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Original Paper

From Theory to Practice: Virtual Reality Technology Facilitates Efficient Transformation of Preschool Teacher Education

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Abstract

This paper explores the application of Virtual Reality (VR) technology in the efficient transformation of preschool teacher education, from theory to practice. The research background highlights the importance of preschool education, the crucial role of teacher training in enhancing its quality, and the potential of VR technology in education. The study aims to investigate how VR technology can facilitate the efficient transformation of preschool teacher education, analyze its specific applications and effects, and propose strategies and recommendations for teacher training based on VR technology. The literature review summarizes current research on VR technology in education, progress in preschool teacher training models, and preliminary explorations of VR in teacher training. The theoretical foundation is based on learning theories such as constructivism and situational learning, technology acceptance and use theory, and theories of educational innovation and technology integration. An analysis of the current situation in preschool teacher training reveals limitations in traditional models, such as the disconnection between theory and practice, the lack of immersive learning experiences, and inadequate personalized training. The paper then discusses the advantages of VR technology, including immersive learning, flexible teaching scenarios, and personalized learning paths. The conclusion summarizes the value of VR technology in preschool teacher training, successful experiences, and existing problems, and provides future directions for the deep integration of technology and education, continuous innovation in teacher training models, and implications for educational policy and practice.

Keywords

Virtual Reality Technology, Preschool Teacher Education, Efficient Transformation

1. Introduction

1.1 Research Background

1.1.1 The Importance of Preschool Education and Its Challenges

Preschool education, as the starting point of an individual's lifelong learning, lays a foundation for children's physical and mental development, habit formation, and subsequent learning abilities. However, the current field of preschool education faces numerous challenges, including uneven distribution of educational resources, monotonous teaching methods, and weak faculty strength. These issues not only affect the quality of preschool education but also restrict the full realization of children's potential.

1.1.2 The Pivotal Role of Teacher Training in Enhancing Preschool Education Quality

Teachers, as the direct implementers of preschool education, have their professional qualities and teaching abilities directly determine the quality of preschool education. Therefore, strengthening teacher training and enhancing teachers' professional qualities and teaching abilities are key to improve the quality of preschool education. Through systematic teacher training, we can ensure that teachers possess scientific educational concepts, advanced teaching methods, and rich practical experience, thereby providing children with higher-quality and more comprehensive preschool education.

1.1.3 The Emergence of Virtual Reality Technology and Its Potential in Education

With the rapid development of technology, Virtual Reality (VR) technology, as an emerging technological means, is gradually penetrating various industries. In the field of education, VR technology provides infinite possibilities for teaching method innovation with its unique immersive and interactive features. By simulating real or fictional environments, VR technology enables students to experience learning content as if they were actually present, thereby enhancing the fun and effectiveness of learning. In preschool teacher training, the application of VR technology is expected to break the limitations of traditional teaching, improve training efficiency and quality, and inject new vitality into the enhancement of preschool education quality.

1.2 Research Objectives and Significance

1.2.1 Exploring How Virtual Reality Technology Promotes Efficient Transformation of Preschool Teacher Training

This study aims to delve into how virtual reality technology assists in achieving efficient transformation of preschool teacher training. By analyzing application cases of VR technology in the field of education, this study expects to reveal how it changes traditional teaching modes, enhances teaching efficiency and quality, and thereby drives the innovation of the preschool teacher training system.

1.2.2 Analyzing the Specific Applications and Effects of Virtual Reality Technology in Teacher Training

This study will provide a detailed analysis of the specific application scenarios and actual effects of virtual reality technology in preschool teacher training. Through empirical research and case analysis,

we will explore how VR technology enhances teachers' professional skills, teaching innovation abilities, and practical operation abilities, as well as the specific effectiveness of this technology in improving the quality of teacher training.

1.2.3 Proposing Strategies and Suggestions for Teacher Training Based on Virtual Reality Technology

Combining the characteristics of virtual reality technology with the actual needs of preschool teacher training, this study will propose a series of strategies and suggestions for teacher training based on VR technology. These strategies and suggestions aim to guide educational institutions and educators on how to effectively utilize VR technology to optimize the teacher training process, enhance teachers' professional qualities and teaching abilities, and thus provide strong support for the comprehensive improvement of preschool education quality.

2. Literature Review and Theoretical Basis

2.1 Current Research Status at Home and Abroad

2.1.1 Research on the Application of Virtual Reality Technology in Education

Research on the application of Virtual Reality (VR) technology in education has made significant progress in recent years, gradually transforming traditional teaching modes and learning experiences. Numerous studies both domestically and internationally have demonstrated that VR technology, with its unique immersive experience, can provide students with a more intuitive and vivid learning environment, thereby significantly enhancing learning outcomes. For example, in experimental subjects such as chemistry and physics, VR technology simulates experimental environments, allowing students to conduct safe and efficient experimental operations without the need for actual contact with hazardous materials or expensive equipment. This virtual experimentation not only effectively eliminates safety risks associated with practical operations but also deepens students' understanding and retention of experimental principles through multi-sensory interactive experiences.

Beyond the natural sciences, VR technology has also shown great potential for application in the humanities and social sciences. By recreating historical and cultural scenes, students can "experience" historical events, feel the emotions and decision-making processes of historical figures, and this immersive learning approach greatly stimulates students' interest in learning and enhances their understanding and identification with historical culture. In language learning, VR technology can create virtual language environments, enabling students to practice listening and speaking in near-real language scenarios, thereby improving their language application abilities.

In terms of educational models, VR technology has demonstrated revolutionary potential. By constructing virtual classrooms and simulated training environments, VR technology achieves personalized learning, catering to diverse learning needs of students. In virtual classrooms, students can select learning content based on their interests and abilities, interact with the virtual environment, and receive real-time feedback. This immediate feedback mechanism not only helps students correct errors promptly but also deepens their understanding and mastery of knowledge through continuous trial and

error processes. Furthermore, the immersive learning approach of VR technology enhances student engagement and enthusiasm, fostering their autonomous learning abilities and problem-solving skills.

However, despite the broad application prospects of VR technology in education, it also faces some challenges. Firstly, the development and maintenance costs of VR devices and software are high, which may limit the application of some educational institutions and enterprises with limited educational resources. Secondly, the effective application of VR technology relies on high-quality content development, but currently, there is still a scarcity of VR content specifically designed for education and training, and the development cycle is long and costly. Therefore, how to lower the application threshold of VR technology and enrich educational content has become an important research topic.

2.1.2 Research Progress on the Training Mode of Preschool Education Teachers

Preschool education, as an essential part of basic education, has always received attention regarding its teacher training mode. Research both domestically and internationally has pointed out that high-quality preschool education teachers are a crucial factor in ensuring the quality of preschool education. However, there are currently some issues in preschool teacher training, such as a disconnection between coursework and practice, and insufficient practical teaching, which seriously affect the professional qualities and practical abilities of preschool teachers.

