A Literature Review on Virtual Reality in Teaching Education

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Abstract
In recent years, virtual reality technology has been progressively integrated into the classroom teaching process with the aim of enhancing academic performance and increasing students' interest and enthusiasm for learning. Virtual reality has become a crucial component of modern educational technology. Therefore, the objective of this study is to summarize the findings in the literature through a comprehensive review. Specifically, this review focuses on literature published between 2018 and 2022 that explores the effectiveness of virtual reality technology in education. Throughout the study, research articles published during the specified timeframe were analyzed using predetermined criteria. The analysis encompassed research objectives, methodologies, topics, and outcomes of each article. Studies have demonstrated that the incorporation of virtual reality into instruction not only has a positive impact on students, but also increases students' interest and motivation. Consequently, in the more educators are likely to consider utilizing virtual reality in art classrooms to enhance students' skills, improve instructional strategies, and enhance teaching outcomes and students' learning capabilities. The findings of this research provide valuable insights and methods for educators.
Keywords: Virtual Reality Technology, Art, Teaching Strategies, Higher Education

Introduction
Over time, virtual reality, like other experimental techniques that have emerged from scientific research, has transcended the boundaries of science, and become more accessible to the general public. Gradually, it has evolved into a valuable tool for enhancing teaching and learning experiences. With the widespread use of multimedia in education, virtual reality

technology has emerged as a new teaching medium, improving teaching efficiency and students' interest in learning. It's worth noting that while virtual reality technology has found widespread application in the realm of science, its utilization in the field of art remains relatively unexplored.

In the context of this study, the author endeavors to leverage virtual reality technology for teaching art subjects. The primary aim of this review is to provide an overview of how educators across various disciplines have harnessed virtual reality in their teaching methods. As Du (2021) highlighted, the incorporation of virtual reality into art and design courses can serve as a catalyst for inspiring teachers to generate fresh ideas and concepts within immersive virtual environments. This approach has the potential to expand design methodologies and enrich the creative language employed in art education. From the initial design phase to the final presentation, users have the opportunity to immerse themselves in a virtual environment and interact with objects through computer interfaces. As a result, virtual reality technology exerts a positive influence on art education, benefiting both educators in their teaching endeavors and students in their learning journeys.

VR provides real-time access to experiences in 3D spaces as part of an interactive environment, giving students the sensation of being in a different space. The availability of up-to-date and cost-effective applications enable integration across all areas of teaching and learning, combining various methods, pedagogies, and styles. This allows students to accumulate knowledge and actively participate in their educational process. Consequently, VR has become an essential tool in fields such as science, geography, heritage, art, and culture, providing a creative space that generates interest and motivation (Chandrasekera &Yoon, 2018).

Virtual reality is integrated into teaching and learning across various fields including geography, art and design and culture. However, to fully harness the potential of VR, educational leaders must comprehend the instructional aspects of VR applications. This understanding enables them to differentiate and support a range of strategies while optimizing student learning (Johnston et al., 2018).

Crucially, instructional leaders require instructional standards to effectively prepare for, apply, and evaluate VR applications before integrating them into existing curricula. As technology continues to advance, the number of virtual reality programs in education continues to grow. Preparation should involve collaboration among state, local and regional leaders at all levels of engagement with the VR programs. These discussions should address university-level roles (Johnston et al., 2018), the possibility of national accreditation (Psotka, 2013), and factors such as curriculum, equipment, classroom setup and training (Miller, 2014). Only when these preliminary tasks are adequately prepared can virtual reality be successfully employed in teaching and learning.

Methodology

This paper aims to investigate the application of virtual reality in education in primary and secondary education from 2018-2022. The authors conducted searches on databases including Google Scholar, Elsevier, Scopus, and Knowledges. The primary objective of this paper is to address the following questions: "What teaching strategies are employed in the utilization of VR for educational purposes?" The articles in the present review were selected through an extensive search of open literature, primarily conducted by searching the following databases: "Google scholar, Elsevier, Scopus, and Web Data". Articles were

identified using the keywords "virtual technology, virtual reality, teaching strategies, educational tools, ".

Data Analysis

Read the abstract and teaching methods section of each article to assess if it meets the researcher's inclusion criteria for this study. Conduct a thorough analysis of the entire article to identify any discussion on teaching strategies. If no teaching strategies are discussed, scan the article for relevant methodological indications including methods, aims, and results, that pertain to the research question addressed in this review (see Table 1).

