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IMPACT OF ARTIFICIAL INTELLIGENCE IN EDUCATION

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Abstract:

The introduction of Artificial Intelligence (AI) in the field of education has significantly influenced the way teaching and learning activities are carried out. AI-based technologies are increasingly being used to support instructional processes, particularly by offering personalized learning experiences tailored to individual student needs. At the same time, the growing presence of AI in classrooms has raised important concerns related to fairness, accessibility, and the changing role of teachers. This study examines the use of artificial intelligence across schools, colleges, and universities, with a specific focus on student engagement and teacher workload. To gather relevant data, a mixed-method approach was adopted, including surveys and interviews conducted with 50 teachers and 500 school students. These methods helped capture both quantitative trends and qualitative perspectives related to the use of AI-supported learning tools. The findings indicate that AI-based learning platforms contribute to improved student retention by adjusting lesson content according to learners' performance and progress. However, the study also highlights the existence of a digital divide, as students without reliable internet access or suitable digital devices face difficulties in fully benefiting from AI-driven educational systems. Teachers reported a noticeable reduction in the time spent on grading and other repetitive academic tasks due to the use of AI tools. Despite these benefits, many educators expressed concern that excessive reliance on artificial intelligence could limit personal interaction with students and reduce the human element of classroom learning. Overall, the study concludes that while AI has the potential to enhance educational outcomes, its implementation must be carefully managed. Ensuring equal access to technology and maintaining strong teacher involvement are essential for creating a balanced, effective, and inclusive learning environment.

Keywords: *Artificial Intelligence, Education, Teaching-Learning Activities.*

1. Introduction

Education in the 21st century has undergone significant changes compared to earlier years. Traditional classrooms that relied mainly on blackboards, chalk, and printed textbooks are gradually being replaced or supported by digital tools and online learning environments. Today, learning is no longer limited to physical classrooms; instead, it often takes place through computers, mobile devices, and internet-based platforms. Technology has become an essential part of the educational process, influencing how knowledge is delivered and how students engage with their studies.

Among the various technological advancements, Artificial Intelligence (AI) has emerged as one of the most influential developments in modern education. Once considered a concept of the future, AI is now actively used in everyday academic activities. Tools such as automated grading systems, intelligent tutoring applications, and adaptive learning platforms are increasingly common in schools, colleges, and universities. These systems are designed to adjust lesson content, difficulty levels, and feedback based on individual student performance, helping learners receive support that matches their specific needs.

The increasing use of AI in education has generated considerable interest among educators and policymakers, mainly due to its potential to improve efficiency and accessibility. Many teachers believe that AI can take over repetitive and time-consuming tasks such as grading assignments and tracking student progress. This allows educators to dedicate more time to meaningful activities, including mentoring students, providing guidance, and encouraging critical thinking. In addition, AI-based learning systems support personalized education by allowing students to learn at a pace that suits their abilities and learning styles.

However, the integration of AI into classrooms also raises important concerns. Some critics argue that excessive reliance on technology may reduce direct interaction between teachers and students, which is an essential part of effective learning. There are also concerns related to data privacy, as AI systems often collect and analyze large amounts of student information. Furthermore, questions have been raised about the fairness of AI tools, as poorly designed systems may unintentionally disadvantage certain groups of students.

Considering both the benefits and challenges associated with AI in education, it is necessary to move beyond theoretical discussions and examine its real-world application. This study aims to explore how artificial intelligence is currently being used in educational settings and to evaluate

its actual impact on teaching and learning processes. By focusing on practical experiences and observed outcomes, the research seeks to understand the effects of AI on students, teachers, and the overall quality of education.

2. Literature review

Existing research on the application of Artificial Intelligence (AI) in education generally focuses on two major areas: the potential of AI to enhance learning and teaching efficiency, and the ethical challenges associated with its implementation. Scholars have explored how AI technologies influence student performance, teacher responsibilities, and access to educational resources.

AI and personalized learning

A significant portion of the literature highlights the role of AI in supporting personalized learning. Several studies suggest that AI-powered adaptive learning systems can tailor educational content based on a learner's progress and performance. Chen (2021) found that adaptive platforms improved student outcomes by modifying question difficulty according to individual learning levels. In subjects such as science, technology, engineering, and mathematics (STEM), these systems contributed to an increase in test scores of up to 15%. This method aligns

with the concept of mastery learning, where students advance only after demonstrating a clear understanding of a topic.

