



Integrating New Media Virtual Reality Technology Middle School Music Curricula: Opportunities and Challenges in Anhui Province

Dong Cao*, Lily Muliana Binti Mustafa

City Graduate School, Faculty of Education & Liberal Studies, City University Malaysia, Petaling Jaya 46100, Selangor Darul Ehsan, Malaysia.

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***Corresponding author:** Dong Cao, City Graduate School, Faculty of Education & Liberal Studies, City University Malaysia, Petaling Jaya 46100, Selangor Darul Ehsan, Malaysia.

Abstract

With the continuous advancement of virtual reality (VR) technology, new opportunities have emerged within the educational realm, particularly with its application in music education. This paper explores the opportunities and challenges of integrating new media VR technology into middle school music curricula in Anhui Province. It analyzes the current state of VR technology's application in music courses, discussing its impact on enriching course content, enhancing student engagement and interest, and fostering innovation skills. Furthermore, the paper proposes the design principles and key components for implementing VR music courses, including hardware and software resource allocation, teacher technology training, and student adaptability assessment. In response to challenges related to the widespread adoption of technology, teacher professional development, and student adaptation, the paper offers specific strategies to address these issues, providing practical guidance and policy recommendations for the application of VR technology in middle school music education in Anhui Province.

Keywords

Virtual Reality Technology; Music Curriculum; Secondary Education; Technological Integration; Anhui Province; Educational Innovation

Introduction

In the wake of the rapid development of information technology, virtual reality (VR)—as an emerging interactive technology—has gradually permeated various sectors, demonstrating enormous potential, particularly in the educational field. Traditional music education models, constrained by limited teaching methods and learning experiences, often fail to fully ignite students' interests and foster their innovative abilities. However, the introduction of VR technology, with its immersive and highly interactive features, offers a groundbreaking approach to music instruction. Through VR, students can engage with musical instruments in simulated environments, participate in virtual concerts, and even immerse themselves in diverse musical cultural contexts, thereby broadening both the forms and contents of music education. This paper focuses on the integration of VR technology into middle school music curricula in Anhui Province, examining both the opportunities and challenges involved, and proposing corresponding solutions. It aims to provide insights and guidance for the wider application of VR technology in the educational domain.

1. Opportunities for Integrating New Media Virtual Reality Technology into Music Curricula

1.1 The Current Application of Virtual Reality Technology in Music Education

With the rapid advancement of information technology, virtual reality (VR) has increasingly found its place in various educational domains, and its distinctive advantages have particularly come to the fore in music education. By creating an immersive learning environment, VR enables students to experience both the performance and appreciation of music firsthand, thereby breaking the spatial and temporal constraints of traditional teaching methods. In this virtual realm, students can simulate the performance of a wide range of instruments, exploring different timbres and playing techniques, thus enhancing both the enjoyment and practicality of learning music. This novel approach not only nurtures a deeper engagement with music but also opens up a vast array of learning possibilities previously unattainable in conventional classroom settings [1].



Figure 1. Virtual Reality Music.

1.2 The Enrichment and Expansion of Music Curriculum Content through Technological Integration

The incorporation of VR technology into music curricula offers significant opportunities to enrich and expand the content of teaching. Through virtual reality, students can engage in practical tasks within a virtual environment, such as simulating construction processes or experimenting with design, thereby deepening their understanding of artistic concepts. VR further allows for the recreation of artistic atmospheres from different historical periods or provides students with the opportunity to experience artistic design styles from diverse cultural contexts. This immersive experience broadens students' artistic perspectives, thereby enhancing their overall cultural literacy and aesthetic appreciation. The ability to transcend the boundaries of traditional artistic exploration fosters a more comprehensive and dynamic approach to both art and music education [2].

