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Challenging the Status Quo and Exploring the New Boundaries in the Age of Algorithms: Reimagining the Role of Generative AI in Distance Education and Online Learning

Aras Bozkurt, Ramesh C Sharma

Abstract: Generative AI is here to stay, and we need to explore the potential role of these technologies in distance education and online learning, considering both the benefits and challenges. With many potentials such as customized learning experiences, intelligent tutoring, automated grading, content creation, and personalized career advice, there are also a wide range of challenges such as bias in data and algorithms, lack of transparency, overreliance on AI, data privacy and security, access and equity, automation, and singularity. Based on these considerations, generative AI requires enhancing the scope of current educational roles or adopting new ones, such as facilitators of learning, curators of learning resources, designers of learning experiences, and assessors of learning. Though distance education and online learning are mostly attributed spatial and temporal distances, generative AI should also be considered in terms of transactional distance. While the use of generative AI has the potential to decrease the transactional distance, educators still can play a crucial role in bridging this gap by providing personalized support and guidance throughout the learning process not only in terms of pedagogical aspects, but also from the perspective of pedagogy of care and human-centered learning design.

Keywords: generative artificial intelligence (AI), artificial intelligence in education (AIEd), online learning, distance education, transactional distance

Highlights

What is already known about this topic:

- AI is a fast-advancing field with implications in the educational landscape.
- Generative AI offers many tasks conducted by humans.

What this paper contributes:

- This article offers a critical perspective on the roles of AI in distance education and online learning.
- This paper presents provocative ideas about the roles of humans in the educational landscape.

Implications for theory, practice and/or policy:

- Educators can adopt their new roles to fully benefit from the potential of generative AI.
- Generative AI can lessen transactional distance by increasing the dialogue and autonomy and lessening the structure, which further requires redesigning the learning.
- Against the wide use of generative AI, there is a need to prioritize pedagogy of care and human-centered learning design.

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Introduction: Towards New Chapters

"How will you add value in the era of generative AI? If you aren't attempting to answer this question now by choice, it will ultimately be answered for you by force."
— Hendrith Vanlon Smith

By the advent of 2023, we have seen a surge of interest in "generative AI" - a subset of artificial intelligence that is capable of creating new content, rather than simply following pre-programmed rules (Bozkurt et al., 2023; Crawford et al., 2023; Tlili et al., 2023). Though some missing conversational depths were reported (Skjuve et al., 2023), from chatbots that can carry on realistic conversations to machine and deep learning models that can generate entire works of art or music, generative AI is transforming the way we think about creativity and innovation (Tlili et al., 2023). Most importantly, generative AI is able to use the most sophisticated technology developed by humans, namely languages (Bozkurt, 2023). If that is the case, what role does generative AI have in education?

Related Literature: From Generic AI to Generative AI

"Success in creating AI would be the biggest event in human history. Unfortunately, it might also be the last, unless we learn how to avoid the risks."
– Stephen Hawking

Numerous studies have reported the benefits of using artificial intelligence (AI) in education, with AI being applied in online higher education to predict student performance, satisfaction, and learning status, recommend resources, automatically assess student work, and enhance the overall learning experience (Ouyang et al., 2022). The main areas of research in big data and AI focus on evaluating and measuring performance, providing personalized learning, and implementing highly targeted and accurate education (Luan et al., 2020). Crompton et al. (2022) conducted a study on AI applications in K-12 settings and identified three primary themes of AIEd related to pedagogies (e.g., gaming, personalization), administration (e.g., diagnostic tools), and subject content. However, there are several challenges associated with implementing AIEd in K-12 settings, including negative perceptions, lack of technology skills among teachers and students, ethical concerns, and difficulties related to the usability and design of AI tools. In another systematic review, Bozkurt et al. (2021) identified various areas of AIEd research, including adaptive learning and personalization through AI-based practices, deep learning and machine learning algorithms for online learning processes, educational human-AI interaction, educational use of AI-generated data, and the use of AI in higher education. Chu et al. (2022) report that predictions of students' learning status (including dropout and retention, student models, and academic achievement) are most frequently discussed in AI in higher education studies. AI technologies most often play the role of profiling and prediction in higher education, followed by intelligent tutoring systems and assessment and evaluation. In terms of research issues, the most frequently discussed issues are learning behavior, accuracy, sensitivity and precision, cognition and affect (Chu et al., 2022). However, students' higher order thinking skills, collaboration or communication, self-efficacy or confidence and skills are less frequently discussed in AI in higher education studies (Chu et al., 2022). Ouyang et al. (2022) discovered that AI applications in online higher education serve various functions, such as predicting learning status, performance or satisfaction, resource recommendation, automatic assessment, and enhancing the learning experience. The researchers also found that traditional AI technologies are more commonly utilized, and advanced techniques such as genetic algorithms and deep learning are less frequently applied. Finally, Dogan et al. (2023) reported that (1) educational data mining, learning analytics, and artificial intelligence for adaptive and personalized learning, (2) algorithmic online educational spaces, ethics, and human agency, and (3) online learning through detection, identification, recognition, and prediction are the leading research themes in the use of AI in online learning and distance education processes.