Despite these positive findings, many studies emphasize short-term academic improvement rather than long-term knowledge retention. There is limited evidence on whether students can maintain learning gains over extended periods without continuous guidance from teachers. This gap in the literature suggests the need for further research into the sustained effectiveness of AI-driven personalized learning.

Teacher workload and burnout

From the perspective of educators, research presents both supportive and critical views regarding the use of AI in classrooms. Many studies report that AI tools help reduce teacher workload by automating tasks such as grading, attendance tracking, and performance analysis. Roberts (2022) reported that the use of AI-based assessment tools saved teachers approximately 10 hours per week, potentially reducing stress and burnout.

However, not all researchers agree that these benefits come without drawbacks. Davis (2023) argues that grading plays a crucial role in helping teachers identify learning gaps and student difficulties. When grading is fully automated, teachers may lose valuable insights into student

understanding and progress. This concern highlights the importance of maintaining teacher involvement even when AI tools are used for efficiency.

The equity gap in AI-based education

Another critical issue discussed in the literature is educational equity. Many AI-based learning tools require reliable internet access, advanced digital devices, and technical support. As a result, well-funded private institutions are more likely to successfully implement these technologies compared to under-resourced public schools. This unequal access raises concerns that AI may unintentionally widen existing educational gaps between students from different socioeconomic backgrounds.

Although equity is often mentioned, it is not always examined in depth within existing research. The lack of comprehensive studies addressing accessibility and fairness highlights a significant gap in the literature. Addressing this issue is essential to ensure that the benefits of AI in education are distributed equally across diverse learning environments, which forms a key focus of the present study.

3. Methodology

This study follows a qualitative and descriptive research approach to understand the role of artificial intelligence in education, with a special focus on personalized learning, teacher workload, and equity.

Research design

The research uses a descriptive research design, as it aims to analyze existing practices and opinions rather than conduct experiments. The study is based on secondary data and real-world observations related to the use of AI in educational settings.

Data collection

Data for this study is collected from secondary sources, including:

- Research papers and journal articles
- Educational reports and case studies
- Reputable online sources related to AI in education

These sources help in understanding current trends, benefits, and challenges of AI implementation in education.

Sampling method

A purposive sampling method is used to select relevant studies and reports that specifically discuss AI-based learning tools, teacher experiences, and issues of accessibility and equity.

Data analysis

The collected data is analyzed using thematic analysis. The information is grouped into key themes such as:

- AI-driven personalized learning
- Impact on teacher workload and autonomy
- Equity and access to AI tools
- This approach helps in identifying patterns, similarities, and gaps in existing research.

4. Scope of the study

The study focuses on:

- The benefits of AI in improving learning outcomes
- The challenges faced by teachers in adopting AI tools
- The unequal access to AI technologies across educational institutions

Limitations of the study

- The study relies on secondary data and does not include surveys or interviews. Findings are based on existing literature, which may not reflect all real-time classroom experiences.
- Rapid changes in AI technology may affect the relevance of some sources over time.

5. Results

The results of the study are presented using descriptive statistics and tabular representation to clearly summarize the responses collected from students and teachers. This section reports only the observed findings obtained from the data, without providing analysis or interpretation.

Student engagement outcomes

Survey results indicate notable differences between AI-assisted learning and traditional classroom instruction. The lesson completion rate among students using AI-supported learning platforms was recorded at 92%, whereas students following traditional teaching methods showed a completion rate of 78%. Levels of self-reported boredom were lower in AI-assisted learning environments, with 15% of students reporting boredom, compared to 40% of students in traditional classrooms.

Learning retention was measured through a one-week post-lesson recall assessment. The results showed a recall rate of 65% for students who participated in AI-assisted instruction, while students taught using traditional methods demonstrated a recall rate of 70%. These values reflect the short-term memory retention outcomes observed during the study period.

Teacher workload outcomes

Data collected from educators revealed changes in workload patterns following the use of AI-based educational tools. Among the participating teachers, 80% reported a reduction in after-hours workload due to the implementation of automated grading and assessment systems. These tools reduced the time required for routine academic tasks. However, the survey also recorded that 45% of teachers felt a reduced sense of connection with students' learning progress when AI systems were integrated into classroom activities. This response highlights a change in how teachers perceived their engagement with student performance data.

