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# Teacher Education in The Age of Artificial Intelligence: A SWOC Analysis

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**Abstract**

*Teaching - learning in all educational environment is changing due to the result of the development of artificial intelligence (AI). Using a SWOC analysis, this essay assesses the potential, challenges, possibilities, and shortcomings of artificial intelligence in educational settings. Intelligent tutoring systems, machine learning, and natural language processing, generative tools like ChatGPT are examples of AI technologies that has a great assurance for enhancing the effectiveness of instruction by promoting individualized learning, and supporting teachers with data-driven insights and automation. In language education, the switch from Computer-Assisted Language Learning (CALL) to Intelligent CALL has improved learner-computer interaction and expanded access to learning resources. However, significant obstacles to broader adoption include worries about job loss, algorithmic bias, ethical issues, and educators' lack of digital proficiency. Even while AI offers revolutionary opportunities for adaptive learning and educational innovation, its integration requires careful consideration of ethical, pedagogical, and societal repercussions to guarantee that it improves rather than replaces human-centered teaching.*

**Keywords: teacher education, Artificial Intelligence (AI), strengths of AI, weaknesses of AI, opportunities of AI, challenges of AI.**

## Introduction

The rapid development of AI approaches and the ongoing introduction of new technology can enhance and improve teaching strategies. AI discovers ways and means for improving the acquisition of information, and manipulation, use the environments in which learning occurs. As a result, it helps teachers in improving the efficacy and fostering the individualized learning of students. As a result, it is crucial to comprehend what and how Artificial Intelligence techniques might be applied to accomplish educational objectives. Specifically, creating accessible, economical, effective, and efficient instruction is a long-term goal of education (Woolf B. P., 2009) quoted by Yang, J., & Zhang, B. (2019). Artificial intelligence is broadly defined and understood as computers performinhg cognitive tasks associated with human minds, and particularly learning along with problem solving capacity. We have chosen a broad capability-based definition for a number of reasons. First of all, the term Artificial Intelligence does not mean to refer to a specific technology these days because it serves as a general word for a variety of technologies, machine learning, neural networks, algorithms, and applications. Because of this, defining it just from a technological perspective is rather challenging. (Baker, T., & Smith, L., 2019).

The teacher education field is not an exception to the transformational power of generative artificial intelligence tools like Microsoft Copilot, ChatGPT, and Bard (Nyaaba, 2024b). Generative artificial intelligence has enormous potential to improve learning overall and completely transform how educators engage with their pupils (Susnjak, 2022; Zhai, 2024) cited by Akanzire, B. N., Nyaaba, M., & Nabang, M. (2025). The potential to revolutionize a variety of industries, GenAI has become a game-changing technology. GenAI is a machine learning framework that analyzes current digital content, including text, audio, movies, photos, and graphics, to create artificial innovations with ease (Baidoo-Anu & Ansah, 2023; Zhai, 2023) cited by Akanzire, B. N., Nyaaba, M., & Nabang, M. (2025).

Generative artificial intelligence (AI) technologies, such as ChatGPT, have advanced quickly since 2022 and demonstrated great promise in a range of downstream tasks (Bengesi et al., 2024; Lin et al., 2022) quoted by Xiao, T., Cheng, G., & Ling, M. H. (2025). Tools like chatbots, data-driven decision support systems, AI-assisted learning platforms, and learning behavior analysis tools, scholars have increasingly investigated how these AI technologies can improve the teaching and learning process (Tang et al., 2023, Zhang & Aslan, 2021). The education sector is actively investigating the possibility of AI revolutionizing teaching (Xiao, T., Cheng, G. & Ling, M. H., 2025) quoted by Xiao, T., Cheng, G., & Ling, M. H. (2025). Students can engage with AI in dialogue-based teaching systems that leverage natural language processing to foster knowledge co-creation. Numerous applications of AI in classroom settings have been studied in research on its deployment in education, emphasizing the benefits it provides for student learning (UNESCO, 2021) quoted by Chan, C.K., & Tsi, L.H. (2023).