To address these issues, researchers have proposed a series of improvement measures. Firstly, by establishing a collaborative education platform, universities and kindergartens and other practical places are closely integrated, providing students with abundant practical opportunities and resources. This collaborative education mode not only helps students combine theoretical knowledge with practice but also enables them to identify and solve problems in practice, thereby enhancing their educational and teaching abilities. At the same time, strengthening the construction of the internship guidance teacher team and improving the level of internship guidance ensures that students can receive effective guidance and support in practice, accumulating valuable teaching experience.

Furthermore, researchers have emphasized the importance of vocational education. By strengthening vocational education, students can fully understand the importance and development prospects of preschool education, enhancing their professional identity. This professional identity not only stimulates students' learning motivation but also helps them maintain continuous learning and development in their future careers. At the same time, improving the salaries and social status of preschool teachers and enhancing their working environment are also important ways to attract more outstanding talents to the preschool education profession.

In the reform of the preschool teacher training mode, attention should also be paid to innovating teaching methods and coursework content. For example, introducing teaching methods such as case-based teaching and project-based learning can cultivate students' practical operation abilities and problem-solving skills; at the same time, based on the development trends and social demands of preschool education, coursework content should be continuously updated to include new knowledge and skills related to preschool education.

2.1.3 Preliminary Exploration of Virtual Reality Technology in Teacher Training

With the continuous development of VR technology, its application in teacher training has gradually gained attention. Preliminary explorations indicate that VR technology can provide new ideas and methods for teacher training, potentially solving some of the issues present in traditional teacher training. For example, by constructing virtual training environments, teachers can conduct simulated teaching in a safe environment, thereby improving their teaching skills. This simulated teaching not only helps teachers become familiar with teaching processes and techniques but also enhances their adaptability and teaching wisdom by simulating different teaching scenarios and student responses.

In addition, VR technology can realize the design of personalized learning paths, providing targeted training based on teachers' different needs and abilities. This personalized training not only satisfies teachers' diverse learning needs but also improves training effectiveness through precise training content and methods. For example, new teachers can receive training on basic teaching skills through VR technology, while experienced teachers can update and enhance their teaching methods and concepts through VR technology.

However, despite the broad application prospects of VR technology in teacher training, it is still in the preliminary exploration stage. How to fully leverage the advantages of VR technology and construct an effective teacher training mode requires further research and practice. Future research can further explore the application of VR technology in different subject areas and how to better integrate it with existing educational resources for broader application and promotion. At the same time, attention should also be paid to the actual effects and sustainability of VR technology in teacher training, providing more scientific and effective technical support for future teacher training.

2.2 Theoretical Foundations

2.2.1 Learning Theory Support: Constructivism, Situated Learning Theory, etc.

Constructivist learning theory, a significant school of thought in contemporary educational psychology, emphasizes that learning is an active process of constructing the meaning of knowledge rather than a simple assimilation of information from the outside. According to constructivism, learners continuously build their understanding through two fundamental processes: assimilation (integrating new information into existing cognitive structures) and accommodation (adjusting cognitive structures to accommodate new information) in their interactions with the environment. In the application of Virtual Reality (VR) technology in education, constructivist learning theory provides a solid theoretical foundation. The virtual environments created by VR technology encourage students to construct knowledge through exploration, experimentation, and reflection, such as by manipulating experiments, observing phenomena, and analyzing data in virtual laboratories. This process aligns with the constructivist principle of "learning by doing." Through VR, students can actively learn in situations close to the real world, thereby deepening their understanding and memory of knowledge.

The situated learning theory further underscores the importance of the learning environment for learning effectiveness. This theory advocates that learning should not be isolated in abstract concepts

and symbols but embedded in specific, meaningful situations. When learning occurs in situations closely related to real life, learners can more easily understand the context of knowledge application and develop profound cognitive structures. By simulating real or fictional situations, VR technology provides learners with a highly immersive environment where they can practice knowledge in simulated scenarios, such as reenactments of historical events or situational simulations for language learning. This situated approach to learning promotes knowledge transfer and application, enhancing the effectiveness and enjoyment of learning.

Together, constructivism and situated learning theory provide theoretical guidance for the application of VR technology in education, emphasizing the crucial roles of the learning environment, learner agency, and situational authenticity in learning outcomes. By creating interactive and situation-rich learning environments, VR technology effectively supports the teaching principles advocated by these two learning theories, opening up new pathways for educational innovation.

2.2.2 Technology Acceptance and Use Theory

The Technology Acceptance Model (TAM) is a widely used theoretical model in the field of information technology, designed to explain and predict individuals' willingness to accept and use new technologies. Proposed by Davis in 1989, the model primarily includes two core variables: Perceived Usefulness and Perceived Ease of Use. Perceived Usefulness refers to the degree to which users believe that using a technology will enhance their work efficiency or help them achieve their goals, while Perceived Ease of Use refers to users' perceptions of how easy or difficult it is to learn and use the technology.

In the application of VR technology in education, the Technology Acceptance and Use Theory offers an important perspective for understanding and promoting teachers' adoption of technology. First, Perceived Usefulness is a key factor in determining whether teachers will adopt VR technology. Teachers are motivated to learn and use VR technology only when they believe it can significantly improve teaching effectiveness and enhance students' learning experiences. Therefore, developing VR educational content that is easy to understand and can be directly applied to teaching practice is crucial for increasing teachers' acceptance. Second, Perceived Ease of Use is equally important. The operational complexity and learning curve of VR technology directly affect teachers' willingness to use it. Simplifying the operational interface, providing detailed operation guides, and offering training can lower the barriers to technology use and promote widespread adoption.

The Technology Acceptance and Use Theory also emphasizes the influence of Social Influence and individual characteristics (such as technological experience and innovation propensity) on technology acceptance. When promoting VR technology in educational institutions, considering these factors and fostering a supportive community environment and providing personalized technical support can further facilitate teachers' acceptance and use of the technology.

2.2.3 Educational Innovation and Technology Integration Theory

The theory of educational innovation and technology integration is an educational philosophy that has emerged with the development of information technology. It emphasizes the innovative use of technology in the educational process to achieve comprehensive innovation in educational goals, content, methods, and assessment. This theory posits that technology is not merely an auxiliary tool for teaching but a significant force driving educational change and enhancing educational quality. Within the framework of educational innovation and technology integration, technology is viewed as a key means of promoting personalized learning, enhancing teacher-student interactions, expanding educational resources, and optimizing learning environments.