1.3 The Potential for Enhancing Student Interest and Engagement

One of the most compelling features of VR technology is its inherent immersiveness and interactivity, both of which significantly enhance student interest and engagement. In virtual environments, students gain the autonomy to choose the content and methods of their learning, thereby increasing their initiative and creativity. By interacting with VR, students can independently explore, practice, and collaborate with peers, fostering a deeper sense of ownership over their learning journey. This interactive approach not only helps to stimulate students' intrinsic motivation but also improves learning outcomes by offering a more personalized and dynamic educational experience. Such a shift in pedagogical approach is instrumental in cultivating a more vibrant and effective learning atmosphere.

1.4 The Effectiveness of VR Technology in Facilitating Music Skill Mastery and Innovation

VR technology provides students with a secure, controlled space in which they can practice repeatedly until they master the desired skills. Beyond simply simulating musical environments, VR also facilitates complex musical

contexts, enabling students to engage in performance and composition without the need for physical instruments [3]. This not only enhances students' technical proficiency but also nurtures their innovative capabilities by allowing them to explore new forms of musical expression. As students engage in virtual practices—be it through simulated performances or collaborative music creation—they deepen their understanding of musical techniques and artistic design. This combination of practical application and creative exploration not only improves their musical skills but also cultivates their broader creative and intellectual abilities. By encouraging experimentation and allowing for trial and error, VR creates an optimal environment for both skill acquisition and innovative thinking.

2. Design and Implementation of New Media Virtual Reality Music Courses

2.1 Design Principles of Virtual Reality Music Courses

When designing virtual reality (VR) music courses, it is essential to define clear instructional goals. Given the immersive and interactive characteristics of VR technology, educators should align the course objectives with both the curriculum standards and students' developmental needs, breaking down the diverse aims of music literacy, aesthetic capability, and technical skills [4]. For example, to cultivate instrumental performance skills, specific performance scenarios can be created within the VR environment, allowing students to experience music from visual, auditory, and tactile dimensions. This multi-sensory engagement ensures that the course design does not rely solely on technological tools but also maximizes the pedagogical advantages VR offers. Moreover, VR should not merely replicate traditional textbook content in a virtual space, but should be intricately integrated with the diverse musical themes—such as traditional, classical, or contemporary music—and skill development goals, such as music theory, performance techniques, and composition. These considerations would ensure that the educational content in VR is congruent with its interactive properties. Engaging in virtual music creation and instrumental simulation in VR can enhance students' creativity and aesthetic experience, promoting a learning environment where the VR technology complements the music curriculum's core competencies. Furthermore, the course design must balance both the artistic and technological aspects, ensuring that VR not only enhances the aesthetic and artistic value of music teaching but also helps students understand the underlying artistic essence of the technology itself. When designing a “virtual concert” or “virtual performance hall,” it is crucial not only to highlight the impact of sound and visual effects but also to emphasize the emotional expression and cultural context of the music. This fusion of “technology empowering art, and art enriching technology” will allow students to experience a more holistic growth, bridging both technical and artistic dimensions.

2.2 Key Components of Course Implementation

Table 1. Key Components of Virtual Reality Music Course Implementation and Corresponding Strategies

Key Component	Main Focus	Corresponding Strategy
Hardware and Software Resources	VR equipment procurement, software platform selection	Government funding, inter-school collaborative purchasing
Teacher Technology Training & Support	VR operation skills, teaching integration guidance	Regular training, experience sharing in research alliances
Student Adaptability Assessment & Feedback Mechanism	Surveys, learning logs, group discussions	Real-time adjustments, addressing individual differences