Table 1

Purpose, methods, and results of the study

Author	Purpose	Methodology	Study sample	Study results
Rojas-Sánchez et al (2023)	Determine a knowledge base for the use of virtual reality in education and whether it is commonly used and integrated into teaching and learning processes.	Quantitative studies	University students	The types and trends of VR use in different knowledge areas will highlight the inclusion of experiential VR models tailored to each knowledge area. With the aim of creating learning tools that promote students' knowledge acquisition in specific knowledge areas.
Johnston et al (2018)	Identifying and classifying the principles and practices of the technology of virtual reality in teaching	Qualitative research	University students	An overview of how educators choose to use VR educational apps.
Hui et al (2022)	By analyzing the influence of virtual reality on teaching, optimizing teaching, examining the opportunities and strategies for integrating virtual reality technology and instruction, thereform of instruction is accomplished with virtual reality technology.	Quantitative studies	Primary school students	Pupils are very receptive to the use of virtual reality in art lessons. It helps to improve the effectiveness of teaching and promote learners' creative expression.
Liu (2021)	Applying virtual reality technology to core computer science courses in art colleges	Qualitative research	University students	Full implementation of the use of VR technology in the teaching of basic computer science courses at art colleges and universities has the potential for significant improvement the standard of instruction effectiveness and instructional effect of computer-based courses

Gong et al (2022)	virtual reality pedagogy in Digital Media Artistic Creation	Quantitative studies	Secondary School Students	Virtual reality teaching methods that combine the benefits of artificial intelligence algorithms have potential applications and good relevance for teaching digital media arts.
Kong (2020)	Designing strategies for the use of artificial intelligence in art teaching	Mixed studies	Secondary School Students	The Application Status of Artificial Intelligence in Art Education and the Problems and Development Strategies of Artificial Intelligence in Art Education
Liang (2022)	Virtual Reality (VR) is a technology widely used in art and design education. VR is created through advanced technologies that create artificial environments that support virtual aesthetics. In particular, ceramic art and design requires technological advances to enhance the commercial individual.	Quantitative studies	Undergraduates	The digital cardboard production function room allows the creation of digital and archival ceramic designs and the use of the ceramic data centre to create scenarios for the development of teaching and learning processes.
Wu (2022)	Art object recognition methods for creating digital media art in virtual reality AODNET	Quantitative studies	Images collected in digital virtual reality media art making	To validate the superiority of AODNET for object recognition in the creation of virtual reality digital media art.
Papanastasiou et al (2019)	Presented methods and examples from the most up-to-date virtual reality/ augmented reality (VR /AR) systems, applications, and experiences with the goal of enhancing student learning and extending their skills into the real world	Qualitative research	K-12 and higher education	VR/AR applications enrich multiple sensory features by providing immersive multimodal environments, providing an effective tool for enhancing learning and memory.
Di Natale et al. (2020)	Mapping the use of immersive virtual reality (IVR) systems in kindergarten -12th grade and higher education and reviewing its effectiveness in promoting knowledge acquisition and retention and stimulating outcomes	Mixed studies	K-12 and higher education students	IVR systems help facilitate knowledge acquisition and retention and motivate results

Discussion

The analysis revealed that five articles applied quantitative methods, employing experimental studies to collect data. Two articles employed mixed methods, and three articles employed

qualitative methods. Previous studies in education have highlighted the limitations of traditional art and design education such as a lack of sensory stimulation, limited opportunities for knowledge-building experiences, insufficient teacher-student interactions, and challenges in fostering self-awareness and habit formation. However, VR innovation provides visual and kinesthetic experiences that traditional teaching methods have been unable to offer. Moreover, VR creates a supportive environment for direct learning and situated cognition, attracting students, and promoting skill development. In the context of art history education, Zhang (2021) discusses the integration of VR technology into traditional in-class teaching, recognizing it is an advanced information technology that can reform and optimize the teaching format and content, break through existing limitations, and better meet the needs of modern era.

Hui (2022) used virtual reality teaching to carry out teaching reform in primary schools. Through experimental research, it was shown that primary schools have a high acceptance of virtual reality technology teaching in art classes. The use of VR teaching tools can effectively improve teaching effects and improve students' learning motivation, and helps students express their creativity. Gong et al (2022) combined the advantages of artificial intelligence and used virtual reality technology to teach in digital media art. Virtual reality provides a good application in digital media teaching. value and promote teaching effects. Research by Liang (2022) shows that virtual reality technology can be widely used in design and art education. Through virtual technology, ceramic art and design can become more commercial, and digital cardboard production can be made The functions have become more powerful, providing more favorable guarantees for ceramic art. Di Natale et al (2020) and Papanastasiou et al. (2019) both discussed the use of virtual reality technology in K-12 and higher education in their studies. , and emphasize that IVR systems can help promote knowledge acquisition and stimulate learning effects. According to the research of Johnston et al (2018), although virtual reality is beneficial to education and teaching, educators should correctly choose VR-related applications and make reasonable decisions. When applied in teaching, it can be seen that virtual reality technology can play a positive role in many age groups and majors and effectively promote the teaching effect. At the same time, teaching workers must pay attention to the combination of teaching methods in order to make virtual reality more effective. Technology plays a greater role.

