



Original Article (Quantified)

Integrating augmented reality and virtual reality in curriculum design

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Abstract

The aim of this research is to integrate augmented reality and virtual reality in curriculum design. The present research is applicable in terms of its purpose, and quantitative in terms of the nature of the data, with a descriptive-analytical approach. The statistical population of the present study includes 800 teachers, university professors, curriculum designers and students of fields related to educational sciences and educational technology, of which the sample size was 264 people selected by a random sampling method based on the Cochran formula. The collection tool in the present study includes a researcher-made questionnaire. SPSS software was applied to analyze the findings. The results showed that variables such as perceived usefulness, ease of use, technological skills, quality of digital content and institutional support have a positive and significant effect on the level of integration of augmented reality and virtual reality in the curriculum. The findings also indicate that the use of immersive educational environments increases learner participation, improves understanding of complex concepts and enhances experiential learning. However, barriers such as limited infrastructure, lack of digital skills, and high equipment costs remain major challenges to the deployment of these technologies in educational settings. According to the research results, achieving effective integration of augmented reality and virtual reality requires simultaneous attention to technological, educational, and organizational factors, as well as the development of policies and operational guidelines for curriculum designers and teachers.

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Extended Abstract

Introduction

In recent years, the digital transformation in educational systems has led to the recognition of emerging technologies as key tools for improving the quality of learning. Among these technologies, augmented reality and virtual reality have gained a special place in educational research due to their ability to create interactive learning environments, complex simulations, and immersive experiences (Radianti et al., 2020). These technologies allow the combination of real environments with digital elements or the creation of completely virtual environments, and in this way, they can provide learners with abstract and complex concepts in a visible and experiential way. Numerous studies have shown that the use of learning environments based on augmented reality and virtual reality can significantly increase the understanding of concepts, the motivation of learners, and their active participation in the learning process. For this reason, many educational systems in the world are exploring solutions to integrate these technologies into formal curricula (Burak & Aysegul, 2024). Despite the significant educational potential of augmented reality and virtual reality technologies, the main challenge in the field of education is not simply the use of these technologies, but how to effectively integrate them into curriculum design. As the core of the educational system, the curriculum provides a framework for determining learning objectives, content, teaching methods, and assessment methods (Sala, 2022). Therefore, if emerging technologies are introduced into the educational environment without considering the principles of curriculum design and learning theories, they may not be able to have a real and sustainable impact on learning. Many studies show that the use of immersive technologies is most effective when it is aligned with educational approaches such as experiential learning, constructivist learning, and problem-based learning; and is systematically integrated into the curriculum structure (Asoodar et al., 2024). On the other hand, studies have shown that the use of augmented reality and virtual reality in education can bring several benefits, including increasing the understanding of complex concepts, promoting practical skills, improving learners' interaction with content, and creating more realistic learning experiences. Especially in fields such as medicine, engineering, architecture, and experimental sciences, where learning based on experience and observation plays an important role, simulated environments based on virtual and augmented reality can create valuable educational opportunities (Masoumian Hosseini et al., 2025).

The aim of this study is to identify key variables affecting the successful integration of these technologies in educational environments and to examine the relationships between them through data analysis and educational modeling methods. The results of such a study can help curriculum designers, educational policymakers, and teachers to design and implement more effective strategies for using augmented reality and virtual reality technologies in the teaching and learning process and to benefit from the capacities of these technologies to improve the quality of education. Therefore, the main question of the present study is: what is the integration of augmented reality and virtual reality in curriculum design?

Theoretical Framework

Augmented Reality and Virtual Reality Technologies

Augmented reality and virtual reality technologies have been proposed as key tools in the transformation of digital learning, and research has shown that these technologies can transform learning from a passive knowledge transfer process to an interactive, exploratory, and immersive learning experience (Burak & Aysegul, 2024).

Heidar Sarlak (2025) examined the potential of using augmented reality and virtual reality technologies in improving the quality of practical jurisprudential education. The research findings show that augmented reality and virtual reality technologies have significant



potential to transform practical jurisprudential education. These technologies can improve learners' understanding and learning by creating simulated environments, providing interactive experiences, and providing the possibility of practicing in virtual spaces. Also, the use of these technologies can help increase students' motivation and active participation. However, challenges such as the need for technical infrastructure, teacher training, and adapting educational content to these technologies have also been identified. This study provides solutions for the successful implementation of virtual reality and augmented reality in jurisprudence education, paving the way for future empirical studies in this area.

Ghazi et al. (2025) investigated the effect of using augmented reality and virtual reality on reverse learning, academic motivation, and cognitive performance of junior high school students in experimental science courses. The findings showed that the data distribution is normal and there is a significant difference between the mean learning and motivation scores of the experimental group after the intervention and the control group. The results indicate that the use of augmented reality and virtual reality leads to a significant increase in cognitive engagement, information retention in long-term memory, and interest in deeper learning.

Research Methodology

The present study is applicable in terms of purpose, and quantitative in terms of the nature of the data, with a descriptive-analytical approach. The statistical population of the present study includes 800 teachers, university professors, curriculum designers, and students of fields related to educational sciences and educational technology, and the sample size was 264 people selected via a random sampling method based on the Cochran formula. The collection tool in the present study includes a researcher-made questionnaire.

Research findings

SPSS software was used to analyze the findings. The results showed that variables such as perceived usefulness, ease of use, technology skills, digital content quality, and institutional support have a positive and significant effect on the level of integration of augmented reality and virtual reality in the curriculum. The findings also indicate that the use of immersive educational environments increases learner participation, improves understanding of complex concepts, and enhances experiential learning. However, obstacles such as limited infrastructure, lack of digital skills, and high cost of equipment continue to be major challenges in the path of deploying these technologies in educational environments. Based on the research results, achieving effective integration of augmented reality and virtual reality requires simultaneous attention to technological, educational, and organizational factors, as well as the development of policies and operational guidelines for curriculum designers and teachers.

Conclusion

The present study was conducted with the aim of integrating augmented reality and virtual reality in curriculum design. The results of this study are consistent with the results of Heidar Sarlak (2025), Ghazi et al. (2025), Mohammad Hasani & Ahmadi Sharif (2025), Fattahi et al. (2025), Malki et al. (2025), Junaidi Jafari & Ghanimati (2025), Seyedi (2025), Shahmohamadi et al. (2023), and Mahmudi & Karimi (2023). Seyedi (2025) showed that without a holistic approach by educational administrators to align these technologies with curricula and provide sustainable resources, the educational potential of augmented and virtual reality will not be realized. This study provides solutions for policymakers and school administrators to facilitate the process of integrating these technologies.



Finally, the results of this study show that augmented and virtual reality have significant potential to transform teaching and learning methods and can help create interactive, experiential, and student-centered learning environments. However, the full realization of this potential requires careful planning, investment in educational infrastructure, and the development of curriculum frameworks compatible with new technologies. Therefore, it is suggested that future research should develop comprehensive models for designing curricula based on immersive technologies and examine their long-term effects on the quality of education.