UNVEILING THE EDUCATIONAL CHALLENGES AND MITIGATION STRATEGIES IN THE WAVE OF AI.

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Abstract

The integration of Artificial Intelligence (AI) in educational contexts represents a significant advancement in pedagogical approaches, providing improved accessibility, personalized learning experiences, and enhanced operational efficiency. AI tools, including ChatGPT, Gemini, and Microsoft Copilot, are transforming instructional delivery and learner engagement. However, the widespread adoption of these technologies also presents critical challenges, such as concerns regarding data authenticity, potential over-reliance, cognitive dependence, academic dishonesty, and digital inequality. This paper conducts a critical examination of the impact of AI within educational settings—highlighting both its transformative potential and the complexities it introduces. Furthermore, it proposes and underscores the strategic interventions that encompass teacher training, the development of policy frameworks, provenance verification, and stakeholder awareness aimed at promoting responsible and equitable AI integration. The study emphasizes the necessity of balancing innovation with academic integrity to ensure that AI functions as an empowering tool rather than a source of dependency within educational environments.

Keywords- Data Authenticity, Over-Reliance, Cognitive Dependence, Digital Divide, and Academic Integrity

Technology has been considered a potential determinant of Educational Transformation. Technology has become an inseparable part of the education system due to its remarkable contribution to enhancing the quantity and quality of educational opportunities. Educationists are always on a hustle to provide education that prepares citizens for the future, one way is by integrating technology with education by looking for educational tools to purchase, trends to follow, and how to prioritize and cater to the needs of students and society (Dousay and Janak 2006). Technology has shaped the learning outcomes and learning environment of the classroom. Classrooms have evolved from chalkboards to tech-driven spaces, shifting their focus from basic literacy to fostering digital fluency. Twenty-first-century classrooms that lack technology are increasingly viewed as incomplete and outdated, making them rare in contemporary education settings. Essential educational goals such as inclusivity, quality of instruction, personalized learning, and skill development appear to be unattainable without the integration of technology. The integration of advanced technologies such as artificial intelligence in education necessitates a thorough understanding of both the benefits and challenges associated with its implementation. This awareness is essential to mitigate the complex issues that educators may face within the classroom context.

Objectives

The research paper aims to

1. To analyze the role of AI in shaping education

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2. To highlight significant challenges posed by AI in education
3. To propose mitigation strategies to ensure the responsible use of AI in education

Research Methodology

This study employs a conceptual and qualitative review methodology to examine the integration of Artificial Intelligence within the educational sector, the challenges it poses, and potential strategies for mitigation. The study is situated within an interpret ivist paradigm and aims to elucidate the ramifications of AI on teaching and learning by analyzing existing scholarly literature, historical developments, and recent trends surrounding educational technology.

Literature review- a diverse array of secondary sources were reviewed, including peer-reviewed journal articles, conference proceedings, policy documents from UNESCO and other relevant organizations, as well as authoritative reports from experts in the fields of AI and education.

The qualitative review offered comprehensive insights into the significant challenges associated with the integration of artificial intelligence in education.

Historical Evolution of Technology in Education

The first mass medium, Radio, took people to real-time events. It brought a new wave to learning where classes went on air on the radio for a large number of students. This digital technology has the greatest educational transformation potential (UNESCO 2023). In educational technology, advancements have been made over the years. These include the introduction of the overhead projector in the 1930s, television in 1939, programmed instructions in the 1960s, computers in the 1960s, learning management systems (LMS), the internet in the 2000s, digital platforms in the 2000s (Molenda, 2022), and most recently, artificial intelligence in the 2010s which holds immense power to shape the future of teaching-learning experiences. Each of these advancements has contributed to an overhaul of the educational system.