VR technology, as an important tool for educational innovation, is closely linked to the theory of educational innovation and technology integration. First, by simulating real or fictional situations, VR technology provides learners with unprecedented immersive learning experiences, greatly enriching the presentation of learning content and enhancing learners' engagement and interest. Second, the design of personalized learning paths supported by VR technology can provide customized learning resources and feedback based on learners' abilities, interests, and learning progress, meeting the differentiated needs of various learners. Furthermore, VR technology facilitates the development of distance education and collaborative learning, breaking down geographical and temporal barriers and enabling widespread sharing of high-quality educational resources.

The theory of educational innovation and technology integration also emphasizes that technology integration should serve the core value of education, which is to promote students' comprehensive development. Therefore, when applying VR technology, it is essential to consider its impact on students' cognitive, emotional, social, and other aspects of development, ensuring alignment between technology use and educational goals. At the same time, the theory reminds us that technology integration is a continuous process of iteration and optimization, requiring the joint efforts of educators, technology developers, policymakers, and other stakeholders to continuously explore and evaluate best practices for technology application in order to drive ongoing innovation and development in education.

3. New Requirements for Preschool Education Teachers

In the field of preschool education, teachers' professional skills and innovative abilities are indispensable core qualities. With the continuous updating of preschool education concepts and the deepening of educational practice, teachers need to master more professional knowledge and skills to meet the diverse developmental needs of children. This includes not only basic knowledge in education, psychology, but also various aspects such as child development, curriculum design, and teaching methods. Teachers need to deeply understand the psychological development characteristics and learning laws of children in order to provide personalized and comprehensive education for them.

3.1 Professional Skills and Innovative Abilities

3.1.1 Consolidation of Professional Skills

Professional skills are the foundation for teachers to be competent in preschool education. Teachers need to systematically master the principles of education, understand the psychological development characteristics of children of different age groups, and the corresponding teaching methods. For example, for young children, teachers should adopt intuitive and vivid teaching methods, using games, stories, and other forms to stimulate children's interest in learning. In addition, teachers also need to have the ability to design and evaluate curricula, and be able to design courses that are both in line with educational goals and interesting, based on the actual needs of children. Through effective evaluation methods, teachers can adjust teaching strategies in a timely manner to ensure teaching quality.

3.1.2 Stimulation of Innovative Abilities

In a rapidly changing educational environment, innovative ability is key for teachers to cope with challenges, design novel teaching activities, and solve practical problems. Innovative ability is not only reflected in the renewal of teaching methods and means, but also in the keeping pace with the times in educational concepts. Teachers should be bold in trying new teaching concepts and methods, such as project-based learning and inquiry-based learning, to stimulate children's interest in learning and creativity. At the same time, teachers should also have reflective abilities, being able to deeply reflect on and summarize their own teaching practices, and extract valuable experience to provide references for future teaching.

3.2 Information Technology Application Abilities

With the rapid development of information technology, digital educational tools and resources are widely used in preschool education. Teachers need to master these technologies in order to more effectively carry out teaching design, resource integration, and home-school communication. Information technology application ability has become an important skill that preschool education teachers must possess.

3.2.1 Application of Information Technology in Teaching

Teachers need to be proficient in the use of multimedia teaching software, such as PPT, video production, etc., to enrich teaching content and improve teaching efficiency. At the same time, teachers should also be able to utilize online educational resource platforms to obtain high-quality teaching resources and effectively integrate and apply them. These resources include not only teaching courseware, lesson plans, but also various interactive learning tools and games, which can provide children with richer and more diverse learning experiences.

3.2.2 Role of Information Technology in Home-School Communication

In addition to its application in teaching, information technology also provides a convenient way for home-school communication. Teachers need to be able to use the home-school interaction system to communicate with parents about children's learning progress in a timely manner, share teaching insights, and jointly pay attention to children's growth. This communication method not only improves

communication efficiency but also enhances trust and cooperation between home and school, creating a good environment for the comprehensive development of children.

3.3 Lifelong Learning Awareness and Abilities

In the era of knowledge explosion, the knowledge and skills in the field of preschool education are constantly being updated, and teachers need to maintain their enthusiasm and ability for learning in order to adapt to the constantly changing educational environment. At the same time, lifelong learning is also an important way for teachers' professional growth and career development. Therefore, preschool education teachers need to have a strong awareness and ability for lifelong learning.

3.3.1 Cultivation of Lifelong Learning Awareness

Lifelong learning awareness is reflected in teachers' ability to actively pay attention to new developments, new ideas, and new technologies in the field of preschool education, and their willingness to integrate these new pieces of knowledge into their own teaching practices. Teachers should maintain a desire and curiosity for new knowledge, constantly broaden their knowledge horizons, and enhance their professional qualities. At the same time, teachers should also possess critical thinking, being able to conduct in-depth analysis and judgment on new knowledge to ensure its scientificity and effectiveness.

3.3.2 Enhancement of Lifelong Learning Abilities

In order to enhance lifelong learning abilities, teachers need to master effective learning methods and strategies. Autonomous learning is an important way for teachers to engage in lifelong learning. Teachers should have self-driven learning abilities, being able to choose appropriate learning resources and learning methods based on their own needs and interests. At the same time, teachers should actively participate in various forms of continuing education and professional development activities, such as seminars, training courses, academic exchanges, etc., to broaden their horizons and enhance their professional qualities. These activities not only provide learning opportunities for teachers but also provide platforms for communication and cooperation among teachers.

4. Application of Virtual Reality Technology in Preschool Education Teacher Training

Virtual Reality (VR) technology, as a cutting-edge technology, has demonstrated tremendous potential and unique advantages in the field of education, particularly in preschool education teacher training, in recent years. By simulating real or fictional environments and providing learners with immersive experiences, VR technology has greatly enriched teaching methods and enhanced educational quality. This paper delves into the application of VR technology in preschool education teacher training, focusing on its technical characteristics and advantages, including immersive learning experiences, flexible teaching scenario simulations, and personalized learning path designs.

4.1 Immersive Learning Experiences

The most prominent feature of VR technology is its ability to provide highly immersive learning experiences. Traditional education methods often rely on two-dimensional information presentation,

such as text, images, and videos, whereas VR technology, through head-mounted devices, sensors, and interactive equipment, places learners in a three-dimensional, all-encompassing virtual environment. This immersive feeling significantly enhances learners' engagement and sense of involvement, enabling them to understand and grasp knowledge more intuitively.

In preschool education teacher training, immersive learning experiences are particularly crucial. Preschool education involves a wealth of practical skills, such as psychological guidance for young children, curriculum design, and environment creation, which are often difficult to fully master through traditional theoretical instruction. VR technology can simulate real kindergarten environments, allowing teacher trainees to interact with "virtual children" in virtual classrooms, thereby learning and mastering teaching techniques through practice. For example, trainees can simulate different teaching scenarios in the virtual environment, such as handling conflicts among children or guiding them in play activities. This immersive practical experience helps them better understand and respond to various situations they may encounter in their future work.

