

Transforming Education: The Evolving Role of Artificial Intelligence in The Students Academic Performance

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Abstract: As technology continues to advance, its integration into various aspects of education has become inevitable. This article delves into the transformative impact of Artificial Intelligence (AI) on students' academic performance. AI's role in education has shifted from a mere supplementary tool to a fundamental component reshaping teaching and learning paradigms. This paper explores how AI-powered educational technologies, such as adaptive learning platforms, intelligent tutoring systems, and automated assessment tools, are revolutionizing traditional educational practices. It examines the benefits AI brings to students, educators, and educational institutions, including personalized learning experiences, enhanced student engagement, and efficient assessment mechanisms. Furthermore, the article discusses the potential challenges and ethical considerations associated with AI integration in education, such as data privacy concerns, algorithmic biases, and the digital divide. By analyzing recent research findings and real-world implementations, this paper provides insights into the evolving landscape of education empowered by AI and underscores the importance of responsible AI adoption to optimize students' academic outcomes in the digital era.

Keywords: Artificial Intelligence, Education Transformation, Academic Performance.

1. Introduction

In the ever-evolving landscape of education, few innovations have captured the imagination and potential for transformation quite like Artificial Intelligence (AI). Over the past decade, AI has emerged as a powerful force, revolutionizing various industries, and the education sector is no exception. As technology continues to reshape the way we learn, teach, and interact with information, educators and learners alike are experiencing a profound shift in their approaches and experiences. The integration of AI in modern education holds the promise of unlocking new frontiers of personalized learning, enhanced educational outcomes, and greater accessibility to quality education for learners worldwide.

The fusion of AI and education is fostering a dynamic ecosystem where traditional instructional methods are being challenged by intelligent algorithms, data analytics, and machine learning capabilities. As AI systems become more sophisticated, they can analyze vast quantities of data, identify patterns, and adapt to individual learning styles, leading to personalized learning experiences that cater to each student's unique needs. This departure from the one-size-fits-all approach has the potential to empower learners, allowing them to progress at their own pace and receive tailored support, ultimately maximizing their academic achievements.

Additionally, AI's integration in education is transcending the confines of traditional classroom settings. E-learning platforms are utilizing AI-driven tools to automate administrative tasks, provide instant feedback to learners, and facilitate real-time collaboration among students and teachers across geographical boundaries. The rise of AI-powered virtual tutors, chatbots, and intelligent tutoring systems is also redefining the role of educators, enabling them to focus on fostering creativity, critical thinking, and problem-solving skills while leaving routine tasks to AI assistants.

Moreover, AI's influence extends beyond the realm of

conventional education to address pressing issues like educational inequality and accessibility. By leveraging AI-driven platforms, underserved communities can gain access to quality educational resources, transcending geographical, economic, and cultural barriers. This democratization of education has the potential to bridge the global educational divide and foster a more inclusive and equitable learning environment for all.

However, as with any transformative technology, the integration of AI in education comes with its own set of challenges and concerns. Ethical considerations, data privacy, and the potential for AI reinforcing existing biases are all pertinent issues that need careful examination. Striking the right balance between human interaction and AI intervention is crucial to ensure that technology remains an enabler rather than a replacement for human educators.

In this rapidly evolving landscape, it is imperative to explore the opportunities and limitations of AI in modern education. This comprehensive analysis seeks to delve into the transformative power of AI, its impact on learning methodologies, its potential to revolutionize educational outcomes, and the ethical considerations that must be upheld to harness its full potential. By understanding and harnessing the power of AI, we can steer education towards a brighter and more inclusive future, empowering learners of all ages and backgrounds to thrive in an increasingly AI-driven world.

Rapid development of artificial intelligence technology

Artificial Intelligence (AI) has undergone a rapid and transformative development in recent years, revolutionizing industries across the board. The convergence of cutting-edge algorithms, advanced machine learning techniques, and unprecedented computing power has propelled AI into the forefront of technological innovation. In the context of education, this exponential growth of AI technology presents a profound potential to revolutionize traditional teaching and learning methodologies.

The education sector, with its diverse challenges and

evolving demands, stands to benefit significantly from the integration of AI. The emergence of AI-driven applications in education promises to address long-standing issues and unlock new opportunities for learners and educators alike. Personalization, adaptability, and efficiency have become the focal points of AI's impact on modern education. By examining the application and impact of AI in education, this research aims to shape a future where AI complements and enhances learning experiences, empowering learners and educators in the digital age.

One of the primary advantages offered by AI technology is the ability to personalize learning experiences based on individual needs and learning styles. Intelligent algorithms can analyze vast amounts of data, from learners' performance to their preferences, and tailor instructional content and methods accordingly. This personalized approach has the potential to boost engagement, motivation, and overall learning outcomes.

However, this rapid development of AI in education also raises several challenges that necessitate careful consideration. Concerns about data privacy and security arise when AI systems collect and analyze sensitive student information to create personalized learning profiles. Ensuring robust data protection and adopting ethical data practices become crucial aspects to address.