In some regions of Anhui Province, due to economic disparities and differences in infrastructure, schools may face considerable financial pressure when purchasing VR equipment and accompanying software. Thus, the initial step in course implementation is the rational allocation and integration of hardware and software resources. On the hardware side, schools should prioritize mobile VR headsets, motion controllers, and audio equipment to meet basic educational needs. As for software, schools can either choose existing VR music teaching platforms or develop customized applications that align with local teaching goals. To ensure the effectiveness and sustainability of resource use, collaborative purchasing across schools or government-backed funding initiatives may alleviate the financial burden. Teachers play a pivotal role in the successful implementation of VR music courses. Their technological literacy and instructional capabilities directly determine whether VR technology can be effectively integrated into the teaching process. If educators are not proficient in operating VR devices or lack a deep understanding of how to merge

technology with pedagogical goals, the VR course could become superficial. It is crucial to provide teachers with specialized guidance on instructional design and integration within their music curriculum. To facilitate this, professional learning communities or regional teaching alliances should be established, fostering a culture of experience-sharing and collaborative support to elevate the overall teaching level. As the primary agents of the learning process, students' adaptability and feedback are essential for optimizing and improving the VR course. Teachers should employ various evaluation methods throughout the course to assess students' experiences and learning outcomes in the VR environment. By collecting feedback through surveys, learning logs, or group discussions, educators can adjust VR course content, interaction design, and pedagogical strategies to better align with students' cognitive levels and interests [5].

2.3 Construction of the Teaching Evaluation System

In evaluating VR music courses, relying solely on outcome-based assessments, such as exam results or the quality of projects, fails to comprehensively capture students' learning processes and potential. Instead, it is essential to combine process-based and outcome-based evaluations, focusing on students' behavior, participation, and collaboration in the VR environment. This can include tracking their practice frequency, interactions within virtual settings, and overall engagement with the content. Additionally, performance-based assessments such as project presentations or performance tests can gauge the depth of their learning achievements. Combining both types of evaluation not only encourages active participation in the learning process but also allows teachers to identify areas for improvement in real-time and adjust teaching strategies accordingly. Given that the learning outcomes of VR music courses often entail both complexity and creativity, traditional single-dimension grading systems are inadequate in capturing students' true performance. It is necessary to establish a diversified evaluation system that encompasses various aspects, such as musical skills (performance proficiency, music theory understanding), technical literacy (VR operation fluency, digital resource usage), artistic creativity (composition ability, musical expression), and collaboration (teamwork, communication). This multidimensional evaluation framework provides a more holistic reflection of students' growth and achievements within VR music courses. Moreover, such an approach not only motivates students to engage more deeply with the course material but also informs future teaching designs by offering more targeted insights into students' progress and challenges. Through this nuanced approach, educators can enhance their teaching strategies, ensuring that they cater to the evolving needs of students in an ever-changing educational landscape [6].

3. Challenges and Strategies for Addressing Issues

3.1 Technological Popularization and Cost Issues

Anhui Province, located in central China, has made significant strides in educational modernization in recent years [7]. However, compared to coastal regions, there remains a substantial disparity in the distribution of educational resources, particularly in rural and remote areas. Schools in these regions often suffer from outdated hardware infrastructure and lack sufficient financial support to introduce advanced technologies such as virtual reality (VR). According to the 2024 report on the development of educational informatization in China, many schools in certain areas still fall short in their investment in VR equipment and related software, which hinders the widespread adoption of the technology. Given the high cost of VR devices and the need for additional equipment such as computers, headphones, and speakers, the overall financial burden becomes significant. Many middle and primary schools, operating with limited budgets, struggle to meet the demands for equipment procurement, teacher training, and curriculum development simultaneously, exacerbating regional disparities in technological application and creating challenges for educational equity.

To address these issues, local governments must increase their investment in educational informatization, particularly in economically underdeveloped regions, by offering specialized funds or education development grants to support the introduction of VR equipment into schools. Additionally, through social cooperation and school-business partnerships, companies can be encouraged to participate in sharing and distributing educational resources. High-tech firms may donate or provide discounted devices, which would facilitate the implementation of VR music courses. Schools can also collaborate across institutions to share VR equipment and teaching resources, thus reducing costs. A concerted effort from both the government and society can alleviate the pressure related to the popularization of technology and equipment procurement, propelling the integration of VR technology into middle school music curricula.