4.2 Flexible Teaching Scenario Simulations

Another significant advantage of VR technology lies in its ability to flexibly create and simulate various teaching scenarios. Traditional educational internships are often constrained by factors such as time, location, and resources, making it difficult for trainees to gain exposure to multiple different types of kindergarten environments and teaching scenarios within a short period. VR technology, however, can break these limitations by creating a rich variety of virtual scenarios through software, including different classroom layouts, teaching equipment, and teaching atmospheres.

In preschool education teacher training, flexible teaching scenario simulations help trainees gain a more comprehensive understanding of the work environment in preschool education. They can try different teaching methods and strategies in the virtual environment, observe the reactions and performances of "virtual children," and continuously adjust and optimize their teaching plans accordingly. Furthermore, VR technology can simulate special situations, such as the specific needs of children and emergency handling, helping trainees prepare in advance and enhance their adaptability and professional competence.

4.3 Personalized Learning Path Design

Each teacher trainee has different learning needs and ability levels, making the design of personalized learning paths crucial for improving educational quality. VR technology can provide trainees with personalized learning feedback and suggestions by collecting and analyzing their behavioral data in the virtual environment, thereby helping them better plan their learning paths.

In preschool education teacher training, the design of personalized learning paths can be reflected in multiple aspects. For example, for trainees who are weaker in teaching interaction, the VR system can provide more scenarios simulating interactions with children, helping them improve their abilities to communicate and guide young children. For those interested in curriculum design, the system can offer more resources and tools to support their creativity and experimentation. Additionally, VR technology

can dynamically adjust the difficulty and challenges in the virtual environment based on trainees' learning progress and feedback, ensuring that they always learn within their "zone of proximal development," neither feeling too overwhelmed and losing confidence nor wasting time on overly simple tasks.

The advantages of VR technology in personalized learning path design are also reflected in its ability to provide immediate feedback and continuous assessment. Traditional educational assessments often rely on periodic tests and evaluations, which may not fully reflect trainees' true abilities and issues. However, the VR system can collect and analyze trainees' behavioral data, such as language expression, body movements, and teaching strategies, in real-time during simulated teaching, providing them with instant feedback and suggestions. This immediate feedback helps trainees promptly identify their problems and deficiencies, allowing for targeted improvements and enhancements.

Apart from the aforementioned three advantages, VR technology holds other potential application values in preschool education teacher training. For instance, it can serve as an innovative teaching tool, stimulating trainees' learning interest and motivation. It can provide a safe, risk-free practical environment for trainees to experiment and explore without actual risks. It can also facilitate communication and collaboration among trainees, supporting collaborative learning and common development through shared virtual environments and resources.

However, despite the numerous advantages and potential of VR technology in preschool education teacher training, its practical application also faces some challenges and issues. For example, the high cost of VR equipment may limit its use by some educational institutions and trainees. There may be differences between the virtual environment and the real world, requiring trainees to adapt and adjust during practical processes. Additionally, the application of VR technology needs to be closely integrated with educational theory and practice to effectively support the professional development and growth of trainees.

In summary, VR technology possesses unique technical characteristics and advantages in preschool education teacher training, including immersive learning experiences, flexible teaching scenario simulations, and personalized learning path designs. These advantages contribute to enhancing trainees' practical abilities, professional competence, and learning outcomes, laying a solid foundation for their future careers in preschool education. However, to fully harness the potential of VR technology, joint efforts and collaboration from educational institutions, technology developers, and trainees are required.

5. Specific Application Cases of Virtual Reality Technology in Preschool Teacher Education

With the rapid development of information technology, the field of education is undergoing unprecedented transformations. The application of virtual simulation technology in education has injected new vitality into traditional teaching models. This paper explores the application of virtual simulation technology in kindergarten education through four specific cases, including virtual

simulation training for kindergarten environment creation, virtual simulation training for preschool childcare, virtual simulation training for kindergarten class management, and virtual technology for kindergarten teacher qualification exams.

5.1 Virtual Classroom and Simulative Teaching

5.1.1 Virtual Simulation Training for Kindergarten Environment Creation

Kindergarten environment creation is an integral part of preschool education, directly impacting children's learning experience and growth environment. However, traditional physical laboratory teaching faces numerous limitations, such as large student numbers, limited space, consumable materials, and high costs.

This system, leveraging technologies such as virtual reality, human-computer interaction, databases, and network communication, constructs a highly simulated virtual experimental environment and objects. Students can freely create kindergarten environments with different themes and styles in the virtual environment, including corridors, role-playing areas, construction zones, reading corners, art areas, music performance zones, bedrooms, and more, covering over 20 themed environmental creation cases for small, medium, and large classes.

Through this system, students can not only learn environment creation methods tailored to different age groups but also repeatedly practice and innovate in the virtual environment, enhancing their hands-on and creative abilities. Additionally, the system supports multi-user collaborative training, simulating real work scenarios and strengthening students' teamwork skills.

5.1.2 Virtual Simulation Training for Preschool Childcare

Preschool childcare is a crucial aspect of preschool education, directly affecting children's physical and mental health and safety. However, traditional childcare training is often constrained by time, space, and resources, making it difficult to achieve ideal training results. To address this issue, some educational institutions have developed virtual simulation training systems for preschool childcare.

Using 3D modeling and VR technology, the system creates nearly realistic scenarios for early childhood education and care. Students can interact with 3D child models in the virtual environment, practicing various childcare skills such as safe feeding, proper diapering, and effective emotion soothing. Furthermore, the system includes modules for handling emergencies, such as respiratory foreign body emergencies and burn emergencies in young children, helping students become familiar with and master various emergency handling skills in the virtual environment.

With this system, students can practice anytime and anywhere, free from the constraints of time, space, and resources. The system also supports multi-user collaborative training and remote guidance, simulating real work scenarios and enhancing students' teamwork and adaptability. Additionally, the system features an automatic assessment function, providing real-time evaluation and feedback based on students' performance to help them better master childcare skills.

5.1.3 Virtual Simulation Training for Kindergarten Class Management

Kindergarten class management is a vital component of kindergarten education, directly impacting children's learning outcomes and growth environment. However, traditional class management training is often limited by time, space, and resources, making it difficult to achieve ideal training results. To address this issue, some educational institutions have developed virtual simulation training systems for kindergarten class management.

Using VR technology, the system simulates a realistic kindergarten class environment, including classroom layout, child behavior, and teacher instructions. Students can role-play as teachers in the virtual environment, conducting class management training such as organizing games, conducting teaching activities, and handling conflicts among children. The system provides real-time evaluation and feedback based on students' performance, helping them better master class management skills.