However, the above studies have a special focus on the use of traditional AI practices. Some other recent studies, from the perspective of education, specifically focused on generative AI which refers to AI algorithms that generate new outputs based on the data they have been trained on. For instance, Tlili et al. (2023) argue for the need to integrate AI-driven innovations into a novel pedagogical approach that prioritizes ethical, personable chatbots and enhances digital proficiency to leverage the potential benefits of AI. They emphasize the importance of including AI literacy as a crucial technological competency for the 21st century. Bozkurt et al. (2023) suggest redefining the roles of human educators and AI in education to take advantage of the capacity of AI to assume more educational tasks. Bozkurt et al. (2023) reported that generative AI provides opportunities for personalized learning, inclusive curriculum, collaboration, automated assessment, accessibility, language skills, and availability 24/7. However, as reported by Bozkurt et al. (2023), it also presents challenges such as algorithmic bias, reliable knowledge sources and quality control, inequality in access, lack of creativity and critical thinking, manipulation, human agency, teacher replacement, privacy and ethics concerns, technical complexity, and dependence on technology.

Reimagining the Roles of Educators and Educational Institutions

"I cannot teach anybody anything; I can only make them think."
– Socrates

We are going through a process of change that we cannot ignore and educational institutions need to embrace the change emerging from the advent of generative AI. Meanwhile, educators must adopt new roles to facilitate this transition fully. That being said, generative AI has the potential to transform distance education and online learning in many ways, including reimagining the roles of educators and universities. The following issues can be considered as the main issues to consider and approach critically:

- Customized learning experiences: With the help of generative AI, educators and universities can create customized learning experiences for students. This could involve creating personalized learning paths, adapting content to suit different learning preferences, and providing targeted feedback to help students improve their performance.
- Intelligent tutoring: Generative AI can be used to create intelligent tutoring systems that can help students learn more effectively. These systems can adapt to the student's pace, provide feedback and support, and even anticipate the student's needs proactively before they ask for help.
- Automated grading: Generative AI can automate the grading process, allowing educators to spend more time on teaching and providing feedback. This could also help to reduce bias in grading and improve consistency.
- Content creation: Generative AI can be used to create educational content such as videos, interactive simulations, and assessments. This could help to reduce the time and cost of creating educational materials, while still providing high-quality content to students.
- Personalized career advice: Generative AI could be used to provide personalized career advice to students based on their interests, skills, and goals. This could help students make more informed decisions about their future careers.

While generative AI has the potential to revolutionize distance education and online learning, there are several challenges that need to be addressed. These challenges range from ethical concerns to technical expertise, and will require careful consideration and planning on the part of educators and universities. Some of the main issues can be considered as follows:

- Bias in data and algorithms: One of the biggest challenges of generative AI is the potential for bias in both data and algorithms. This could result in unfair or inaccurate predictions and recommendations, which could have serious consequences for students. To address this

challenge, data sets used for training AI models should be diverse and inclusive, and algorithms should be regularly audited for bias.