Another challenge lies in the potential for AI algorithms to perpetuate biases present in the data they are trained on. If not carefully managed, AI-powered educational tools could inadvertently reinforce stereotypes and widen educational disparities. Thus, mitigating bias and ensuring algorithmic fairness are essential goals to achieve equitable and inclusive AI-driven education.

While AI holds immense promise, it is crucial to strike the right balance between technology-driven learning and the nurturing of essential human skills. Educators must not be replaced but rather empowered by AI tools to focus on fostering critical thinking, creativity, and social-emotional development.

Understanding the impact of AI on education can also contribute to advancing educational equity and inclusion. By exploring how AI-powered platforms can improve access to quality education, particularly for underserved communities and remote learners, this research can guide efforts to bridge the educational divide and reduce disparities. Identifying ways to mitigate bias in AI systems can also promote fairness and equal opportunities for all learners.

The dynamic nature of AI technology demands continuous monitoring and anticipation of future trends. By analyzing the current impact of AI on education, this study can help identify potential challenges and opportunities that may arise in the future. This foresight is essential for educational institutions, policymakers, and stakeholders to be prepared for upcoming changes and developments in the AI-driven education landscape.

The reason for this study lies in its contribution to advancing knowledge, improving educational practices, addressing challenges, and fostering ethical and equitable adoption of artificial intelligence in education. By examining the application and impact of AI in education, this research aims to shape a future where AI complements and enhances learning experiences, empowering learners and educators in the digital age.

The integration of AI in education is a rapidly evolving landscape that presents both exciting opportunities and

significant challenges. Understanding the potential of AI technology and its implications on the field of education is essential for educators, policymakers, and stakeholders to make informed decisions and shape a future where AI augments and enhances learning experiences for all learners. This study aims to explore the impact of artificial intelligence on modern education, examining the challenges and opportunities that arise in this dynamic intersection of technology and pedagogy. By shedding light on these aspects, the study seeks to contribute to the ongoing discourse on harnessing AI's transformative potential in creating a more efficient, inclusive, and effective education system for the 21st century.

2. Statement of the Problem

The rapid development of artificial intelligence (AI) technology and its integration into the field of education have introduced both promising opportunities and critical challenges. This study aims to address the following key issues to gain a comprehensive understanding of the impact of AI on modern education:

1. What is the assessment of the teacher and student respondents on the impact of AI on education?

1.1 Personalized Learning

1.2 Creativity

1.3 Reflective Thinking

1.4 Language Support

1.5 Critical Judgement

1.6 Independent Thinking

1.7 Time Management

1.8 Emotional Intelligence

1.9 Learning Initiatives and Motivation

2. Is there a significant difference in the assessment of the teachers and student respondents on the impact of AI on education

3. What are the challenges encountered by teachers

4. Based from the results of the study what training program can be established for teachers?

3. Hypothesis:

H 1: There is no significant difference in the assessment of the teachers and student respondents on the impact of AI on education

4. Scope and Delimitation of the Study

This study aims to comprehensively investigate the impact of artificial intelligence (AI) on modern education, with a primary focus on higher education settings. It will encompass a broad range of aspects related to AI's influence on educational practices, including its applications, effects on personalized learning experiences, academic outcomes, and student engagement. The study will explore the challenges and ethical considerations emerging from the integration of AI in education. It will also examine students' perceptions of AI-driven educational tools and their experiences with personalized learning facilitated by AI algorithms. The research will provide insights into educators' attitudes and proactive measures for addressing challenges in AI adoption. The geographic scope of the study is limited to universities and higher education institutions in the specified research locale.

While this study aims to provide comprehensive insights into the impact of AI on education, certain limitations and

delimitations will be acknowledged.

Geographical Scope

The research is confined to higher education institutions within the specified research locale, namely, universities in Guangzhou, China. The findings may not be fully generalizable to other geographical regions or educational contexts.

Time Frame

The research will consider the developments and trends in AI technology and education up to the current date. However, due to the rapidly evolving nature of both fields, some of the latest developments might not be fully captured.

5. Research Design

The research design for studying the impact of artificial intelligence on modern education is a mixed-methods approach that combines both quantitative and qualitative methods to provide a comprehensive understanding of the multifaceted effects of AI technology on educational practices, outcomes, and stakeholder perceptions. This research design aims to address the research questions and hypotheses while capturing the nuances and complexities of AI integration in education.

5.1. Research Locale and Research Participants

The research locale for "The Impact of Artificial Intelligence on Modern Education" is limited to university located in Guangzhou, China. Guangzhou is a significant metropolitan area with a rich cultural heritage and a rapidly growing economy. As a major hub for university and technology development in China, studying AI integration in university in Guangzhou provides valuable insights into the regional context.

University in Guangzhou, China:

This includes universities and colleges within Guangzhou, representing a diverse range of disciplines, academic programs, and student demographics. The focus on Guangzhou allows for a concentrated study of AI's impact on university within this specific urban environment.

