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AI and the Future of Education in the Classroom

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Artificial Intelligence (AI) has rapidly become a central force in society, including the field of education. The increasing use of AI tools by students in both K-12 and higher education necessitates a reevaluation of curriculum and instructional practices. This article examines the implications of AI for curriculum development and instructional strategies, emphasizing the need for educators and institutions to adapt to the AI revolution.

Keywords: K-12 education, artificial intelligence, higher education, classroom instruction

Artificial Intelligence is defined as a computing system that is able to engage in human-like processes such as learning, adapting, synthesizing, self-correction and the use of data for complex processing tasks (as cited in Crompton & Burke, 2023). AI technology has made its presence known in community grocery stores as self-checkout, telephone automated responses, and Chat-GPT4 to name a few. With this being said, AI technology is already ingrained in the daily workings of society. The question then presents itself as to why AI technology has not made its way into English Language Learner (ELL) and K-12 classrooms. It then becomes imperative for school districts and higher education to develop an understanding of AI technology and how to incorporate AI into daily schooling.

Artificial Intelligence and Education

The question that seems to be at the forefront of the minds of educators is as follows: How will AI impact the future of education and classroom instruction? AI includes four processes that include how a system perceives data, analyzes data, uses data, and improves its intelligence based on the data (Antonenko & Abramowitz, 2023). This is the basis for AI and developing a basic understanding of how to begin the process of implementing AI into the K-12 educational system. Would it be fundamental to incorporate the basic understanding of AI into the curriculum of study thus allowing students to understand how AI is developing within their communities and future workplaces? Another potential aspect of introducing AI into the K-12 classroom would be to incorporate the different types of AI platforms and applications.

Despite recent interest in applications of AI and education, the two fields have intersected for some time, which has long raised important philosophical and ethical questions (Gillani et al., 2023). How much of AI needs to be, or should be incorporated into the K-12 classroom? As technology advances and develops, so shall the technology usage in the classroom. The determining factor would be developing an understanding of implementation of the usage of AI in the K-12 educational setting.

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Classroom Education and Artificial Intelligence

While concerns persist about AI's impact on the workforce, its influence on education and student engagement is equally significant. It is safe to say that computers have been used in education for over 20 years (Beck, Stern, & Haugsjaa, 2025). So, the implementation of AI technology usage in the classroom, would be considered the next step in engaging students. Intelligent tutoring systems have been shown to be highly effective at increasing students' performance and motivation (Beck, Stern, & Haugsjaa, 2025). Students today are living in a futuristic technological era, which means these students fully understand the latest technologies through the video games they play, or the type of cell phone they own; consequently, students of this era should be more likely to benefit from the use of AI in the 21st century classroom.

There will be definite challenges in implementing AI completely into the classroom. One major concern of this implementation is quantifying the amount of AI technology teachers should use with students. Humans are very good at two things that AI tools have not yet mastered: abstract reasoning and learning how to learn (Gillani et al., 2023). The concern of using AI Tools in the classroom would be student dependency upon the AI functions these tools have to offer. Teachers who can facilitate the use of AI-generated tools have the potential to support their colleagues in several areas: (1) planning instruction, (2) creating teaching materials, (3) differentiating curricula, (4) composing personal and professional correspondence, (5) developing assessments and rubrics, and (6) requesting feedback on written content. This underscores the importance of effectively training teachers in when and how to use AI tools in the classroom.

Teacher Education Preparation Programs and AI

The 21st-century classroom is anticipated to operate distinctively compared to its 20th-century predecessor, largely due to the introduction of ChatGPT in November 2022 and other subsequent chatbots. These advancements have initiated discussions on the integration of such technologies, their benefits, and the challenges they present, including ethical concerns that have raised apprehension among educators (Alexandrowicz, 2024). Teachers now face the challenge of ethically and effectively employing AI tools like ChatGPT in their classrooms, which necessitates adequate preparation and training. As AI continues to evolve, educators must learn to navigate its use across various aspects of curriculum and instruction rather than resisting its incorporation (Alexandrowicz, 2024). This creates a pressing need for teachers and future educators to achieve AI literacy. By fostering AI literacy, teachers can better equip their students for a future shaped by AI, improving educational outcomes and providing essential skills for an AI-driven world (Alexandrowicz, 2024).

Research conducted shortly after the launch of ChatGPT indicated that many K-12 educators acknowledged the potential advantages of generative AI in the classroom while expressing significant concern about its possible pitfalls (aiEDU, 2023). This underscores the necessity for teacher preparation and professional development regarding the effective implementation of AI tools in the K-12 curriculum. Additionally, current K-12 educators should receive appropriate professional development on AI tools adopted by their districts. University teacher preparation programs must also incorporate AI tools into their curricula to prepare teachers for contemporary classrooms. A report by Bryant et al. (2020) suggested that AI could initially benefit teaching roles by alleviating low-level administrative burdens (as cited in Alexandrowicz, 2024). Consequently, it is essential for teachers, administrative staff, and school leaders to become comfortable using AI tools before students do.

The first step in preparing educators and administrators to utilize AI tools effectively involves developing AI literacy. This process begins with understanding fundamental AI concepts such as large language models (LLMs), machine learning, and natural language processing (Alexandrowicz, 2024). Teachers and future educators must cultivate the ability to recognize both machine and natural language to assess whether AI tools are being ethically employed in assignments. Teacher preparation programs should provide opportunities for participants to analyze diverse text data, learning to identify patterns of language, which will help them detect unethical AI usage in their classrooms. Since the launch of ChatGPT in 2022, educators have grappled with whether to embrace or resist AI in teaching and learning. With proper training and practice, teachers will likely be more inclined to implement AI tools in their instructional practices.