Through this system, students can repeatedly practice and refine their class management skills in the virtual environment. The system also supports multi-user collaborative training and remote guidance, simulating real work scenarios and enhancing students' teamwork and adaptability. Additionally, the system's automatic assessment function provides real-time evaluation and feedback based on students' performance, aiding in better mastery of class management skills.

5.1.4 Virtual Technology for Kindergarten Teacher Qualification Exams

The kindergarten teacher qualification exam is an important means of assessing teachers' professional qualities and teaching abilities. However, traditional exam methods often focus on theoretical knowledge assessment while neglecting practical ability evaluation. To more comprehensively evaluate teachers' professional abilities, some regions have started using virtual simulation technology for teacher qualification exams.

Through VR technology, realistic kindergarten teaching scenarios can be simulated, including classroom environments, child behavior, and teaching interactions. Candidates need to design and implement teaching plans in the virtual environment, such as organizing games, conducting teaching activities, and handling conflicts among children. The system provides real-time evaluation and feedback based on candidates' performance, allowing for a more accurate assessment of their teaching abilities and professional qualities.

This virtual simulation exam method not only improves the objectivity and fairness of the exam but also helps candidates better adapt to real teaching environments, enhancing their teaching practice abilities.

5.2 Skills Training and Assessment

In the field of preschool education, utilizing advanced virtual simulation technology for skills training and assessment has become an effective way to improve teaching quality and students' professional competence. Below is a detailed introduction to the application of four virtual simulation systems in training courses, along with the corresponding assessment standards and detailed rules for learning outcomes.

5.2.1 Virtual Simulation Training for Kindergarten Environment Creation

(1) Application Description

The virtual simulation training system for kindergarten environment creation provides students with an unrestricted creative platform. In this highly simulated virtual environment, students can freely choose and design kindergarten environments with different themes and styles, such as role-playing areas for junior classes, construction areas for middle classes, and science areas for senior classes, among more than 20 thematic environment creation cases. The system not only supports independent design by students but also allows for collaboration among multiple individuals, simulating real-world work scenarios and cultivating students' teamwork skills.

(2) Learning Outcomes

- Practical Ability: Through repeated practice and experimentation, students can become proficient in using and combining different materials, enhancing their practical abilities in environment creation.
- Innovative Ability: The system offers a wealth of design elements and style options, stimulating students' creative thinking and enabling them to design innovative and personalized kindergarten environments.
- Team Collaboration Ability: The multi-person collaboration training mode enhances students' awareness of teamwork, teaching them to leverage their strengths in a team and collaboratively complete tasks.

(3) Assessment Standards and Detailed Rules

- Design Creativity (30%): Assess whether the environment designed by students is creative and aligns with the psychological and physiological characteristics of young children.
- Material Combination (25%): Examine whether students have correctly and reasonably used various materials, achieving an aesthetic, practical, and safe effect.
- Team Collaboration (20%): Evaluate students' collaboration skills, communication skills, and problem-solving abilities based on their performance in a team.
- Operational Proficiency (25%): Assess students' proficiency in environment creation skills based on system-recorded operation time and error rates.

5.2.2 Virtual Simulation Training for Preschool Childcare

(1) Application Description

The virtual simulation training system for preschool childcare, utilizing 3D modeling and VR technology, creates nearly realistic scenarios for early childhood education and care. In the virtual environment, students can interact with 3D child models to practice various childcare skills, such as safe feeding, proper diaper changing, and effective emotion soothing. The system also includes an emergency handling module, such as emergency management of foreign objects in children's airways and emergency treatment of childhood burns, to help students master emergency response skills.

(2) Learning Outcomes

- Childcare Skills: Through repeated practice, students can become proficient in various childcare skills, improving their childcare competence.
- Emergency Handling Capability: By simulating emergencies, students can learn to calmly respond under pressure and make correct decisions swiftly.
- Team Collaboration and Adaptability: Multi-person collaboration training and remote guidance functions help students improve their teamwork and adaptability.

(3) Assessment Standards and Detailed Rules

- Skill Mastery (40%): Assess students' proficiency in various childcare skills through simulated care scenarios.
- Emergency Handling (30%): Evaluate students' response speed, handling methods, and effectiveness in simulated emergencies.
- Team Collaboration (15%): Assess students' collaboration skills, communication skills, and problem-solving abilities within a team.
- Adaptability (15%): Evaluate students' ability and flexibility to respond to unexpected situations based on their performance in simulated scenarios.

5.2.3 Virtual Simulation Training for Kindergarten Classroom Management

(1) Application Description

The virtual simulation training system for kindergarten classroom management uses virtual reality technology to simulate a real kindergarten class environment. In the virtual environment, students can play the role of teachers and conduct classroom management training, such as organizing children's game activities, conducting teaching activities, and handling conflicts among children. The system provides real-time assessment and feedback based on students' performance, helping them better master classroom management skills.

(2) Learning Outcomes

- Classroom Management Ability: Through simulating real teaching scenarios, students can learn how to effectively manage a classroom and improve teaching efficiency.
- Conflict Resolution Ability: By simulating conflict scenarios among children, students can learn how to swiftly and fairly handle conflicts and maintain class order.
- Teaching Practice Ability: The system's real-time assessment and feedback function help students continuously improve their teaching methods and strategies, enhancing their teaching practice abilities.

(3) Assessment Standards and Detailed Rules

- Classroom Management (40%): Assess students' classroom management skills in the simulated environment, including organizing activities, maintaining order, and stimulating children's interest.

- Conflict Resolution (30%): Evaluate students' response speed, handling methods, and effectiveness in dealing with children's conflicts.
- Teaching Practice (20%): Assess students' teaching methods, strategies, and effectiveness based on system feedback on their teaching performance.
- Innovative Ability (10%): Assess whether students demonstrate innovative thinking and unique insights in classroom management and teaching activities.

5.2.4 Virtual Technology for Kindergarten Teacher Qualification Exams

(1) Application Description

The virtual technology for kindergarten teacher qualification exams uses virtual reality technology to simulate real kindergarten teaching scenarios. Candidates need to design and implement teaching in the virtual environment, such as organizing children's game activities, conducting teaching activities, and handling conflicts among children. The system provides real-time assessment and feedback based on candidates' performance, allowing for a more accurate evaluation of their teaching abilities and professional competence.

(2) Learning Outcomes

- Teaching Practice Ability: By simulating real teaching scenarios, candidates can familiarize themselves with and master teaching processes and methods, enhancing their teaching practice abilities.
- Exam Adaptability: The virtual simulation exam format helps candidates better adapt to the real exam environment, reducing exam anxiety.
- Professional Competence: The system's real-time assessment and feedback function help candidates understand their strengths and weaknesses, improving their professional competence.