5.2. Research Participants:

Given the focused scope on university in Guangzhou, the research participants will include key stakeholders directly engaged in the educational process and those with insights into AI integration in these institutions.

5.2.1 Educators (Professors and Instructors):

Professors and instructors from various academic departments within higher education schools in Guangzhou. Participants will be selected to represent different disciplines to capture a broad understanding of AI's application across various subjects.

5.2.2 Students:

University students from different disciplines and academic levels within higher education institutions in Guangzhou. Diverse representation of students in terms of majors, age, gender, and familiarity with technology.

5.2.3 Administrators and Educational Policymakers:

University administrators in Guangzhou responsible for decision-making related to technology integration, academic policies, and curriculum development. Educational policymakers at the institutional level, offering insights into the alignment of AI initiatives with the educational goals of higher education schools in Guangzhou.

5.2.4 AI Developers and Technology Providers:

Professionals and researchers involved in AI development and deployment within the context of higher education in Guangzhou. Representatives from technology companies, AI research institutes, or educational technology providers working closely with these institutions.

By focusing specifically on higher education schools in Guangzhou, China, this research aims to provide a detailed examination of how AI is impacting teaching, learning, and administrative practices within the local higher education environment. The insights gained from this targeted research locale and participant group will contribute to a deeper understanding of the regional dynamics, opportunities, challenges, and implications of AI integration in higher education within the context of Guangzhou.

6. Results and Discussion

This chapter includes an analysis and interpretation of the data that was gathered in tabular form. This section's conclusions are based on a statistical analysis that was carried out with the jamovi 2.3.19 software

A normality test, specifically the Shapiro-Wilk test, will be conducted to ascertain whether the parametric test will be utilized to address the research objectives. In instances where the p-values exceed .05, parametric testing is employed. Nonparametric tests will be used if the p-values are less than .05 and the data is not normally distributed.

This study's research questions have been reviewed. Consequently, the results are presented along with an interpretation and analysis of the data.

Preliminary Analysis

Reliability

Table A summarizes the reliability measurement, specifically the Cronbach's alpha of the scale, and the impact of AI on education, which is composed of personalized learning, creativity, reflective thinking, language support, critical judgement, independent thinking, time management, emotional intelligence, learning initiatives, and motivation. The statistic known as Cronbach's alpha, which is abbreviated as CA, is one of the statistics that is utilized to evaluate the reliability of constructs or the internal consistency of the constructs, according to Roldan and Sanchez-Franco (2012) and Kock (2015). For Cronbach's alpha to be able to determine whether or not a measurement is reliable, the value of the measurement that is being analyzed must be equal to or greater than 0.70 (Fornell & Larcker, 1981; Nunnally, 1978). Based on the analysis of the data, it was determined that each of the scales' domains satisfied the criterion of reliability based on the CA values ranging between CA = 0.85 and 0.91.

Table A: Reliability Measurement – Impact of AI (Cronbach’s Alpha)

Construct	Cronbach’s Alpha	No. of Item/s Deleted	No. of Items
Personalized Learning	0.85	0	5
Creativity	0.85	0	5
Reflective Thinking	0.87	0	5
Language Support	0.88	0	5
Critical Judgement	0.87	0	5
Independent Thinking	0.88	0	5
Time Management	0.87	0	5
Emotional Intelligence	0.91	0	5
Learning Initiatives and Motivation	0.88	0	5

Table B Normality Test

	Shapiro-Wilk	
	W	p
Personalized Learning	0.98	0.081
Creativity	0.97	0.077
Reflective Thinking	0.97	0.077
Language Support	0.97	0.077
Critical Judgment	0.97	0.077
Independent Thinking	0.97	0.077
Time Management	0.98	0.081
Emotional Intelligence	0.98	0.081
Learning Initiatives and Motivation	0.98	0.081

Homogeneity of Variances Test (Levene's)

	F	df1	df2	p
Personalized Learning	2.73	1	659	0.099
Creativity	6.65	1	659	0.060
Reflective Thinking	0.72	1	659	0.396
Language Support	1.31	1	659	0.253
Critical Judgment	5.09	1	659	0.064
Independent Thinking	0.00	1	659	0.994
Time Management	1.25	1	659	0.265
Emotional Intelligence	0.00	1	659	0.947
Learning Initiatives and Motivation	0.03	1	659	0.857

Table B Normality Test

		Shapiro-Wilk	
		W	p

Note. A low p-value suggests a violation of the assumption of equal variances

According to the results of the Shapiro-Wilk test, all of the p-values produced by the test are greater than 0.05, implying that the scores follow a normal distribution. Furthermore, all of the generated Levenes' test p-values are greater than 0.05, indicating that the data achieved variance homogeneity. As a result, to provide answers to the inferences, a parametric test,

specifically the independent sample t-test, will be used.

