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From Present to Future: The Evolution of E-Learning Towards the Emergence of Artificial Intelligence: A Narrative Review

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Abstract The adoption of artificial intelligence in higher education has significantly increased, enhancing learning through machine learning and language processing. A review study examining 42 articles found that AI is used for personalized learning, intelligent tutoring systems, virtual assistants, automation, data analysis, and instructional design. However, challenges like privacy concerns and algorithmic bias remain. An intelligent integration of traditional pedagogies and new technologies is needed.

Introduction

Education is a crucial sector, with the rise of online courses and programs leading to a competitive environment. Artificial intelligence has the potential to transform higher education in the 21st century, with a 43% growth rate in its use over 5 years. The scope of AI applications in education is diverse, and its adoption has become a major research subject. The field is divided into three levels: development, application, and integration. The study aims to explore the general applications of AI in higher education, its ethical implications, and its effectiveness in predicting student life cycles. The review article aims to answer these questions and provide insights for students, instructors, and institutions.

Methodology

A literature review was conducted to identify relevant studies on applications of artificial intelligence in higher education published in English between 1990-2022. The databases searched included Scopus, Web of Science, IEEE Xplore, ERIC, and Google Scholar. Search terms consisted of combinations of the keywords “artificial intelligence” or “AI” and “higher education” or “tertiary education”. Inclusion criteria consisted of original research studies specifically addressing applications of artificial intelligence in higher education and studies providing empirical evaluations or models of AI systems. Commentaries, conceptual frameworks, and review articles were excluded.

The initial search resulted in 152 articles. After screening titles, abstracts, and full texts, 42 articles met inclusion criteria and were reviewed. A thematic analysis was conducted by coding key features of the studies, AI applications, advantages, and limitations. Findings were narratively synthesized using a framework of major application areas of AI in higher education. Limitations of the study included only considering English language articles and lack of access to theses. The emergence of the internet and rapid advances in educational technologies over the past decades have fundamentally transformed teaching and learning.

E-learning, referring to the use of electronic media and information technologies to deliver educational content and support instruction, has evolved from early basic online course pages to sophisticated, intelligent systems leveraging artificial intelligence capabilities(1). As access to the internet and computing power has exponentially increased, so have the possibilities for technology-enhanced learning experiences that can expand access, increase interactivity, and improve outcomes for learners across educational domains. (1)

A. The evolution of E-Learning Technologies in Education can be categorized as

1. Web-based Learning
2. Learning Open Online Courses (MOOCs)-Augmented

3. Reality (AR) and Virtual Reality (VR)
4. Growth of Social and Collaborative Learning
5. Simulation and Gamification
6. Artificial Intelligence and its Expanding Role

B. *applications of artificial intelligence in education can* be *categorized as*

1. Personalized and Adaptive Learning
2. Intelligent Tutoring Systems
3. Virtual Teaching Assistants
4. Automating Administrative Tasks
5. Data-driven analysis and Improvement
6. Limitations and threaten

C. *Challenges included*

1) Compromised Student Privacy and Consent
2) Unfair and Discriminatory Systems
3) Over-Automating Education and Dehumanizing Learning
4) Normalizing Surveillance Via Learner Monitoring
5) Overreliance and Diminished Self-Regulation
6) Isolating the Learner
7) De-Skilling Teachers and Undervaluing Their Judgment

Conclusion

When implemented wisely and rationally, artificial intelligence technologies create new opportunities for personalized, accessible, attractive, and efficient learning. The start of this path could be the use of simple web pages to provide learning content that has gradually evolved and led to the invention of learning management systems, mobile training, extensive open online courses, and other technologies. But the most important recent development is the use of innovative technologies such as artificial intelligence and machine learning in education. Artificial intelligence provides the ability to analyze huge volumes of educational data, the possibility of personalization, and unprecedented customization(3). Intelligent systems based on advanced algorithms can recommend the best course and educational content for each student based on their learning patterns and abilities(18). Of course, it should be noted that artificial intelligence has challenges and limitations that should not be ignored. The most important of these challenges include concerns about student privacy, algorithmic interference, the likelihood of reduced human interaction, and excessive reliance on technology(40). It is therefore essential that higher education institutions implement artificial intelligence with a critical and evidence-based approach in a way that can enhance, not replace, human capacity.

References

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The Main Message: Artificial intelligence technologies offer personalized, accessible, and efficient learning opportunities, transforming web pages, learning management systems, mobile training, and extensive online courses when implemented wisely.