Kong (2020) developed three strategies to promote the utilization of artificial intelligence (AI) in modern art education. These strategies include increasing the adaptability of AI in art teaching, enhancing the intelligent teaching mode of art education through AI, and improving the art experience and ambiance of AI art teaching (Wu, 2022). Through virtual reality technology, users can interact with virtual objects using various methods of interaction. Virtual reality technology utilizes computer technology to create realistic visual, audio, and other sensory experiences. The field of artificial intelligence is rapidly evolving alongside the advancements in computer technology. As digital media art continues to progress, VR and AI have emerged as essential tools for the creation of new artworks.

According to a study by Liu (2021), the complete implementation of VR technology in computer-based courses in art colleges can significantly enhance the efficiency and effectiveness of such courses. However, it is crucial to note that when utilizing VR technology, the traditional approach to teaching basic computer science courses needs to be improved and updated based on the specific context of art colleges and the actual computer proficiency of the students. It is essential to ensure that the teaching of computer fundamentals aligns with current social and economic developments. Only then can we genuinely enhance

students' computing skills and promote their practical application abilities. Rojas-Sánchez et al (2022) have emphasized the significance of designing VR learning tasks and activities that are both valuable and user-friendly, as they play a critical role in improving learning outcomes. These activities should be tailored to accommodate different learning modalities and cater to learners with specific abilities. While this experiment is innovative, it is worth noting that further longitudinal studies are necessary to assess whether improvements in the instructional process are sustained over time.

VR is widely used not only in art education, but also in teaching in art museum teaching. For instance, Parker and Saker (2020) discuss the potential of VR to create a different spatial and social relationship with art museums. Traditionally, the physical environment of art museums has imposed certain limitations on breaking established norms. However, as visitors become more familiar with the technology and as emerging applications enable multiple users to share these digital spaces simultaneously, it is likely that new spatial and social norms will emerge that are not constrained by physical limitation. This trend parallels the growing popularity of modern systems and the increasing availability of VR-based apps outside of art museums. These developments raise interesting questions about the nature of the interaction with these displays in the context of incongruent physical circumstances. Consequently, further research is encouraged to gain a broader understanding of the spatial and social implications of this unique technology within museology.

Overall, the use of VR technologies has made teaching art easier and faster resulting in the emergence of various innovative forms of creation (Kong, 2020). It is evident that the increasing popularity of VR technology and artificial intelligence has fueled continues evolution over time, providing digital media art with more substance and depth. Many educators acknowledge the educational benefits of virtual reality techniques and including opportunities to enhance students' creativity through interactive learning experiences and stimulate their collective imagination.

Conclusion

In conclusion, virtual reality technology is being utilized in art education, and it is important to consider the pros and cons of VR technology in comparison to traditional education. It is necessary to continuously improve and innovate based on the characteristics of the subject matter, professional requirements, the learning environments, and curriculum features. This ensures that virtual reality technology aligns with the curriculum and genuinely enhances students' learning experiences.

Based on this study, we can infer that teaching with VR technology can support and learning, and

Enhance teaching and learning processes. The incorporation of technology in education has received positive feedback from students and contributes to their interest and motivation to learn. However, it is crucial to recognize the importance of integrating VR technology with the specific characteristics of the curriculum and the students. It is necessary to avoid rigidity and instead combine the immersive, interactive, and contextual aspects of VR technology effectively in specific courses.

Suggestions and Future Research

Most of the studies in the ten reviewed articles utilized quantitative research for analysis with some researchers conducting experimental studies and others employing qualitative research

methods. VR teaching and learning were examined in various contexts including the teaching of computers in art colleges and art museums, as well as teaching art and digital media.

As a researcher, when planning to integrate VR technology into teaching, it is essential to reflect on the following aspects such as high integration of teaching content and technology, optimization and innovation of the technology platform and construction of classroom interactivity. VR technology is considered one of the most innovative technologies of present time, and it is expected that more teachers in primary, secondary, and higher education will incorporate it into their teaching practice.

Based on the findings of this study, several suggestions for future research can be made. While this study primarily focused on purpose, methods and results, future studies could explore different research approaches. For instance, examining participants' learning feedback and teaching evaluations could provide valuable insights for further investigations.

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