7. Assessment of The Teacher and Student Respondents on The Impact of AI On Education?

7.1. Personalized Learning

Table 1. Assessment of the Teachers and Students on the Impact of AI on Education in terms of Personalized Learning

Indicators	Respondents	Mean	SD	Verbal Interpretation	Rank
1.AI-powered educational tools help make education more accessible to students with disabilities by providing customized learning experiences that cater to their unique needs.	Teachers	3.53	0.66	Very High Impact Moderate Impact	1
	Students	3.50	0.61		1
2.AI-powered educational tools adapt to the learning pace and style of each student, providing customized learning experiences that are tailored to their needs	Teachers	3.31	0.69	Moderate Impact Moderate Impact	2.5
	Students	3.27	0.71		4
3.AI-powered tutoring systems provide real-time feedback to students, helping them identify areas where they need improvement and providing personalized guidance to help them succeed.	Teachers	3.30	0.70	Moderate Impact Moderate Impact	4
	Students	3.34	0.68		2
4.AI-powered virtual assistants provide students with personalized support and guidance, answering questions and providing feedback in real-time.	Teachers	3.31	0.71	Moderate Impact Moderate Impact	2.5
	Students	3.32	0.71		3
5.AI-powered collaborative learning tools facilitate group work and collaboration, providing students with opportunities to learn from each other and work together on projects	Teachers	3.27	0.73	Moderate Impact Moderate Impact	5
	Students	3.26	0.78		5
COMPOSITE MEAN	Teachers	3.34	0.53	Moderate Impact Moderate Impact	
	Students	3.34	0.57		

Legend: 1.00-1.50: No Impact (Very Low); 1.51-2.50: Less Impact (Low); 2.51-3.50; Moderate Impact (Average); 3.51-4.00: Very High Impact (High)

Table 1 summarizes how teachers and students rated the impact of AI on education in terms of personalized learning. Based on the teachers' ratings, the data produced a composite mean score of 3.34 and a standard deviation of 0.53, indicating that they have an average assessment in this domain. Based on the responses, AI is considered to have a moderate impact. Respondents believe that AI-powered educational tools facilitate accessible education for students with disabilities by tailoring learning experiences to their specific requirements (M = 3.53), that AI-powered educational tools adapt to the learning pace and style of individual students (M = 3.31), and that AI-powered virtual assistants offer personalized learning experiences (M = 3.31).

The students' evaluation resulted in a composite mean score of 3.34 and a standard deviation of 0.57, suggesting that they hold a moderate perception regarding the influence of AI on education. In particular, they held the belief that educational tools powered by AI contribute to the accessibility of education for students with disabilities

through the provision of tailored learning experiences that accommodate their distinct requirements (M = 3.53). Moreover, they believed that tutoring systems powered by AI furnish students with immediate feedback, enabling them to recognize areas requiring improvement and furnishing personalized guidance to facilitate success (M = 3.34). Lastly, AI-powered virtual assistants assisted students in attaining their objectives.

The impact of AI on education has been a source of debate among educators and students alike. In a recent survey, both teachers and students indicated that the impact of AI on education is moderately significant. According to Chen et al. (2020), teachers noted that AI has the potential to improve students' learning experiences by providing personalized and adaptive learning opportunities. AI can also assist educators in developing more effective teaching strategies and providing more personalized support to students (Pratama et al., 2023). Furthermore, AI can automate administrative tasks, giving educators more time to focus on teaching and

mentoring (Alam, 2021).

Teachers, on the other hand, expressed concern about potential job displacement caused by AI in the education sector. Based on the study of Selwyn (2019), teachers emphasized the importance of keeping a human touch in education and ensuring that AI is used as a supplement, not a replacement for human teachers. Students, on the other hand, recognized the value of AI in education, particularly in terms of access to resources and information (Rožman et al., 2023). However, they expressed concern about AI's potential biases and limitations, as well as the impact on their future job prospects.

For a variety of reasons, the impact of AI on education was rated as moderate by teacher and student respondents. First, while AI has the potential to improve the learning experience

through personalized tutoring and adaptive learning systems, its implementation is still in its early stages. Many educational institutions are still integrating AI technologies into their curricula, and there are no standardized methods for assessing AI's effectiveness in education.

Furthermore, teachers and students have expressed concerns about AI's potential to replace human educators. While AI can supplement and support the teaching process, it cannot completely replace the valuable mentorship and guidance that teachers offer (Pedro et al., 2019). This has resulted in a cautious approach to AI adoption in education, with both teachers and students hesitant to fully realize its potential.