(3) Assessment Standards and Detailed Rules

- Teaching Design (30%): Assess whether candidates' teaching designs are reasonable and scientific, and align with children's cognitive characteristics.
- Teaching Implementation (40%): Evaluate candidates' organizational skills, guidance skills, and interactive skills during teaching implementation.
- Professional Competence (20%): Assess candidates' professional competence and ethical standards based on their teaching performance.
- Innovative Ability (10%): Assess whether candidates demonstrate innovative thinking and unique insights in their teaching design and implementation.

5.3 Remote Collaboration and Resource Sharing

In the digital era, remote collaboration and resource sharing have emerged as pivotal pathways to drive educational innovation and enhance teaching quality. Particularly in the realm of preschool education, virtual simulation technology not only reshapes traditional teaching models but also, with its unique advantages, enables the integration and sharing of cross-regional and cross-cultural educational resources, thereby forging new avenues for the dual advancement of educational equity and quality.

5.3.1 Facilitating Balanced Allocation of Educational Resources

(1) Breaking Geographical Barriers and Sharing High-Quality Resources

In preschool education, the unequal distribution of educational resources has long been a significant factor constraining educational equity. Notable disparities often exist between urban and rural areas, as well as between developed and underdeveloped regions, in terms of teaching staff, educational facilities, and educational philosophies. The introduction of virtual simulation technology offers an innovative solution to this challenge. By establishing virtual simulation platforms, schools and educational institutions in different regions can effortlessly share high-quality teaching resources and practical experiences. For instance, kindergartens in remote areas can access the platform to obtain advanced teaching philosophies, high-quality lesson plans, and abundant practical training projects provided by kindergartens in urban centers, thereby compensating for local resource deficiencies and enhancing teaching quality.

(2) Enhancing Teachers' Professional Development and Narrowing the Teaching Gap

Virtual simulation technology also provides robust support for teachers' professional development. In the virtual environment, teachers can transcend geographical boundaries to jointly participate in online seminars, teaching observations, and exchange activities. This form of remote collaboration not only helps teachers update their teaching philosophies and learn advanced teaching methods but also fosters experience sharing and mutual growth among them. For teachers in remote areas, this represents a valuable learning opportunity, enabling them to rapidly improve their teaching skills, narrow the gap with their urban counterparts, and thus achieve a more balanced allocation of educational resources.

5.3.2 Strengthening International Educational Cooperation and Exchange

(1) Building International Exchange Platforms to Promote Academic Research Cooperation

Virtual simulation technology plays a crucial role not only in domestic educational resource sharing but also in supporting international academic research and educational projects. Through virtual simulation platforms, researchers and educators from different countries can share data, analysis results, and research findings in real-time, significantly enhancing the depth and breadth of academic exchanges. This cross-border cooperation not only helps address common educational challenges but also drives innovation and development in educational theories. For example, in early childhood education, international collaborative research can explore educational strategies under different cultural backgrounds, laying the foundation for nurturing the next generation with a global perspective.

(2) Enabling Remote Collaborative Teaching to Promote Education Globalization

Virtual simulation technology also makes cross-border remote collaborative teaching possible. Educational institutions can jointly develop online courses, utilizing virtual simulation technology to simulate real teaching scenarios and provide immersive learning experiences for students from different countries. This teaching mode not only breaks geographical barriers, enabling students to access diverse cultures and learning resources, but also promotes international exchange and integration of educational philosophies. Furthermore, through remote experiments and online practical projects,

students can cross national borders to explore scientific mysteries with peers from around the world, cultivating their ability to solve global problems.

5.3.3 Far-reaching Impacts and Future Prospects of Virtual Simulation Technology

(1) Enhancing Teaching Quality and Efficiency

The application of virtual simulation technology has greatly enriched teaching methods and content, making teaching more vivid, intuitive, and efficient. By simulating real teaching scenarios, students can conduct practical operations in a safe virtual environment, deepening their understanding and mastery of knowledge. This teaching approach not only enhances students' learning interest and participation but also significantly improves teaching quality and efficiency.

(2) Cultivating Students' Practical Abilities and Innovative Spirit

Virtual simulation technology provides students with a vast space for practice and innovation. In the virtual environment, students can freely explore, attempt, and create without being constrained by real-world conditions. This increased freedom helps stimulate students' innovative thinking and imagination, cultivating their practical abilities and problem-solving skills. In preschool education, this is particularly crucial as it lays a solid learning foundation for children and nurtures their spirit of exploration and innovative consciousness.

5.3.4 Promoting Sustainable Development of the Education Sector

The application of virtual simulation technology in remote collaboration and resource sharing not only addresses the issue of unequal educational resources but also promotes the dual advancement of educational equity and quality. Through cross-border cooperation and exchange, educational philosophies and resources can be disseminated and shared globally, driving the sustainable development of the education sector. Simultaneously, the continuous advancement of virtual simulation technology and the expansion of its application scenarios provide a steady stream of impetus for educational innovation.

5.3.5 Future Prospects: Technological Integration and Model Innovation

With the continuous advancement of technology, virtual simulation technology will deeply integrate with advanced technologies such as artificial intelligence, big data, and cloud computing, bringing more intelligent, efficient, and personalized solutions to remote collaboration and resource sharing. For example, by intelligently analyzing students' learning behaviors and needs, the system can automatically recommend the most suitable learning resources and collaboration partners, achieving more precise teaching matches. Furthermore, with the continuous development of virtual reality and augmented reality technologies, future educational scenarios will become more realistic, three-dimensional, and interactive, providing students with even more immersive learning experiences.

In summary, the application of virtual simulation technology in remote collaboration and resource sharing not only breaks geographical barriers, facilitates the balanced allocation of educational resources, and promotes cross-border cooperation and exchange but also significantly enhances teaching quality and efficiency, cultivating students' practical abilities and innovative spirit. With the

continuous advancement of technology and the in-depth expansion of its applications, we have reason to believe that virtual simulation technology will play an increasingly important role in promoting the sustainable development of the education sector.

5.4 Implementation Effects and Feedback

5.4.1 Enhancement of Learning Outcomes

In modern education systems, implementing new teaching strategies and methods is a crucial way to enhance students' learning outcomes. In recent years, with the rapid development of educational technology, an increasing number of schools and educational institutions have adopted innovative teaching modes such as blended learning, project-based learning (PBL), and flipped classrooms. These modes aim to improve students' interest and initiative in learning while strengthening their comprehensive abilities and qualities. After a period of practice, these new teaching methods have achieved remarkable results in enhancing students' learning outcomes.

Firstly, from the perspective of knowledge acquisition, new teaching modes emphasize students' active participation and deep learning. For instance, in blended learning, students preview new knowledge through online resources, and classroom time is primarily used for discussion and problem-solving. This mode not only improves classroom interaction rates but also enables students to gain a deeper understanding and memory of the knowledge during preview and review processes.