3.2 Teacher Technology and Pedagogical Concept Updates

The success of VR courses hinges on the technological capabilities and teaching philosophy of the educators. Many secondary school music teachers have yet to engage with VR technology and lack the necessary operational skills and pedagogical methods. Consequently, professional development training becomes an indispensable part of the process. A significant portion of teachers may have an inherent resistance to new technologies, fearing that their introduction will disrupt traditional teaching methods and increase their workload. To overcome these barriers, schools and educational departments should establish continuous professional development plans for teachers to ensure they systematically learn and master the basic skills required for VR instruction. Teacher training should include VR equipment usage, designing virtual music classrooms, and integrating VR with traditional music education content. Particularly in regions like Anhui, where educational resources are relatively scarce, remote learning platforms could provide teachers with online training and resource-sharing opportunities, thereby reducing the time and spatial costs of training. Establishing regional teacher communities would also be an effective way to facilitate regular teaching research activities and online forums, allowing teachers to share experiences and address challenges collectively, fostering an overall improvement in professional skills [8].

As technology continues to advance, the transformation of educational philosophies is equally crucial. Traditional music education tends to emphasize the transmission of knowledge and skill practice, but the introduction of VR technology offers a fresh perspective in music education. Teachers must not only focus on the technical aspects of operating VR technology but also explore how to deeply integrate technology with educational principles. Teachers need to shift their mindset from simply imparting knowledge to fostering more interactive and experiential learning. For example, when using VR for simulated instrument performances, educators should guide students to focus not only on improving performance techniques but also on understanding the emotional expression and cultural context of the music. This dual integration of technology and pedagogy ensures that students not only master musical skills but also better understand the multifaceted value of music. Teachers, in their course design, should carefully consider students' cognitive development and interests, organically combining technology with artistic elements, leading to innovation in both content and methods.

3.3 Student Adaptability and Cultivation of Independent Learning

In VR music courses, students' technological literacy is of paramount importance. While most students are familiar with the basic operation of devices like smartphones, they may not be accustomed to using VR technology, which could initially lead to confusion. Schools should devise plans to enhance students' technological literacy, helping them acquire the fundamental VR operational skills. Such a plan should begin with introductory-level content and gradually progress, allowing students to become familiar with device operation and interaction within virtual environments through simple virtual interactions. As their skills evolve, more complex tasks and projects should be introduced to progressively advance their technical abilities. Teachers should also guide students in their use of technology, fostering their independence in learning, allowing them to explore, practice, and problem-solve within the VR environment.

VR technology provides students with a broader space for independent learning. In traditional music classrooms, students are often constrained by time and space limitations, which hinders efficient personalized learning. VR technology breaks these constraints, offering students the ability to choose virtual environments that align with their interests and needs for practice and creation. Schools should encourage students to independently explore in VR courses and adopt personalized learning plans to meet the needs of diverse students. Moreover, VR technology offers new platforms for cooperative learning. Through virtual teamwork, students can collaborate and interact in simulated music creation or performance scenarios, cultivating core competencies such as teamwork and communication skills. Schools should design group tasks thoughtfully, promoting collaboration and interaction in virtual environments, ultimately enhancing learning outcomes.

4. Conclusion

The introduction of virtual reality (VR) technology has ushered in a revolutionary transformation in middle school music education. By providing an immersive learning environment, VR not only enriches the content of music courses but also effectively enhances student engagement and participation. In regions like Anhui Province, where educational resources are relatively imbalanced, VR technology helps overcome the limitations of traditional teaching

models, offering students a more diversified and personalized learning experience. However, challenges still persist in areas such as the widespread adoption of technology, the updating of teachers' technological competencies, and the cultivation of students' adaptability to these new tools. To address these challenges, a concerted effort from governments, schools, and society is crucial. Such efforts should aim at promoting resource sharing, securing financial support, enhancing teachers' professional abilities, and providing students with comprehensive technological support and platforms for autonomous learning. Through these concerted actions, VR technology is expected to play an even greater role in middle school music education, enhancing students' overall competencies and contributing to the advancement of educational modernization.

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