7.2. Creativity

Table 2. Assessment of the Teachers and Students on the Impact of AI on Education in terms of Creativity

Indicators	Respondents	Mean	SD	Verbal Interpretation	Rank
1.AI analyze large data sets and identify patterns. This can lead to new insights and hypothesis	Teachers	3.39	0.70	Moderate Impact Moderate Impact	1
	Students	3.31	0.75		3
2.AI filter, group, and prioritize large amounts of information from various sources, creating knowledge graphs and helping students identify associations between seemingly unconnected data	Teachers	3.35	0.70	Moderate Impact Moderate Impact	2
	Students	3.41	0.65		1
3.Generative AI promote divergent thinking, challenge expertise bias, assist in idea evaluation, support idea refinement, and facilitate collaboration among students	Teachers	3.21	0.76	Moderate Impact Moderate Impact	5
	Students	3.29	0.73		5
4.AI help students analyze data, generate reports, and perform other routine tasks, allowing them to focus on more creative work	Teachers	3.22	0.76	Moderate Impact Moderate Impact	4
	Students	3.32	0.74		2
5.AI help make scientific research more accessible by automating the process of summarizing research papers, translating them into different languages, and making them available to students .	Teachers	3.33	0.71	Moderate Impact Moderate Impact	3
	Students	3.30	0.75		4
COMPOSITE MEAN	Teachers	3.30	0.54	Moderate Impact Moderate Impact	
	Students	3.32	0.60		

Legend: 1.00-1.50: No Impact (Very Low); 1.51-2.50: Less Impact (Low); 2.51-3.50; Moderate Impact (Average); 3.51-4.00: Very High Impact (High)

The respondents' evaluations of the effects of AI on education in terms of creativity are presented in Table 2. The teachers' evaluation received a composite mean score of 3.30, accompanied by a standard deviation of 0.54, as indicated by the data in the table. This indicates that the participants have the perception that AI has a moderate influence on education. Additionally, they concur that AI is capable of analyzing extensive data sets and discerning patterns that may give rise to novel insights and hypotheses (M = 3.39). Furthermore, they acknowledge that AI facilitates scientific research accessibility by automating the process of identifying associations between seemingly unrelated data points (M = 3.35) and filtering, grouping, and prioritizing vast quantities of information from diverse sources (M = 3.33). Similarly, the composite mean score of 3.32 and standard deviation of 0.60 for the students' rating indicate that they recognized the moderate impact of AI on education. More precisely, they held the belief that artificial intelligence (AI) could assist

students in discerning connections between seemingly unrelated data by filtering, grouping, and prioritizing vast quantities of information from diverse sources (M = 3.41). Furthermore, they asserted that AI's capability to analyze extensive data sets and detect patterns could potentially generate novel insights and hypotheses (M = 3.31).

In the field of education, the introduction of artificial intelligence (AI) has sparked interest and speculation about its potential impact on creativity. When evaluating the impact of AI on creativity in education, both teachers' and students' perspectives are important. According to teacher respondents, the use of AI in education has had a moderate impact on creativity. As stated by Cheung et al. (2021), while AI can provide personalized learning experiences and facilitate more efficient processes, it is viewed as limited in its ability to foster and enhance students' creativity. Teachers are concerned about AI's potential to stifle individualism and critical thinking, as well as its inability to provide the

emotional support and encouragement required to foster creativity in the classroom.

On the other hand, students acknowledge that AI has a moderate impact on educational creativity. Some students value AI's ability to provide them with innovative tools and resources that foster creativity. They do, however, express concern that AI may limit their creative expression and independence in learning (Akgun, & Greenhow, 2022).

Overall, teachers' and students' assessments indicate that AI has a moderate impact on creativity in education. While AI has the potential to improve certain aspects of creativity, it is critical to recognize its limitations and work to close the gap through innovative teaching methods and curriculum adaptations.

7.3. Reflective Thinking

Table 3. Assessment of the Teachers and Students on the Impact of AI on Education in terms of Creativity

Indicators	Respondents	Mean	SD	Verbal Interpretation	Rank
1.AI make harder texts into more understandable resources, which is particularly helpful for students with learning disabilities who often have a difficult time reading more advanced texts .	Teachers	3.31	0.67	Moderate Impact Moderate Impact	1
	Students	3.38	0.71		1
2.AI help to set the perfect pace for every student, allowing them to move on at their own rate. This gives children an ideal opportunity to explore academics at a comfortable speed, which is neither overwhelming nor frustrating for them to learn	Teachers	3.14	0.74	Moderate Impact Moderate Impact	5
	Students	3.20	0.79		5
3.AI identify knowledge gaps in students' understanding of a subject and provide targeted resources to help them fill those gaps.	Teachers	3.22	0.74	Moderate Impact Moderate Impact	3
	Students	3.28	0.73		2
4.AI assist students with research by providing them with relevant resources and helping them organize their findings.	Teachers	3.23	0.72	Moderate Impact Moderate Impact	2
	Students	3.27	0.73		3
5.AI create interactive learning experiences that engage students and help them learn more effectively.	Teachers	3.21	0.79	Moderate Impact Moderate Impact	4
	Students	3.24	0.75		4
COMPOSITE MEAN	Teachers	3.22	0.60	Moderate Impact Moderate Impact	
	Students	3.28	0.60		

Legend: 1.00-1.50: No Impact (Very Low); 1.51-2.50: Less Impact (Low); 2.51-3.50; Moderate Impact (Average); 3.51-4.00: Very High Impact (High)