**Strengths of AI**

Artificial intelligence can mimic human thought processes and analyze large amounts of data to generate intelligent solutions. Because of this ability, it has a lot of potential for use in education, changing traditional teaching methods, improving teaching efficacy, and meeting the needs of individualized learning (Tan, X.Y. et al., 2024). Jiarong Fan and Shaochun Zhong (2023) has stated that technology of AI has paved the way for the digital transformation in classroom teaching and bringing new concepts along with the practical approaches in blended learning environment. The use of this technological assistance not only increases the effectiveness of instruction in the classroom but also piques students' interest in learning (Tan, X.Y. et al., 2024).

Language studies and particularly foreign language education can benefit greatly from today's AI. The shift from CALL to ICALL has been found to be inevitable and brought a considerable change in the quality of student-computer interaction (Kannan and Munday, 2018). Artificial intelligence can be implemented through different of methods, expert systems, and NLP, and machine learning techniques that leads to learning. AI is fundamentally about building machines that can imitate human behavior and cognition, including learning and problem-solving (By Chat-GPT December 10, 2022) quoted by Pavlik, J.V. (2023).

Language translation based on Artificial intelligence technologies such as Google Translate made considerable advances in aiding the learners of second language and foreign language. As of May 2017, Google Translate served more than 500 million users every day and supported more than 100 languages at different levels. Given the pervasive availability of this translation service, second language learners are tapping into it to boost their learning beyond the classroom (Kannan & Munday, 2018). According to Nedelkoska and Quintini (2018), employment in the field of driving, construction, food preparation, and agricultural labor will be the first to disappear as a result of artificial intelligence by 2030.

**Weaknesses of AI**

The growing application of AI, however, does not mean broad acceptance and implementation in all sectors in higher education (Yu, 2020). With reports indicating that 400 - 800 million jobs will be displaced by 2030 owing to AI and automation (Bughin et al., 2017; Smithies, 2017) cited by

Hutson, J. etal., (2022). By giving teachers and students access to tools that enable quicker responses to what and how students are learning as well as how they feel about the experience, AI education offers the potential to provide more individualized, inclusive, flexible, and engaging learning (Schiff, 2021; Taneri, 2020). Deep learning, Machine learning, Natural Language Processing, Pattern Recognition, Computer vision, and Neural networks are just a few examples of the algorithms, software, and tools that instructors need to start teaching their students (Hutson, J. etal., (2022). Polls conducted recently have indicated major concerns over the ethical usage of Artificial Intelligence. For instance, 68% of higher educated professionals highlighted issues about ethics in AI, while 67% cited concerns about algorithmic prejudice (Brooks, 2021).

Ayling, J., & Chapman, A. (2022). make the parallel comment that, since lack of transparency and accountability, unfairness, and bias continue to be major problems in the field of AI, identified gaps in the ethics of AI may be filled by increasing the number of stakeholders involved in the creation of ethics based Artificial Intelligence tools. stakeholders presents different challenges at the level of organizations building AI systems, since it is time and resource expensive and demands specialized types of expertise not necessarily present in developer teams (Thuermer, G. et al. 2021) cited by Ayling, J., & Chapman, A. (2022).

**Opportunities of AI**

The study and development of ideas, techniques, and technologies, application systems which enhance, and broaden human intelligence is known as artificial intelligence (AI), a technical science. With the rapid growth of information technology, artificial intelligence has entered different industries and its use in the field of education is becoming increasingly ubiquitous, helping to support the digital transformation of education (Tan, X.Y. et al., 2024).

Teachers may lessen their burden, learn more about their pupils, and innovate in the classroom with the aid of teacher-facing AIEd. It helps teachers in a number of ways, such as automating activities (including assessment, plagiarism detection, administration, or feedback), giving them insights on a student's or class's progress, and encouraging them to try new things. (Baker, T., & Smith, L. 2019).