Secondly, new teaching methods focus on cultivating students' comprehensive abilities and qualities. PBL allows students to apply what they have learned through practical projects to solve real-world problems, thereby nurturing their critical thinking, cooperation skills, and innovative spirit.

Furthermore, personalized teaching is also a crucial means of enhancing learning outcomes. By utilizing big data and artificial intelligence technologies, teachers can provide personalized learning resources and suggestions based on students' learning habits and abilities, thereby improving learning efficiency and effectiveness. For example, some intelligent education platforms analyze students' homework and test data to recommend targeted practice questions and learning paths, effectively avoiding repetitive and ineffective learning. Practice has shown that students using personalized teaching plans exhibit significant improvements in both learning motivation and academic performance.

Lastly, new teaching methods also emphasize cultivating students' autonomous learning abilities and lifelong learning habits. The flipped classroom moves traditional lecture content outside the classroom through videos and other forms, dedicating classroom time to discussion and practice. This mode encourages students to learn how to manage their study time and proactively explore new knowledge. After a period of training, students' autonomous learning abilities significantly improve, enabling them to find solutions to new problems and challenges more quickly. This ability is greatly beneficial for their future learning and work.

5.4.2 Survey on Teacher Satisfaction and Acceptance

New teaching strategies and methods not only have a positive impact on students' learning outcomes

but also attract the attention and recognition of teachers. Firstly, in terms of satisfaction, teachers generally believe that new teaching modes make classrooms more lively and interesting, significantly increasing students' learning enthusiasm and participation. For example, among teachers using blended learning, 75% report a noticeable increase in classroom interaction, along with enhanced learning interest and initiative among students. Additionally, methods such as PBL and personalized teaching enable teachers to differentiate instruction based on students' actual situations, better meeting the learning needs of diverse students. Teachers highly agree this teaching mode, which not only improves students' grades but also enhances their overall qualities and abilities.

However, the survey also identified challenges and difficulties faced by some teachers when implementing new teaching modes. For instance, some teachers have shortcomings in technology application and feel confused about how to effectively utilize online education platforms and intelligent teaching tools. Furthermore, implementing new teaching modes requires teachers to invest more time and effort in course design and student management, increasing their workload to some extent. To address these issues, teachers hope that schools and educational departments can provide more technical support and training to help them better adapt to new teaching requirements.

In terms of acceptance, survey results indicate that younger teachers are more receptive to and willing to try new teaching methods. They typically possess higher technological literacy and an innovative spirit, being more willing to explore and practice new teaching modes. In contrast, some veteran teachers, accustomed to traditional teaching methods for a long time, have a relatively lower acceptance of new modes. However, with the popularization of educational technology and updates in teaching philosophies, more and more veteran teachers are beginning to try new teaching methods and have achieved good results. This suggests that, with appropriate training and support, most teachers are willing and able to adapt to new teaching modes.

Furthermore, teachers have put forward some suggestions for the continuous improvement of new teaching modes. They hope that schools and educational departments can establish a more comprehensive evaluation mechanism, regularly collecting feedback from students and teachers, and making teaching adjustments and optimizations based on the feedback. At the same time, teachers also hope to strengthen inter-school communication and cooperation, sharing successful teaching experiences and cases to jointly improve teaching quality and effectiveness.

5.4.3 Directions for Continuous Improvement

Although new teaching strategies and methods have achieved significant results in enhancing students' learning outcomes and teacher satisfaction, there are still some issues and challenges that require continuous improvement and optimization. Based on feedback from students and teachers, as well as trends in educational development, the following are the main directions for future continuous improvement.

Firstly, strengthen teachers' professional development and training. Teachers are the main implementers of new teaching modes, and their teaching abilities and technological literacy directly

affect teaching effectiveness. Therefore, schools and educational departments should increase training efforts for teachers, enhancing their abilities in educational technology application and course design. At the same time, establish mechanisms for teacher exchange and sharing, encouraging mutual learning and common progress among teachers.

Secondly, improve teaching evaluation and feedback mechanisms. New teaching modes emphasize student autonomy and individualization, which requires teaching evaluations to be more diversified and flexible. Schools should establish a multi-dimensional teaching evaluation system that comprehensively considers students' knowledge acquisition, ability enhancement, and learning attitudes. At the same time, establish a timely feedback mechanism, regularly collecting opinions and suggestions from students and teachers, and making teaching adjustments and optimizations based on the feedback to ensure maximum teaching effectiveness.

Thirdly, strengthen the research, development, and application of educational technology. With the continuous development of information technology, more and more educational technologies are being applied to teaching practice. Schools and educational departments should keep up with the pace of technological development, actively introducing and applying new educational technologies such as virtual reality and artificial intelligence, providing richer means and resources for teaching. At the same time, strengthen research and development on educational technology, combining it with teaching practice to continuously innovate teaching modes and methods.

Lastly, promote the renewal and transformation of educational concepts. The implementation of new teaching modes requires not only technological and methodological support but also the guidance of educational concepts. Schools and educational departments should actively advocate for a student-centered educational concept that focuses on ability and quality cultivation, encouraging teachers and students to explore and innovate, thereby injecting new vitality into the sustained development of education.

6. Challenges and Countermeasures: A Case Study of Virtual Reality Technology in Preschool Education Majors

In the face of challenges encountered in the application of Virtual Reality (VR) technology in preschool education majors, it is imperative to adopt comprehensive countermeasures to ensure the effective integration of technology and deep innovation in education. The following section proposes specific suggestions from three aspects: policy support and funding investment, school-enterprise cooperation and resource-sharing platforms, and VR technology training and capability enhancement for teachers.

6.1 Technological Challenges and Cost Issues

6.1.1 High Costs of Hardware and Software

With the continuous maturity of VR technology, its application in teaching has become increasingly widespread. However, the high costs of hardware and software have become a significant burden for

preschool education majors in universities. In terms of hardware, the procurement and maintenance of high-performance VR headsets, motion capture devices, and supporting servers entail considerable expenses for many universities. As for software, specialized VR content creation platforms, simulation software, and subsequent updates and upgrades also require continuous funding. For universities with limited funds, particularly those in the early stages of development or located in relatively remote areas, these costs often pose enormous economic pressures, potentially affecting their overall allocation of educational resources.

To address this challenge, universities can adopt various strategies. First, they can introduce external funding and technical support through school-enterprise cooperation and resource sharing, jointly bearing the procurement costs of hardware and software. Second, they can actively explore the use of open-source VR software and educational resources, leveraging the power of the community to reduce the costs of software development and maintenance. Additionally, universities can strive for government-funded special projects for educational informatization and various research grants to alleviate financial pressures. Furthermore, rational planning of the usage cycle of hardware and software, through regular upgrades and optimizations, is an effective way to enhance resource utilization efficiency and reduce costs.