The evaluation of the influence of AI on education based on reflective thinking, as assessed by both educators and learners, is presented in Table 3. Upon analyzing the evaluations of the teachers, a composite mean score of 3.22 and a standard deviation of 0.60 were obtained, indicating that the impact was moderate. This indicates that they concur that artificial intelligence (AI) facilitates comprehension of more complex texts, which is especially beneficial for students with learning disabilities who frequently encounter challenges in reading such materials (M = 3.31). Additionally, AI aids students in conducting research by furnishing pertinent resources and aiding in the organization of their discoveries (M = 3.23), detects deficiencies in students' understanding of a particular subject, and offers focused resources to assist them in bridging those gaps (M = 3.23).

The assessment produced a composite mean score of 3.28 with a standard deviation of 0.60, as determined by the students' ratings. that indicates a moderate effect. This indicates that they held the belief that artificial intelligence (AI) could simplify complex texts into more accessible

resources, which would be especially beneficial for students with learning disabilities who frequently encounter challenges in reading more advanced material (M = 3.38). Additionally, AI could identify areas where students lack understanding of a subject and offer targeted resources to bridge those gaps (M = 3.28), aid students in conducting research by furnishing them with pertinent resources, and aid in the organization of their thoughts (M = 3.28).

According to responses from teachers and students, the impact of AI on education in terms of reflective thinking is moderate. According to Chen et al. (2019), reflective thinking is an important skill for students to develop because it enables them to critically analyze their own learning process and adjust their approach accordingly. The introduction of artificial intelligence (AI) in education has resulted in significant changes in how students learn and teachers instruct, but its impact on reflective thinking is moderate.

Teachers and students believe that AI can provide valuable resources and support for reflective thinking, such as personalized learning experiences and real-time feedback

(Bhutoria, 2022). They do, however, express concern about the potential loss of human interaction and critical thinking skills as a result of excessive reliance on AI technology.

In terms of assessment, both teachers and students recognize the importance of a balanced approach to integrating AI into education. They emphasize the importance of using AI as a tool to improve, not replace, reflective thinking abilities. This assessment expresses cautious

optimism about the potential of AI in education, while also emphasizing the need for ongoing research and professional development to effectively leverage AI to support reflective thinking. Overall, AI's impact on reflective thinking in education is viewed as moderate, with both opportunities and challenges to consider.

7.4. Language Support

Table 4. Assessment of the Teachers and Students on the Impact of AI on Education in terms of Language Support

Indicators	Respondents	Mean	SD	Verbal Interpretation	Rank
1. AI provides automated assessments of students' writing, speaking, and listening skills, which can help teachers identify areas where students need more support	Teachers	3.31	0.74	Moderate Impact	3
	Students	3.33	0.73	Moderate Impact	3
2. AI provide students with opportunities to practice their language skills through interactive activities such as chatbots and language games	Teachers	3.23	0.75	Moderate Impact	4
	Students	3.29	0.75	Moderate Impact	5
3. AI help students understand content in a language they are not familiar with by providing real-time translation	Teachers	3.37	0.71	Moderate Impact	1.5
	Students	3.38	0.70	Moderate Impact	1.5
4. AI help make language learning more accessible to students with disabilities by providing tools such as speech recognition and text-to-speech	Teachers	3.37	0.66	Moderate Impact	1.5
	Students	3.38	0.69	Moderate Impact	1.5
5. AI-powered virtual tutors provide students with one-on-one support outside of the classroom, which can help them improve their language skills	Teachers	3.29	0.74	Moderate Impact	5
	Students	3.30	0.73	Moderate Impact	4
COMPOSITE MEAN	Teachers	3.31	0.59	Moderate Impact	
	Students	3.33	0.59	Moderate Impact	

Legend: 1.00-1.50: No Impact (Very Low); 1.51-2.50: Less Impact (Low); 2.51-3.50; Moderate Impact (Average); 3.51-4.00: Very High Impact (High)

Regarding language support, Table 4 displays how respondents rated the impact of AI on education. Descriptive statistics indicate that the composite mean score for the teachers was 3.31, accompanied by a standard deviation of 0.59. For the students, the corresponding values were 3.33 and 0.59. This indicates that respondents consider the impact of AI on education to be moderate. In particular, both cohorts concur that artificial intelligence (AI) facilitates comprehension of foreign language material for students through real-time translation ($M = 3.37$; $M = 3.38$), that AI contributes to the accessibility of language learning for students with disabilities through the provision of speech recognition and text-to-speech tools ($M = 3.37$; $M = 3.38$), and that AI conducts automated evaluations of students' writing, speaking, and listening proficiencies, thereby aiding instructors in the identification of problem areas ($M = 3.31$; $M = 3.33$).