AI and Higher Education

Higher Education is no stranger when it comes to the usage of AI generated tools. As the K-12 sector, higher education encountered similar challenges of whether implementing AI-generated tools in courses outside computer science courses would be proven beneficial to students. This was soon put to rest as the work force quickly changed that perspective with the implementation of AI. This increased the demand on universities and colleges to have not only their student population AI literate, but faculty and staff as well. The same apprehensions teachers had for the K-12 sector with the implementation of AI generated tools paralleled the concerns of faculty and staff at universities. College professors remain concerned about students using generative AI such as ChatGPT to cheat in class; a growing number of faculty have chosen to encourage its limited use in classroom assignments (Alexandrowicz, 2024).

Even with doubts and apprehension, colleges and universities must move forward with the times. AI plays an increasingly prominent role in enhancing learning processes and improving accessibility in the field of education (Bora & Kolemen, 2025). Making it essential for colleges and universities to develop methods of implementation of the usage of AI generated tools effectively and ethically. According to Complete College America (2025), three universities did this by finding ways to have their students, faculty and staff become AI literate and use AI generated tools effectively. The universities of Louisiana, Massachusetts Lowell, and Arizona State implemented three different methods to involve students, faculty and staff in becoming AI literate on their campuses. University of Louisiana, chose to launch the AI literacy Microcredential program, that was designed to provide foundational AI knowledge to all students within the university (Complete College America, 2025). The program offered for free, allowed students, staff, and faculty to complete a self-paced course that was approximately 16 hours. The course offered a tool-agnostic curriculum, focusing on broad AI concepts rather than specific tools, ensuring the content remained relevant as AI technology evolved (Complete College America, 2025). While the University of Massachusetts Lowell, took the approach of launching a Mini-Grant Program, that offered faculty $1000 in mini-grants to experiment with using AI-generated tools in their courses; an additional $500 was offered if both students and faculty collaborated using AI-generated tools. Lastly, Arizona State University, launched an AI Innovative Challenge to encourage both faculty and staff to propose AI-driven projects that could reshape teaching, learning, and research.

These universities understood the value of AI-generated tools and designed ways to implement its usage into higher education. Moreover, universities will begin to put into place standards and criteria for the usage of AI-generated tools on campus and in the classroom. Overall, AI-generated tools are beneficial at both higher

education and K-12 education, but can AI generated tools hinder students' motivation, by over usage of AI-generated tools? Bringing into question, the future of AI-generated tools and education.

AI and the Future of Education

AI and the future of education is definitely a concern across school districts and college and university campuses. The integration of artificial intelligence (AI) in K-12 and Higher Education presents a paradigm shift requiring fundamental changes in curriculum design, course development, instructional practices, and teacher preparation (Joshi, 2025). AI-generated tools offer numerous benefits, such as automated assessment, language translation support, and personalized learning experiences (as cited in Melisa et al., 2025). However, concerns arise as to whether AI-generated tools will diminish a students' ability to think critically. There are variations of thought concerning whether AI-generated tools diminish or enhance critical thinking abilities among students. The overreliance on ChatGPT may diminish analytical thinking skills and impact students' cognitive abilities, particularly in critical thinking (as cited in Melisa et al., 2025). Critical thinking is defined as the ability to evaluate information, make reasonable judgements, and arrive at sound decisions which is a key component of both higher education and K-12 education, curriculum and instruction.

Teacher preparation programs and teacher training are vital in preparing for a future with AI-generated tools in the college/university courseroom, and K-12 classroom. With the escalation of AI advancements, the global market for AI education is anticipated to grow rapidly from $5.2 billion reported in 2024 to $112.3 billion by 2034 (Kulesa et al., 2025). This would require the proper training of K-12 teachers to effectively use AI-generated tools to enhance instruction and improve student learning outcomes. This would mean that at the university and college level, staff, faculty and students would also need to be trained in order to ethically, and effectively use AI-generated tools to improve their learning experience, and prepare students for the workforce. Most of the current research is surrounding the use of ChatGPT, and there remains a lack of systematic analysis of its direct impact on students' critical thinking skills.

Critical thinking is a rational and reflective skill focused on assessing beliefs and making informed decisions (Ennis, 2018) which would require educators, and administrations to focus on what AI-generated tools would be the most effective in developing, supporting and improving critical thinking.

Conclusion

The rapid advancement and integration of Artificial Intelligence (AI) technologies have significantly transformed the landscape of education at both K-12 and higher education levels. As illustrated throughout this article, the necessity for educators to adapt curriculum and instructional practices to incorporate AI-generated tools is becoming increasingly pressing. While AI has the potential to enhance learning experiences through personalized instruction, automated assessments, and improved engagement, it also presents challenges, including ethical concerns and the risk of diminishing students' critical thinking abilities.

Furthermore, the importance of cultivating AI literacy among both teachers and students cannot be overstated. Effective teacher preparation programs must equip educators with the knowledge and skills to integrate AI tools ethically and successfully into their classrooms, thereby preparing students for a future inevitably shaped by these technologies. As the landscape of education continues to evolve, it is essential for educational institutions to foster an innovative and forward-thinking approach to AI implementation.

In conclusion, embracing AI in educational settings offers valuable opportunities to enhance teaching and learning processes. However, ongoing research and systematic analysis are needed to understand the long-term implications of AI on critical thinking and overall student development. By addressing these challenges and cultivating a culture of adaptability and growth, the educational community can harness the benefits of AI while ensuring that students develop the fundamental skills necessary for success in an increasingly complex world.

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