI's role in teaching improvement suggest that educators recognize AI as a valued support that strengthens various aspects of the educational process. Overall, the results imply that AI is perceived as a complementary tool that empowers teachers rather than as a replacement for the traditional education system (Zainuddin, 2024).

How does AI support personalized learning?

Table 4. Statistics on perceived AI support for personalized education

Themes	Sub Themes	Frequency	Percentage
Support for Personalized Learning	Adaptive Content and Customized Resources	13	25.49%
	Personalized Assessment and Feedback	7	13.73%
	Supporting Different Learning Styles and Paces	6	11.76%
	Enabling Student Engagement and Self-	5	9.80%

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	directed Learning		
	Providing Quick Access to Relevant Information	7	13.73%
Uncertain or Conditional	Unsure / No Idea / Depends on Factors	11	21.57%
Negative Perceptions	Concerns About Overdependence or Negative Impact	2	3.92%

The statistics indicate that AI is perceived by educators as supportive to personalized education by a clear majority for adaptive and customized resources (25.49%), personalized evaluation and feedback (13.73%), quick access to related information (13.73%), supportive to different learning styles and learning paces (11.76%), enhancing engagement, and self-directed learning (9.80%). Meanwhile, another 21.57% educators remain uncertain regarding the AI support for personalized teaching and learning. Moreover, 2 respondents (3.92%) believe that AI has a negative impact.

These results suggest that educators generally observe AI as a powerful enabler of personalized education. However, uncertainty among 21.57% of educators may be due to inadequate exposure to AI tools and, lack of training for proper usage of the technology. Overall, the findings indicate that AI is widely perceived as supportive of personalized education (Ahmed et al., 2025).

What is the role of AI in enhancing student learning outcomes?

Table 3. Statistics on the perceived AI role in enhanced learning outcomes

Themes	Sub Themes	Frequency	Percentage
Positive role	Increased Knowledge Level	14	27.45%
	Personalized Learning and Adaptive Paths	10	19.61%
	Instant Feedback and Increased Engagement	9	17.65%
	Improved Academic Performance	8	15.69%
	Enhanced Critical Thinking	6	11.76%
	Simplified and Accessible Content	5	9.80%
	Better Focus, Attention, and Confidence	4	7.84%
	Creativity and Fresh Ideas	3	5.88%
Negative role	Reduced Learning Levels	3	5.88%
Neutral or No Specific Benefit	No Special Benefits / No Ideas	4	7.84%

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The insights on the perceived AI role in enhancing learners' academic outcomes revealed that, the educators positively view the role of AI in increased learning outcomes particularly for increased knowledge level (27.45%), personalized learning and adaptive paths (19.61%), instant feedback and increased engagement (17.65%), improved performance (15.69%), enhancement in critical thinking (11.76%), and simple and easily accessible content (9.80%). In addition, a very few educators believe there is no specific impact, 7.84%, or there is a negative impact of AI on learning, 5.88%.

These statistics imply that the AI role in improving the academic performance of the learners is highly perceived (Vieriu & Petrea, 2025).

What is the role of AI in the modern teaching landscape?

Table 6. Statistics on the Perceived AI role in modern teaching

Themes	Sub Themes	Frequency	Percentage
Positive Perceptions of AI Role	AI as Essential and Powerful Teaching Assistants	14	27.45%
	Personalization of Learning and Real-Time Feedback	11	21.57%
	Efficiency, Time-Saving, and Enhancing Teaching	10	19.61%
	Accessibility and Universal Knowledge Empowerment	9	17.65%
	Future Dependence and Necessity	6	11.76%
	Innovation in Teaching Methods (e.g., videos, chatbots)	5	9.80%
	Importance of Learning AI for Teachers and Students	5	9.80%
Conditional	Conditional Agreement	4	7.84%
Concerns	Concerns About Negative Impact on Personal Growth	3	5.88%

The results of educators' perception of AI role in modern teaching revealed that AI has a very positive and imperative role in many aspects in modern educational landscape as evident from high percentages especially as powerful teaching assistant (27.45%), for personalized learning and instant feedback (21.57%), timesaving and

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efficiency (19.61%), accessibility to universal knowledge (17.65%), future dependence and necessity (11.76%), innovative teaching (9.80%), and AI importance for teachers and students (9.80%). Despite a marginal (7.84%) conditional agreement to the positive role of AI in education, 5.88% respondents raised concerns about the negative impact of AI on the personal growth of the learners.