When assessing the impact of AI on education in terms of language support, both teachers and students said it was moderate. This is similar to the study of Pokrivcakova (2019), that teachers believe that artificial intelligence tools, such as translation software and language learning apps, have made it

easier for students to learn new languages. However, they also stated that these tools are insufficient to replace the need for human language instruction. Furthermore, some teachers expressed concern about the accuracy and dependability of AI language support tools.

Students, on the other hand, acknowledged that AI has provided them with valuable language learning resources, but they also stated that a lack of personalized feedback and interaction impedes their language acquisition efforts. They appreciate the convenience of AI tools for language practice and translation, but they also recognize the importance of human instructors in providing comprehensive language education (Anis, 2023).

To summarize, both teacher and student respondents see AI as a useful tool for language learning, but not as a complete solution. They acknowledge the ease and accessibility of AI language support tools, but they also emphasize the value of human interaction and personalized instruction in language education. As a result, they rate AI's impact on education in terms of language support as moderate.

7.5. Critical Judgement

Table 5. Assessment of the Teachers and Students on the Impact of AI on Education in terms of Critical Judgement

Indicators	Respondents	Mean	SD	Verbal Interpretation	Rank
1. Enhanced problem-solving: AI help students to solve problems more efficiently by providing them with real-time feedback and post-lesson reports	Teachers	3.34	0.67	Moderate Impact Moderate Impact	1
	Students	3.33	0.70		1
2.Freedom to make and learn from wrong decisions: AI and simulation removes the effects of bad decisions, allowing students to learn from failing	Teachers	3.23	0.73	Moderate Impact Moderate Impact	4
	Students	3.17	0.80		5
3.Improved decision-making: AI help students make better decisions by identifying conclusions, reasons, and assumptions, asking appropriate clarifying questions, and judging the quality of an argument	Teachers	3.18	0.76	Moderate Impact Moderate Impact	5
	Students	3.28	0.74		2.5
4.Increased creative thinking: AI help students to think more creatively by providing them with new ideas and perspectives	Teachers	3.24	0.77	Moderate Impact Moderate Impact	2.5
	Students	3.24	0.77		4
5.Improved memory retention: AI help students to retain information more effectively by providing them with personalized learning experiences.	Teachers	3.24	0.71	Moderate Impact Moderate Impact	2.5
	Students	3.28	0.76		2.5
COMPOSITE MEAN	Teachers	3.25	0.58	Moderate Impact Moderate Impact	
	Students	3.26			
		3.28			0.62

Legend: 1.00-1.50: No Impact (Very Low); 1.51-2.50: Less Impact (Low); 2.51-3.50: Moderate Impact (Average); 3.51-4.00: Very High Impact (High)

Table 5 summarizes the impact of AI on education in terms of critical judgment, as evaluated by both teachers and students. According to the tabulated data, the teachers' assessment had a composite mean score of 3.25 and a standard deviation of 0.58, indicating moderate impact. This may indicate that they agree that AI enhanced problem-solving, which helps students solve problems more efficiently by providing them with real-time feedback and post-lesson reports ($M = 3.34$), increased creative thinking, which helps students think more creatively by providing them with new ideas and perspectives ($M = 3.24$), and improved memory retention, which helps students retain information more effectively by providing them with personalized learning experiences.

The students' assessment yielded a composite mean score of 3.26 and a standard deviation of 0.62, indicating that they agree that AI helps students solve problems more efficiently by providing them with real-time feedback and post-lesson reports ($M = 3.33$), help students retain information more effectively by providing them with personalized learning experiences ($M = 3.28$), and make decisions by identifying conclusions, reasons, and assumptions.

Assessing the impact of AI on education from the perspectives of both teachers and students reveals that it has

a moderate impact on critical thinking. According to Pedro et al. (2019), AI has the potential to improve critical thinking skills by providing access to vast amounts of information and allowing for personalized learning experiences. However, there is concern that students will become overly reliant on AI for problem solving and decision making, reducing their ability to think critically and independently.

Similarly, student respondents acknowledge that AI can be a useful tool for gathering and analyzing data, but they are concerned about its impact on their critical thinking. Some students believe that relying on AI for learning may limit their ability to develop strong analytical and evaluation skills because they will become accustomed to accepting information at face value rather than questioning and challenging it (Spector & Ma, 2019).

In short, both teachers and students believe that while AI can provide valuable resources and support for education, it also has the potential to influence critical judgment. It is critical for educational institutions to incorporate AI into the curriculum in a way that encourages students to think critically and develop strong analytical skills rather than becoming passive consumers of information.