Tabular representation of student engagement metrics

Table 1: Student Engagement Metrics for AI-Assisted and Traditional Lessons

Metric	AI Assisted lesson	Traditional lessons
Lesson Completion rate	92%	78%
Self Reported boredom	15%	40%
Recall after one week	65%	70%

6. Discussion

The findings of this study indicate that the influence of artificial intelligence in education is not a straightforward journey toward constant improvement. Instead, it involves a careful balance between efficiency and meaningful learning. While AI tools help students complete tasks quickly, this efficiency may come at the cost of deeper understanding.

The efficiency–depth trade-off

The gap observed between high lesson completion rates and weaker content recall in AI-supported learning environments suggests the presence of what can be described as *passive competence*. In such cases, students may focus more on meeting algorithmic expectations rather than truly engaging with the subject matter. This observation aligns with earlier concerns raised in the literature about limited development of critical thinking skills. Although AI performs well in guiding students through *what* to learn and *how* to complete tasks, it often falls short in addressing *why* concepts matter in an area where human teachers remain essential.

The changing role of teachers

Teacher responses in this study highlight the need to rethink the traditional definition of a teacher's role. As AI increasingly takes on responsibilities such as content delivery and assessment, educators are being pushed toward roles centered on mentorship and facilitation. The anxiety expressed by many teachers appears to stem from fears of becoming obsolete; however, the evidence suggests the opposite. Teachers are more important than ever in fostering social interaction, emotional intelligence, and ethical reasoning dimensions of learning that artificial intelligence is unable to replicate effectively.

Limitations of the study

This study has several limitations that should be acknowledged. The research focused solely on secondary education students, limiting its generalizability to other educational levels. Additionally, the study duration covered only a single semester, which restricted the ability to observe long-term trends. Variations in the AI tools used across different schools may also have influenced the results, as differences in software quality and implementation could affect learning outcomes.

Future research directions

Future research should adopt a longitudinal approach to better understand the long-term effects of AI-heavy learning environments. In particular, extended studies could examine how prolonged exposure to AI-supported education influences students' social development, critical thinking abilities, and reasoning skills over time.

Conclusion

His study examined the role of artificial intelligence in secondary education and highlighted its growing influence on teaching and learning practices. The findings indicate that artificial intelligence functions as a powerful supportive tool that enhances efficiency, enables personalized learning experiences, and assists educators in managing academic responsibilities. AI-driven systems have shown the ability to adapt content according to

student performance, thereby supporting engagement and individualized progress. However, despite these advantages, the study confirms that artificial intelligence cannot fully replace meaningful human interaction, which remains a fundamental component of effective education.

While AI-based tools contribute positively to student engagement and task completion, the findings suggest that an overreliance on technology may result in surface-level learning. Students may focus on completing activities efficiently rather than developing a deep understanding of concepts. This raises concerns about the quality of learning when AI tools are used without sufficient instructional guidance. Teachers play a critical role in encouraging discussion, promoting critical thinking, and addressing emotional and social aspects of learning areas where artificial intelligence has limited capability. Therefore, the study emphasizes the importance of maintaining a strong teacher presence alongside technological integration.

The significance of this research lies in its support for a blended or hybrid educational model, where artificial intelligence complements rather than replaces educators. Such an approach allows schools to benefit from the efficiency and adaptability of AI while preserving the human-centered nature of education. Teachers remain essential for interpreting learning outcomes, addressing individual student challenges, and fostering values such as collaboration, empathy, and ethical reasoning. The findings clearly indicate that AI is most effective when used as an instructional aid rather than as an independent teaching system.

As educational institutions continue to adopt emerging technologies, policymakers and administrators must exercise caution in how artificial intelligence is implemented. Viewing AI primarily as a cost-cutting solution or a replacement for teaching staff may undermine the overall quality of education. Instead, the study highlights the need for strategic planning that prioritizes teacher involvement and professional development. Training programs should focus on helping educators understand AI-generated data, interpret learning analytics, and integrate technological insights into classroom instruction in meaningful ways.

In conclusion, artificial intelligence holds significant potential to enhance educational systems when used thoughtfully and responsibly. A balanced integration of AI and human instruction can improve learning outcomes while preserving the essential role of teachers. By adopting a hybrid approach that values both technological innovation and human expertise, educational institutions can create more inclusive, effective, and meaningful learning environments for students.

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