- Lack of transparency: Generative AI models can be complex and difficult to understand, making it challenging for educators and students to trust the recommendations they receive. To address this challenge, there is a need for increased transparency and explainability in AI-based systems. Educators and students should be provided with clear explanations of how AI-based systems work, and why they are making specific recommendations.
- Overreliance on AI: Generative AI can be incredibly powerful, but there is a risk of overreliance on these systems. Educators and students may become too reliant on AI-based recommendations, potentially leading to a lack of critical thinking and independent learning. To address this challenge, AI-based systems should be used as a tool to support learning, rather than as a replacement for human expertise and judgment.
- Data privacy and security: Generative AI relies on large amounts of data to train models and make recommendations. This raises concerns about data privacy and security, particularly in the context of distance education and online learning. To address this challenge, data should be collected and stored in a secure and ethical manner, and appropriate safeguards should be put in place to protect the privacy of students and educators.
- Access and equity: There is a risk that the use of generative AI could exacerbate existing inequities in access to education. Students from marginalized communities may not have access to the technology or resources required to fully participate in AI-based learning experiences. To address this challenge, educators and universities must work to ensure that AI-based systems are accessible to all students, regardless of their background or socioeconomic status.
- Automation: While automation has the potential to improve the efficiency and effectiveness of distance education and online learning, it also raises concerns about the displacement of human labor. As generative AI systems become more sophisticated, there is a risk that they could replace human instructors and support staff, leading to job losses and a lack of human interaction in the learning process. This could also lead to a widening of the digital divide, as students without access to AI-based learning systems may be at a disadvantage.
- Singularity: The potential for generative AI to achieve singularity raises ethical concerns about the role of humans in the learning process. If AI becomes more intelligent than humans, it could potentially make decisions and take actions without human oversight or control. This could have unintended consequences for students, leading to biased or discriminatory outcomes, or even harm. Furthermore, the potential for AI to develop its own goals and values could lead to conflicts with human values and ethical principles.

In terms of the roles of educators and universities, these changes could lead to a shift away from traditional teaching methods and towards more personalized, adaptive, and student-centered approaches. Upon considering the above issues, it is also important to focus on learning analytics through the use of educational technology (Bozkurt & Sharma, 2022a; Pelletier et al., 2021) so that AI applications can benefit from existing knowledge in theory and practice. However, these considerations should be taken into account as a part of larger strategies such as digital transformation processes so that it affects the broad educational ecosystem (Bozkurt & Sharma, 2022b). In short, current changes force educators and universities to focus more on guiding and supporting students, rather than merely delivering content. They may also need to develop new skills related to working with generative AI including new literacy types (Bozkurt et al., 2023; Tlili et al., 2023).

The possibilities that emerge with generative AI also lead to a widening of the scope of existing roles or the emergence of new roles for educators in the educational landscape. Some of these roles can be considered as follows:

- Facilitators of learning: With the use of generative AI to automate many of the traditional tasks of educators, such as content creation and grading, educators may shift towards a more

facilitative role in distance education. This would involve guiding and supporting students through their learning journey, providing personalized feedback and support, and helping students to make connections between different concepts and ideas. Such a practice is also helpful to promote lifelong learning by equipping students with the necessary skills.

- Curators of learning resources: As generative AI continues to improve, it could potentially be used to curate learning resources for students, such as recommended readings, videos, and interactive learning activities. Educators could play a role in selecting and curating these resources, ensuring that they are high-quality and aligned with learning objectives. Educators can also act to ensure the quality assurance of these contents along with acting a role to benchmark the reliability and validity of learning contents.
- Designers of learning experiences: With the use of generative AI to create personalized learning experiences, educators could shift towards a more design-oriented role in distance education. This would involve designing learning experiences that are engaging, interactive, and tailored to the individual needs and preferences of students.
- Assessors of learning: While generative AI can be used to automate the grading process, educators will still play a role in assessing student learning and providing feedback. This could involve reviewing the feedback generated by AI systems and providing additional insights and suggestions for improvement.

