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Generative Artificial Intelligence and Learning Needs: Opportunities or Challenges?

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Abstract

Artificial Intelligence (AI) is reshaping every aspect of human life including learning process. AI is engraved in handheld devices and mobile applications as digital companion. However, the proliferation of sense engines that are content creators make researchers to question the quality of learning by students who are frequently using AI. Hence, this paper addresses a fundamental question of whether Gen-AI (Gen-AI) poses opportunities or challenges in students' learning process. This analytical paper adopts a scoping review and PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analysis) approach by identifying and reviewing SCOPUS-indexed publications from 2019 to 2024 on the variables under review. This review is significant for the future of Gen-AI in education. As a way forward, several recommendations are made that there should be institutional guidelines on the use of Gen-AI for learning so that algorithm-generated content aligns with acceptable moral values, and students should always assess whether the generated content satisfies their learning needs rather than giving them quick answers for immediate use.

Keywords: Artificial Intelligence (AI), Gen-AI, Learning Needs, Opportunities and Challenges

Introduction

Despite many opportunities associated with Generative Artificial Intelligence (Gen-AI), teachers have expressed concerns that reliance on Gen-AI for tasks like assignments and research may suppress learners' critical thinking abilities because learners' willingness to engage deeply with challenging tasks may decline. It is for this reason that the application of AI in education

has elicited diverse reactions among teachers and stakeholders, highlighting the need for thoughtful consideration. While proponents of Gen-AI argue that it could elevate the academic experience for students and revolutionize learning, critics usually show concerns about its impact on instructional strategies. Given the foregoing, it is therefore pertinent to study whether Gen-AI presents opportunities or challenges in addressing learning needs.

In spite of the two divergent philosophies on Gen-AI towards learning, researchers have reported that Gen-AI poses both opportunities and challenges to effective learning process (Holmes, Bialik & Fadel, 2019). Xu (2024) argued that AI in education helps tailor learning to each student's needs. This personalised approach may increase engagement and academic success. Gen-AI also streamlines administrative tasks, allowing teachers to concentrate on teaching and supporting learners. However, the reliance on GEN-AI content also raises concerns about authenticity, accuracy, and bias. Moreover, the lack of transparency in AI decision-making processes can make identifying and addressing errors or misconceptions difficult. Therefore, effective implementation of Gen-AI in education requires careful consideration of these challenges. Hence, educators must ensure that Gen-AI-driven tools complement, rather than replace human instruction. The successful integration of Gen-AI in education depends on a complex understanding of the opportunities and challenges it has for the teaching and learning process.

Generative-AI

Gen-AI (Gen-AI) is described as a mythical creature, reminiscent of the dragons of ancient tales, which has only recently hatched with the emergence of Gen-AI at the end of 2022. This powerful digital creature, like a dragon, possesses a body forged from computer processors and a soul woven from intricate algorithms (Bozkurt, 2024). As a human-made technology, its character and nature will be shaped not only by the features it possesses but also by the competencies and skills with which we use it. Gen-AI technology continuously presents features that its users need to learn, unlearn and relearn. Gen-AI algorithms are shaped by observing and imitating human behaviour through learning how the users think and act. This forms the concept of Gen-AI literacy. Artificial intelligence can be described as the act of deploying digital computers to perform typical human tasks (Copeland, 2024). In other words, it is the development of computer systems that can perform tasks that typically require human intelligence. These tasks include learning, reasoning, problem-solving, perception, language understanding, and speech recognition.

Opportunities of Gen-AI for Learning

Gen-AI has emerged as a revolutionary technology, offering unprecedented opportunities in the realm of learning. Its ability to discern meaningful patterns and relationships within vast databases enables the creation of original and innovative artefacts across various mediums, including images, texts, audio, and video. This technology has the potential to transform the educational landscape, revolutionizing instructional strategies and enhancing the overall learning experience for students (Kadaruddin, 2023).

One of the primary advantages of Gen-AI in learning is its capacity for personalized content delivery. Adaptive algorithms can tailor the content to each student's unique strengths, weaknesses, and learning tempo, creating a more engaging and effective learning environment. Furthermore, AI-generated content that is dynamic and interactive can captivate learners, making

education more immersive and fostering deeper engagement. This paradigm shift in curriculum design and delivery has the potential to significantly improve learning outcomes and foster a more dynamic and engaging educational experience. Moreover, Gen-AI can enhance the efficiency and productivity of educators by automating certain tasks, such as content creation, grading, and feedback generation. This frees up valuable time for educators to focus on more meaningful and personalized interactions with students, ultimately enhancing the overall quality of instruction.

Another opportunity Gen-AI offers is that it can significantly enhance personalized learning experiences for students. This is possible through analysing individual learning styles, habits, and progress; this technology can generate customized lesson plans and resources tailored to each student's unique needs. For instance, a language learning app could utilize Gen-AI to create personalized quizzes based on a student's weaknesses and strengths (Pesovski, Santos, Henriques & Trajkovic, 2024). Given the above discourse, it can be deduced that Gen-AI has the potential to bring about a profound sense of satisfaction and joy for learners. This is achievable when the learning experiences are tailored to suit the individual's needs and preferences effectively. In essence, this concept mirrors Aristotle's belief in education as a pathway to ultimate happiness.