The education system has repeatedly adapted and adopted technological advancements resulting in a paradigm shift in aims, objectives, content, curriculum, and pedagogical approaches. The debate on Artificial Intelligence and its significant effect on the education system has been prominent with the launch of ChatGPT in November 2022. Though AI existed way before ChatGPT, with this remarkable advancement, AI has become an inseparable part of everyday life, including education. The term 'artificial intelligence' was first coined as part of a project and workshop at Dartmouth College in the mid-1950s (Williamson and Eynon, 2020).In the 1960s AI gained its entry into the classroom with the Intelligent Tutoring System. According to Conati (2009), “The interdisciplinary field of intelligent tutoring systems (ITS) studies how to create educational systems that offer individualised instruction, much like many successful teachers.” Intelligent Tutoring Systems (ITSs) have aimed to provide a level of learning effectiveness on par with an apprentice receiving one-on-one guidance from a personal mentor. It was Newell and his student, James Moore, in 1967 who worked on developing an intelligent tutoring system. This educational advancement was taken over

by the Learning Management System in the 1990s. LMS is a software application that helps with the management of digital training content which includes creating, managing, organizing and delivering material in a virtual mode to the learners (Parsad 2020; Fry 2022). Earlier LMS was used for distance or online courses but in the 2010s LMS became a part of the regular education system. With advancing technology, LMSs have been used for teaching, eLearning, testing, assessment, reporting, analytics, discussions, and virtual collaborations. The AI with chatgpt has evolved into ideal machines that are capable of improving themselves by constructing new algorithms that can make predictions and carry out tasks with minimal human oversight (Alpaydin 2016; Mackenzie 2017).

The features of AI chatbots (ChatGPT, Gemini, Jasper, Microsoft Copilot, etc.), such as the ability to understand the text entered by the user, produce text as humans do, and carry out tasks with minimal supervision all with just one command have significantly influenced the teaching and learning process to reform. As educators, we can significantly enhance our pedagogical practices and learning processes by using artificial intelligence. However, this advancement also challenges establishing appropriate boundaries for its implementation within educational environments, applicable to educators and students. The opportunities offered by AI in the educational ecosystem are limitless but along with this it poses various challenges and threats to academic integrity which are discussed below-

Authenticity of Data drawn- When given a command or asked a query, the chatbots analyze the intent of the question and search for knowledge bases available over the internet, including both structured and unstructured documents. With the help of advanced algorithms, it provides us with a relevant answer. As these AI tools rely on sources available online it becomes very significant to check the authenticity of data they provide and the sources they rely upon. AI sometimes creates non-existent, impressive data and citations that contain incomplete or biased falsities; this is called AI hallucinations (Han, Kim, Kim, You, Bae, Yoon, and Yoon, 2023). Many researchers have highlighted that AI produces well written but inaccurate text. As teachers and students are relying upon AI chatbots, it becomes crucial to highlight the importance of provenance and verification. Provenance involves examining the origin and ownership to ensure the content's authenticity and integrity. Verification focuses on evaluating the accuracy and consistency of the data. Verification and Provenance is a complementary procedure that can aid in establishing credibility in media produced by artificial intelligence.

Over-reliance- The benefits of AI are numerous, as it can quickly generate the information or text that is needed. However, this rapid capability has led to a growing dependency among students and teachers. This reliance is not only due to the efficiency of AI but also stems from a psychological mindset that assumes AI produces higher-quality data than the individual can. As a result, teachers and students often turn to AI for quick and immediate solutions to problems, which ultimately hampers their problem-solving and critical-thinking skills**.** This further increases efficiency, leading to overuse, misuse, and abuse (Zhang, Zhao, Zhou and Kim, 2024).

Cognitive dependence- Artificial Intelligence (AI) offers several advantages, particularly in the areas of information retrieval and production. As individuals increasingly rely on AI to locate information, there is a tendency to prioritize access over memory retention. This growing copy-paste culture and dependence on technology can result in cognitive reliance, where people become accustomed to using AI for even simple, routine tasks that they can manage independently. Consequently, this reliance may contribute to a decline in critical thinking skills (Gerlich, 2025).