7.6. Independent Thinking

Table 6. Assessment of the Teachers and Students on the Impact of AI on Education in terms of Independent Thinking

Indicators	Respondents	Mean	SD	Verbal Interpretation	Rank
1.Students tap into their critical thinking skills by examining artificial intelligence outputs to see if they meet learning standards. This can prompt their learning and their development of critical thinking skills	Teachers	3.22	0.78	Moderate Impact	4
	Students	3.27	0.75	Moderate Impact	4
2.An AI system observe how a student proceeds through an assigned task, how much time they take and whether they are successful. If the student is struggling, the system can offer help; if the student is doing well, the system provide more challenging tasks	Teachers	3.25	0.78	Moderate Impact	2
	Students	3.28	0.71	Moderate Impact	3
3.AI can be used to engage students in the process of problem-solving AI-assisted technology can enhance learners' critical thinking skills by providing them with a platform to practice their reasoning and problem-solving abilities.	Teachers	3.25	0.75	Moderate Impact	2
	Students	3.29	0.73	Moderate Impact	2
4.AI allow students to construct knowledge, and create something new in any content area	Teachers	3.25	0.73	Moderate Impact	2
	Students	3.30	0.71	Moderate Impact	1
5.Providing feedback: AI provide students with feedback on their work, which can help them improve their independent thinking skills	Teachers	3.18	0.81	Moderate Impact	5
	Students	3.22	0.80	Moderate Impact	5
COMPOSITE MEAN	Teachers	3.23	0.63	Moderate Impact	
	Students	3.27	0.62	Moderate Impact	

Legend: 1.00-1.50: No Impact (Very Low); 1.51-2.50: Less Impact (Low); 2.51-3.50; Moderate Impact (Average); 3.51-4.00: Very High Impact (High)

Table 6 shows how teachers and students evaluated the impact of AI on education using independent thinking. The data analysis revealed composite mean scores of 3.23 (teachers) and 3.27 (students), as well as standard deviations of 0.63 (teachers) and 0.62 (students), indicating that both groups perceived AI as having a moderate impact on education. The teachers, in particular, believed that an AI system would observe how a student completes an assigned task, how long it takes, and whether or not they succeed ($M = 3.25$). The system can assist struggling students and provide more challenging tasks for those performing well ($M = 3.25$). AI can be used to engage students in problem-solving activities. AI-assisted technology can improve learners' critical thinking skills by providing a platform for them to practice their reasoning and problem-solving abilities ($M = 3.25$), and AI enables students to construct knowledge and create something new in any content area.

Meanwhile, the students agree that AI allows students to construct knowledge and create something new in any content area ($M = 3.30$) and that AI can be used to engage students in the problem-solving process. AI-assisted technology can improve learners' critical thinking skills by giving them a platform to practice their reasoning and problem-solving abilities ($M = 3.29$), and an AI system can monitor how a student completes an assigned task, how long it takes, and whether they succeed. The system can assist struggling students and provide more challenging tasks for those performing well ($M = 3.28$).

Teachers generally recognize AI's potential to provide

personalized learning experiences for students, allowing them to explore and learn at their own pace (Pratama et al., 2023). However, they are concerned about the over-reliance on AI for critical thinking and problem-solving abilities. Based on the findings of Markauskaite et al. (2023), AI can help students learn, it cannot replace the critical role of human teachers in encouraging independent thinking and creativity.

Students, on the other hand, understand how AI can simplify and supplement their learning process (Kabudi et al., 2021). They value the access to a diverse range of educational resources and personalized study plans that AI provides. However, they are concerned about the risk of becoming overly reliant on AI for critical thinking and decision-making. They believe that a balanced approach, in which AI is used to support rather than dictate learning, is required for the development of independent thinking skills.

Overall, both teachers and students agree that, while AI has the potential to improve the learning process, a balance must be struck to ensure that it does not impede the development of independent thinking skills in education.

8. Conclusions

Based on the findings, the following conclusions were generated:

Both the teachers and students perceived that AI has a moderate impact on education. One implication of this viewpoint is the need for a balanced approach to incorporating AI into education. Teachers may believe that

they still play an important role in the classroom and that AI can be used to support and supplement their teaching efforts rather than replace them entirely. As a result, educators may seek professional development opportunities to learn how to effectively incorporate AI into their teaching practices. Furthermore, students may view AI as a tool to help them learn rather than a replacement for human interaction and guidance. This balanced approach may result in a more symbiotic relationship between AI and traditional teaching methods.

Both teachers and students have the same level of assessment of the impact of AI in education. When teachers and students have similar assessments of AI in education, there is the potential for increased collaboration and understanding. Teachers and students can collaborate to identify areas where AI could help improve the learning experience. This collaborative approach can result in the creation and implementation of innovative AI-powered tools and resources that address the specific needs and preferences of both teachers and students. Such a synergistic relationship can lead to a more effective and efficient educational environment in which the benefits of AI are maximized to improve overall learning outcomes.

9. Recommendations

The education system may need to adapt to integrate AI tools and technologies into the learning environment without overwhelming traditional methods.

There is potential for increased collaboration between teachers and AI systems to enhance the educational experience for students.

Both teachers and students may focus on developing skills that complement AI technology, such as critical thinking, problem-solving, and creativity.

Educational institutions may need to invest in AI solutions that align with the perceived moderate impact, balancing innovation with practicality.

Teachers and students may need to prepare for a future where AI plays a more substantial role in education while maintaining the human element of teaching and learning.

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