The main goal of education is to comprehend and facilitate teaching and learning. Since communication, curriculum design and course design, assessment, motivation all have an impact on teaching and learning of learners, it concentrates to how to teach and learn. The constant introduction of new technologies and the quick development of AI methods can enhance and improve teaching strategies. AI approaches may uncover ways for increasing the acquisition of knowledge, manipulation of knowledge and utilization of knowledge and the environment where learning is found to take place. Hence, they may help instructors improve their effective teaching and promote students' individualized learning (Woolf B. P., 2009) quoted by Yang, J., & Zhang, B. (2019). As AI technology develops, it holds great promise for intelligent administrative and support systems, real-time feedback, and tailored and adaptive learning (Renz & Gronau, 2020).

**Challenges of AI**

With the recent debut of ChatGPT (OpenAI, 2023), a generative AI software that can generate human-like responses to a wide range of topics and the expanding capabilities of AI technologies, the question of whether AI can entirely replace the work of teachers is becoming more serious.(Chan, C.K., & Tsi, L.H. , 2023). Powerful AI may mimic human cognitive processes and AI tools may think like humans have not been proved right. In the future, it is still unclear if machines may think or become conscious on their own. Many writers concur that the development of such powerful AI is unlikely to occur anytime soon (Pokrivcakova, S., 2019).

When the MOOC took up the experiment of helping learners on at a large scale through OERs in early 2000s, AI's effect in second language education saw a pause. Although the MOOCS provided a much-needed alternative to the very expensive cost of higher education that is in the US and abroad, they

had significant shortcomings in terms of engagement, peer learning, legitimate scaffolding, and large-scale outreach to learners around the world. These limitations have slowed down the MOOC movement when it comes to giving education on a big scale (Kannan, J. & Munday, P., 2018).

AI's future is unknown. Artificial intelligence and machine learning are sometimes used synonymously due to the rapid global expansion of machine learning algorithms (Baker, T., & Smith, L., 2019). Turovsky (2016) has noted that Machine translation from Google, which uses statistical machine translation rather than grammatical norms, has been harshly criticized for accuracy difficulties, however. Improvements in accuracy and fluency were noted in more recent iterations of Google Translate (Kannan, J. & Munday, P., 2018).

Concerns have been raised on whether AI will replace human labor or serve more as a tool to increase human potential (Pavlik, J.V., 2023). It is understood that Artificial intelligence systems is found to have the potential to replace human-labor in various industries and media, due to their capacity to analyze massive volumes of data and performing jobs rapidly and effectively. However, others claim that AI is not yet advanced enough to totally replace human journalists and media professionals, and that it is likely to complement and enhance their work rather than replace it (By ChatGPT December 10, 2022) mentioned by (Pavlik, J.V., 2023). However, widespread acceptability and adoption in all higher education sectors are not implied by the growing use (Yu, 2020). According to reports, automation and artificial intelligence will eliminate 400–800 million jobs by 2030 (Bughin et al., 2017; Smithies, 2017), quoted by Hutson, J. et al. (2022). As a result, every new development is greeted with some reluctance.

## Conclusion

Artificial intelligence has emerged as a potent catalyst for innovation in education, delivering major benefits in individualized learning, instructional efficiency, and digital transformation. The study demonstrates how, with proper application, AI may enhance teaching methods, support educators, and boost student interest. However, ongoing issues—like moral dilemmas, prejudice, a lack of openness, job relocation, and unequal access—highlight the necessity of adopting policies carefully and responsibly. Instead of being viewed as a possible teacher replacement in the near future, AI should be viewed as an additional instrument that improves human competence. To solve these concerns, policymakers, educators, technologists, and other stakeholders must collaborate to develop ethical frameworks, finance capacity building, and ensure equitable access. Ultimately, maintaining the vital role that educators play in the learning process, upholding human values, and aligning technological capabilities with educational goals are all necessary for the successful integration of AI into education.

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