


Chapter 17

Challenges and Opportunities of Integrating Generative Artificial Intelligence in Higher Education: A Systematic Review

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ABSTRACT

Generative artificial intelligence (GenAI) is an emerging technology that has significantly transformed the interaction between humans and machines. GenAI has the capacity to create content such as text, images, and videos, and it even uses human language. In the educational field, tools such as ChatGPT stand out for their ability to maintain coherent conversations, simulating human interactions. This study aims to offer a comprehensive and critical view of the convergence of GenAI and higher education. To this end, a systematic literature review has been carried out following the PRISMA protocol through the WoS and Dialnet databases. The analysis focuses on understanding the role of GenAI in this context, identifying both the opportunities and challenges associated with its implementation. The results of the study highlight key challenge areas, promising trends, and future prospects. Likewise, the effects of GenAI on students and teachers are analyzed, paying special attention to the ethical and social implications that accompany its integration into higher education.

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INTRODUCTION

Generative Artificial Intelligence (GenAI) has become crucially important in the contemporary world, transforming key sectors such as education and learning by opening new and innovative opportunities for learning (Sánchez-Prieto et al., 2024). This growing impact is due to the role that companies and organizations have given in this technology to optimize their processes and services, making it a strategic tool with global reach. GenAI's ability to profoundly influence daily and professional life lies in its ability to perform human tasks more quickly and accurately, automating processes and increasing operational efficiency. This automation potential not only improves productivity but also redefines the way decision-making is carried out. Thanks to its learning capacity, accuracy and precision, GenAI is positioned as an invaluable resource in the management and analysis of large volumes of data. It can process complex information in real time, allowing it to identify patterns, generate relevant insights and optimize results. This level of analysis not only saves time but also promotes more informed and strategic decision-making. Ultimately, AI is not only transforming sectors such as education and learning, but it is redefining the very foundations of efficiency and innovation in multiple areas, consolidating itself as a driving force in the evolution of modern societies. In this sense, according to Kostopoulos and Kostopoulos (2021), GenAI has a key role to play in revolutionizing education by personalizing learning, providing educators with tools to improve teaching. However, it also poses ethical and practical challenges that need to be addressed (Bostrom & Yudkowsky, 2014). For Celik (2023), the use of technology in education over the past ten years has changed several aspects of learning. In this sense, making educational resources more easily accessible, expanding the reach of higher education outside of typical classroom settings, also creating new opportunities for both teachers and students. For example, by leveraging the potential of GenAI to improve teaching methods, the learning experience, or purely administrative tasks (Kshetri & Voas, 2024). Also, by providing personalized learning experiences for students or improving instructional processes for teachers (Sun & Zhou, 2024).

LITERATURE REVIEW

Origins of AI

The origins of AI date back to the mid-20th century, with pioneers such as Alan Turing who posed the question “Can machines think?” (Turing, 1950). Early research focused on creating machines capable of performing simple logic and calculation tasks. However, the computational limits of the time significantly restricted these advances. In the 1980s and 1990s, artificial neural networks experienced a resurgence. These networks, inspired by the functioning of the human brain, made it possible to tackle more complex problems such as pattern recognition and machine learning (LeCun et al., 2015). However, a lack of data and computational power limited its application on a large scale. Subsequently, with the increase in computational power and the availability of large data sets, deep learning became the driving force behind recent advances in AI. Deep, multi-layered neural networks have demonstrated an exceptional ability to learn complex representations of data, leading to significant advances in areas such as natural language processing, computer vision, and content generation (Goodfellow et al., 2016). Yet, despite impressive advances, AI still faces significant challenges, such as model interpretability, data privacy, and algorithmic bias. Future research is therefore geared towards developing more robust, explainable,

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