Based on the aforementioned issues, it can be argued that the advent of generative AI has the potential to shift the roles of educators and universities in distance education towards a more facilitative, design-oriented, and personalized approach to learning.

Redefining Transactional Distance

"Distance doesn't matter when you have a good communication system."
– Falak Jan Enayat

Transactional distance is a concept that was introduced by Moore (1997; 2013) to describe the psychological and communication space that exists between learners and educators in distance education. It refers to the degree of separation between learners and educators, as well as the level of interactivity and feedback that exists between them. In the context of generative AI, transactional distance can be impacted in the following ways:

- Dialogue: Generative AI has the potential to enhance the dialogue between students and instructors by providing personalized feedback and support. With the help of AI-based tutoring systems, students can receive immediate feedback and support, which can help to reduce the perceived distance between students and instructors. Furthermore, AI-based chatbots and virtual assistants can provide students with answers to common questions and concerns, reducing the need for them to wait for a response from instructors.
- Structure: Generative AI can help to create organized learning experiences to decrease structural barriers. For example, AI-based systems can be used to create personalized learning paths for students, ensuring that they are exposed to the right content at the right time. Additionally, AI-based assessment systems can help to provide more consistent grading and feedback, which can help to reduce the perceived transactional distance between students and instructors.
- Autonomy: Generative AI can also help to increase the autonomy of students in distance education settings. With the help of AI-based systems, students can have more control over their learning experiences, choosing when and how they want to learn. Additionally, AI-based career advice systems can provide students with personalized guidance and support, helping them to make informed decisions about their future careers.

Generative AI has the potential to reduce the perceived transactional distance between students and instructors in distance education settings by enhancing the dialogue, structure, and autonomy of learning

experiences. By leveraging the power of AI, educators and universities can create more engaging and personalized learning experiences that help students to feel more connected to their instructors and peers, and ultimately improve their academic performance. However, it's important to note that the impact of generative AI on transactional distance will depend on how it is implemented. For example, if generative AI is used to create personalized learning experiences and provide targeted feedback, it could potentially decrease transactional distance by improving the quality and frequency of communication between learners and instructors. In brief, while the use of generative AI has the potential to decrease the transactional distance, educators still can and should play a crucial role in bridging this gap by providing personalized support and guidance throughout the learning process not only in terms of pedagogical aspects, but also from the perspective of pedagogy of care and human-centered learning design.

Conclusion

The rise of online learning and distance education has created new opportunities and challenges for educators, learners, and policymakers. Generative AI has been hailed as a potential solution to some of these challenges, offering personalized and adaptive learning experiences that can be tailored to the needs and preferences of each student. On the other hand, there are also significant risks and limitations associated with the use of generative AI in this context. Therefore, it is important to approach the use of generative AI in online learning and distance education with a critical and reflective stance, and to carefully consider the potential trade-offs between efficiency and effectiveness, personalization and privacy, and innovation and tradition. Ultimately, the use of generative AI in online learning and distance education should be guided by a commitment to the core values of education, such as equity, diversity, and inclusivity, and a recognition of the complex and dynamic nature of the educational landscape in the digital age. Only by doing so can we ensure that generative AI is used in ways that support, rather than undermine, the core goals of education in the digital age. It is for sure that the status quo of education in general, and distance education and online learning in particular, was challenged, and we are about to start a new journey to explore the new boundaries of the educational landscape. However, before we embark on this journey, we must evaluate the opportunities and challenges posed in this work and answer critical questions in order to better navigate our way.

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About the Author(s)

- Aras Bozkurt; arasbozkurt@gmail.com; Anadolu University, Turkey. https://orcid.org/0000-0002-4520-642X
- Ramesh C. Sharma; rc_sharma@yahoo.com; Ambedkar University Delhi, India. https://orcid.org/0000-0002-1371-1157

Author's Contributions (CRediT)

Aras Bozkurt: Conceptualization, Methodology, Visualization, Writing – original draft, Writing – review & editing; Ramesh C Sharma: Writing – original draft, Writing – review & editing.

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Because this study doesn't involve any living entities, an ethics review is not applicable.

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