These high positive views on AI's role in contemporary education indicate that AI is well accepted by educators for its potential to augment and enhance the modern education system in many ways (Uygun, 2024).

What are the biggest strengths of using AI in education?

Table 7. Statistics on the perceived AI strength of using AI in education

Themes	Sub Themes	Frequency	Percentage
Biggest Strengths	Personalized Learning and Tailored Content	14	27.45%
	Efficiency and Time Saving	12	23.53%
	Accessibility and Scalability	10	19.61%
	Immediate Feedback and Real-time Support	6	11.76%
	Vast Knowledge and Quick Information Access	9	17.65%
	Simplifying Learning and Understanding	8	15.69%
	Innovation and Creative Tools	5	9.80%
	Administrative Automation	4	7.84%
	One-on-One Support	3	5.88%
Neutral or Uncertain	No clear opinion / No idea	3	5.88%
Perceived Limitations	Viewed as Shortcuts or Less Special	2	3.92%

The analysis of the perceived biggest strengths of using AI in education revealed that AI strength is well viewed by educators in many ways most importantly for personalized education (27.45%), efficiency and time saving (23.53%), accessibility and scalability (19.61%), quick access to vast knowledge (17.65%), simplifying learning (15.69%), and real-time support (11.76%). Meanwhile, very few respondents remained neutral (5.88%) or viewed AI as less special (3.92%).

These results suggest that educators overwhelmingly recognize AI's strengths in transforming education. AI is largely viewed as a planned strength in education, offering significant potential to enhance teaching and learning effectiveness (Tan, Cheng, & Ling, 2025).

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CONCLUSION:

This paper investigates the transformative benefits AI provides to the education field perceived by educators. The insights suggest that AI is perceived as enhancing teaching effectiveness for personalized education, time saving, increasing efficiency, and quick and easy access to knowledge. Further, AI is perceived to improve teaching in the form of increased knowledge and access to information, efficiency, problem solving and clarification, personalized education and real-time communication, and creativity and innovation. Moreover, the educators positively perceive the role of AI in increased learning outcomes, particularly for increased knowledge, personalized learning, instant feedback, and increased engagement, improved academic performance, and enhancement in critical thinking. Furthermore, AI is perceived as a positive and imperative role in the modern educational landscape as a teaching assistant, support for personalized learning and instant feedback, time-saving and efficiency, access to universal knowledge, and innovative teaching. Moreover, the biggest strength of AI lies in its support for personalized education, time saving, accessibility and scalability, quick access to vast knowledge, simplifying learning, and immediate support.

However, some educators expressed concerns regarding over-reliance on technology, reduced critical thinking, and limited engagement with literature. Further, some educators remained uncertain regarding the possible benefits of AI in education.

In summary, AI holds the potential to revolutionize teaching and learning into more adaptive, efficient, engaging, and productive experiences. However, the concern of over-reliance on the technology and less engagement with academic material should also be considered.

Contributions:

The paper contributes to the increasing body of knowledge on AI in education by offering empirical evidence from the context of a developing country. The study insights guide policy makers, curriculum designers, and educators for an effective integration of AI education, aiming long long-term positive effects.

Recommendations:

For successful embracement of AI in education, this study recommends organized capacity-building training programs for educators, the formation of policy frameworks for AI usage, and investments in infrastructure for AI integration into education.

Future Research:

Future research should investigate the long-term effectiveness of AI adoption in education..

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