Furthermore, Gen-AI can revolutionize content creation for educators. Through natural language generation capabilities, AI can assist in creating high-quality educational materials such as textbooks, lesson plans, and assessments. For example, a history teacher could use a Gen-AI tool to automatically generate engaging study guides for students based on key historical events (Kehoe, 2023). The application of Gen-AI in educational pursuits opens countless possibilities for optimizing learning experiences and improving efficiency by transforming traditional educational practices into a more dynamic and effective method of knowledge acquisition.

In addition to the foregoing, Gen-AI has the capability to effectively contribute towards offering immediate responses to educators and learners. Through the examination of student reactions towards inquiries and tasks, AI has the potential to provide instantaneous feedback that assists in directing students towards increased comprehension and memory retention. Imagine a scenario where an educator of mathematics utilizes AI-driven technology to promptly evaluate the problem-solving abilities of students and furnish tailored feedback to enhance their achievements (Igbokwe, 2023).

Challenges of Gen-AI in Learning Process

While the integration of Gen-AI in education brings numerous opportunities in education, but it inherently diffuses setbacks to both students and teachers. Some of these main challenges are reliance on outdated data, lack of transparency and explainability; moral accountability, and potential for misinformation and disinformation.

Most applications of Gen-AI rely mostly on data and thus, the continued reliance on this kind of AI may pose a significant challenge for quality research and innovation. Another challenge is that of lack of transparency and explicability. Most Gen-AIs are narrow and therefore have limitations which pose challenges in their applicability in the educational context. As AI becomes increasingly integrated into students' lives, questions arise about its moral accountability. Can Gen-AI be held morally accountable for its actions or its users? This

question is critical to full integration of Gen-AI in teaching and learning. The rapid advancements in Gen-AI systems have introduced an unprecedented capacity to produce persuasive fabricated digital content, posing a grave threat to the dissemination of accurate information (Saber et al., 2023). These advanced Gen-AI models can generate hyper-realistic media, including images, videos, and audio, that can effectively deceive viewers and listeners (Horvitz, 2022). Implicitly, this misuse of AI capabilities has far-reaching implications, ranging from misinformation and fraud to national security concerns, such as election manipulation (Horvitz, 2022).

Addressing the Challenges of Gen-AI in Education

The application of Gen-AI into education is met with a plethora of challenges that must be addressed with careful consideration and ethical contemplation. The potential benefits of utilizing Gen-AI in education are immense, from personalized learning experiences to efficient administrative tasks as discussed earlier. However, educators and researchers must not turn blind eyes to the ethical dilemmas that accompany the integration of this advanced technology into the educational systems. As educators rely more heavily on Gen-AI for educational purposes, there is a growing concern about the potential for bias and discrimination in the algorithms that underpin this technology.

If not carefully monitored and curated, Gen-AI has the potential to perpetuate inequalities and reinforce existing biases in educational outcomes. Developers and educators must work together to ensure that the algorithms used in Gen-AI are fair, transparent, and free from bias (Chinta, Wang, Yin, Hoang, Gonzalez, Le Quy, & Zhang, 2024). Another challenge that must be addressed is the ethical implications of delegating important educational tasks to machines. While Gen-AI can undoubtedly streamline administrative processes and provide valuable insights for educators, there is a risk of dehumanizing the learning experience and diminishing the role of teachers in fostering critical thinking and creativity in students (Williams, 2024). Educators and Gen-AI developers must strike a balance between the benefits of Gen-AI and the irreplaceable value of human connection and empathy in education. Therefore, by addressing these concerns head-on, it can harness the transformative power of Gen-AI to enhance educational experiences and empower students to thrive in an increasingly complex and digital world.

Conclusion

The intersection of Gen-AI and learning needs presents both opportunities and challenges for the educational landscape. Educators, policymakers, and technologists must work together to harness the potential of these technologies while mitigating the risks they pose. Educators must approach the integration of Gen-AI with a strong emphasis on ethics and privacy. Through thoughtful consideration and proactive measures, this will pave the way for a future where Gen-AI enhances learning experiences while safeguarding the privacy and rights of all individuals involved.

Way Forward

Based on the foregoing discussions, the following suggestions are made:

1. There should be institutional guidelines regulating the use of Gen-AI for learning so that algorithm-generated content aligns with acceptable moral values.

2. Students, who use Gen-AI should always assess whether the generated content satisfies their learning needs rather than giving them quick answers for immediate submission.
3. There should be ethical screening of the information provided by Gen-AI before its used especially in research.
4. Users of Gen-AI should learn about the basic skills of prompt engineering, as the quality of the output one gets depends on the quality of prompt. These skills include Gen-AI literacy, specificity of prompts and so forth.
5. Geen-AI contents should be subjected to ethical screening by its users such as using Turnitin to avoid issues of plagiarism and similarity index. This could address the ethical concerns labelled aGen-AInst Gen-AI.

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