Hampers cognitive development- Individuals tend to engage with information superficially rather than deeply when cognitive dependence increases. In educational settings where the focus is on developing critical thinking skills, problem-solving, and creativity, students need to engage with information or concepts at a deeper level. This deeper engagement is not possible if students are completely reliant on AI. As a result, they become less proficient in developing problem-solving strategies, conducting critical analysis, and engaging critically, ultimately hindering their cognitive development**.**

Widens Digital Divide- The digital divide results in significant disparities in access to education, particularly as the adoption of artificial intelligence in educational settings accelerates. Numerous individuals lack the financial resources to acquire digital devices and internet connectivity, which hinders their educational progress and exacerbates inequalities. Some institutions struggle to afford the digital infrastructure to integrate AI technologies into the classroom. This limitation can negatively affect the quality of education and increase educational disparities among institutions. Additionally, ongoing maintenance and updates of the infrastructure can be quite costly.

Compromised Integrity- With over-reliance of students on AI for assignments and academic work it becomes challenging for the teacher to assess the work done by them. It also becomes difficult to check the authenticity and originality of work that is being submitted to them. It has been reported that in some cases AI-generated text bypasses plagiarism checkers including Turnitin. Khalil and Er (2023) utilized plagiarism detection tools to assess the originality of 50 essays generated by ChatGPT. The plagiarism reports showed that 40 of the essays generated had a similarity score of less than 20%. The results indicated that ChatGPT can produce text that evades detection by these plagiarism tools.

The challenges associated with artificial intelligence in education are multifaceted and evolve with the advancements in AI technology. Therefore, it is essential to address the potential drawbacks outlined above.

Mitigation Strategies

There are various strategies to overcome the challenges and use AI judiciously **–**

1. Awareness- It is crucial to inform educational stakeholders about potential threats being posed by use of AI in education and it can be used in a judicious way to maximise benefits and reduce threats to academic quality and integrity.

2. Teacher Training- Teachers play a central role in managing their students' use of AI by taking thoughtful actions. They can reduce reliance on AI chatbots by providing more authentic and comprehensive materials. Additionally, when designing assignments, teachers can create questions that encourage

critical engagement with the content instead of merely recalling superficial information.

3. Monitoring- Parents and teachers must regularly monitor students' reliance on AI. This will help manage students' over-dependence on AI chatbots for academic purposes. Additionally, teachers should ensure that students are aware of issues regarding the authenticity and inaccuracies of information that can sometimes be generated by chatbots.

4. Rules and regulations- Stakeholders should establish guidelines for the responsible and ethical use of AI in academic settings. They may define plagiarism limits and consequences for exceeding acceptable limits of plagiarized content to mitigate the culture of copying among students.

5. Collaboration- The development of AI systems in partnership with educational stakeholders represents a significant initiative, as it can promote the ethical application of artificial intelligence.

6. Provenance and verification- Emphasizing the critical importance of governance and verification of data generated by AI is essential to ensure the authenticity, consistency, and integrity of information.

By adopting these strategies, we can minimise the challenges and threats that are posed by AI in education.

Educational Implications-

1. **Curriculum Redesign-** The curriculum should encompass instruction aimed at enhancing awareness and skill development among students and educators regarding the ethics of artificial intelligence, digital literacy, and the skills necessary for data verification.
2. **Stringent measures to ensure academic integrity**- Institutions are required to implement measures that ensure the verification of data authenticity, the detection of plagiarized content, and the originality of the work produced.
3. **Bridging Digital Divide**- It is essential for educational stakeholders and policymakers to prioritize equitable access to digital resources in order to minimize disparities.
4. **Teachers Professional Development**- Teachers must possess a comprehensive understanding of digital literacy and should be informed of the limitations and challenges presented by the emergence of artificial intelligence.
5. **AI Resistant Assignments**- It may not be feasible to develop assignments that artificial intelligence cannot replicate; however, educators may implement strategies to reduce the reliance on AI and inspire students to engage their own creativity.

Conclusion

The potential of artificial intelligence to transform the educational system must not be overlooked. Its application in education is poised to enhance the quality of education by addressing individual needs. However, it also presents challenges related to authenticity, transparency, over-reliance on technology, and the potential for misuse by individuals. It is essential to address these challenges in a responsible manner to mitigate risks that impede both individual growth and broader societal development.

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