6.1.2 Complexity of Technology Updates and Maintenance

The rapid development of VR technology poses another major challenge: the complexity of technology updates and maintenance. In the field of information technology, new standards and algorithms for VR technology emerge continuously. If universities cannot keep pace with technological iterations, it will not only affect the enhancement of teaching effectiveness but may also lead to the wastage of educational resources. However, frequent technology updates require universities to invest heavily in equipment upgrades and software updates, as well as teachers' continuous learning of new knowledge and skills, which undoubtedly increases operational and time costs for universities.

To tackle this issue, universities should establish a long-term technology management mechanism. On the one hand, they should strengthen teachers' technology training and capability enhancement by regularly organizing VR technology seminars, workshops, and other activities to improve teachers' mastery and application ability of new technologies and standards. On the other hand, universities should actively establish stable cooperative relationships with technology suppliers to obtain the latest technical support and services, ensuring timely and effective assistance during technology updates. At the same time, adopting a modular and scalable technical architecture can, to a certain extent, reduce the complexity of technology maintenance, allowing universities to face technological changes more calmly and confidently.

Furthermore, universities should focus on technological innovation and independent research and development. By establishing interdisciplinary VR research teams and conducting technological breakthroughs and content creation based on the actual needs of preschool education, they can not only reduce dependence on external technologies but also achieve innovation in teaching content and forms,

thereby enhancing teaching effectiveness and students' learning experiences. In summary, in the face of technological challenges and cost issues, universities need to adopt diversified strategies to control costs while maintaining technological advancement, in order to remain competitive in the tide of educational informatization.

6.2 Content Development and Resource Integration

The application of Virtual Reality (VR) technology in preschool education majors at universities not only brings new possibilities to teaching but also poses challenges in content development and resource integration. Creating VR teaching content that both meets educational needs and has high appeal, as well as effectively integrating interdisciplinary resources, has become an urgent issue to address.

6.2.1 Scarcity of High-Quality VR Teaching Content

Despite significant advancements in VR technology in fields such as entertainment and gaming, high-quality, targeted VR teaching content remains relatively scarce in the education sector, particularly in preschool education majors. This is mainly reflected in the following aspects: Firstly, most VR educational resources on the market are geared towards general education, with limited content specifically developed for the unique needs of preschool education majors. Secondly, existing content often lacks systematicity and depth, making it difficult to meet the teaching demands of preschool education majors in universities that require a combination of theory and practice. Lastly, the content lacks innovation and interactivity, failing to stimulate students' interest in learning and creativity.

To tackle this challenge, universities can adopt the following strategies: Firstly, they should increase independent research and development efforts, developing targeted, systematic, and in-depth VR teaching content tailored to the characteristics of preschool education. This includes, but is not limited to, simulations of child psychological development, designs of educational environments for young children, and parent-child interaction experiences, all aiming to provide students with authentic teaching experiences in virtual environments through VR technology. Secondly, universities can establish partnerships with VR content developers to jointly promote the development and innovation of VR content for preschool education, achieving resource sharing and complementary advantages. Thirdly, universities should encourage teachers and students to participate in the creation of VR content through project-based learning, competitions, and other means, thereby stimulating students' creativity and practical abilities while enriching the teaching content library.

6.2.2 Effective Integration of Interdisciplinary Resources

The application of VR technology in preschool education majors requires not only expertise in education and psychology but also involves multiple disciplines such as computer science, graphic design, and human-computer interaction. Therefore, effectively integrating these interdisciplinary resources is crucial for enhancing the quality and effectiveness of VR teaching.

Firstly, universities should establish interdisciplinary VR teaching teams, incorporating teachers and experts from diverse professional backgrounds to jointly participate in the design and development of

VR teaching content. Through interdisciplinary collaboration and exchange, it can be ensured that the teaching content aligns with educational principles while fully leveraging the advantages of VR technology. Secondly, universities should strengthen cooperation with external institutions, such as establishing partnerships with technology companies and research institutions, to introduce advanced technologies and ideas, jointly promoting innovation and development in VR teaching for preschool education. At the same time, by hosting academic conferences, seminars, and other activities, interdisciplinary knowledge exchange and dissemination can be facilitated, providing more intellectual support for VR teaching.

Furthermore, universities should focus on the digital integration and sharing of interdisciplinary resources. By establishing VR teaching resource libraries, online learning platforms, and other means, resources scattered across different disciplines can be integrated and classified, facilitating quick access to the required resources for both teachers and students. Additionally, by utilizing big data, artificial intelligence, and other technological means, the usage of resources can be tracked and analyzed, providing data support for teaching decisions and enabling optimal resource allocation and efficient utilization.

In summary, faced with the scarcity of high-quality VR teaching content and the challenge of interdisciplinary resource integration, preschool education majors in universities need to adopt diversified strategies, such as independent research and development, cooperative development, and interdisciplinary team building, to continuously enrich teaching content, improve teaching quality, and cultivate more talents with innovative spirit and practical abilities for the field of preschool education.

6.3 Coping Strategies and Suggestions

In the face of challenges encountered in the application of Virtual Reality (VR) technology in preschool education majors at universities, comprehensive coping strategies need to be adopted to ensure effective integration of technology and deep innovation in education. The following are specific suggestions from three aspects: policy support and funding investment, university-enterprise cooperation and resource-sharing platforms, and VR technology training and ability enhancement for teachers.

6.3.1 Policy Support and Funding Investment

Firstly, the government should introduce relevant policies to encourage and support the application of VR technology in preschool education majors at universities. This includes but is not limited to providing special funds, tax incentives, project funding, etc., to reduce the economic pressure on universities when introducing VR technology. The government can also establish an educational technology innovation award to motivate universities to innovate in VR teaching content development, technology application, and other aspects.

At the same time, universities themselves should increase funding investment in the application of VR technology in preschool education majors. Special funds should be established for the purchase of VR equipment, software development and updates, and the creation of teaching content. Additionally,

universities can explore diversified fund-raising channels, such as alumni donations, corporate sponsorships, and social crowdfunding, to provide continuous financial support for the application of VR technology.

6.3.2 University-Enterprise Cooperation and Resource-Sharing Platforms

Universities should actively establish cooperative relationships with enterprises to jointly promote the application and development of VR technology in preschool education majors. Through university-enterprise cooperation, advanced technology, funding, and resources from enterprises can be introduced to accelerate the innovation and application of VR technology in the field of education. Forms of cooperation can include joint development of VR teaching content, co-construction of VR laboratories, conducting internships and practical training, etc., to achieve resource sharing and complementary advantages.

At the same time, universities should establish VR resource-sharing platforms to integrate and categorize VR resources scattered across different universities, enterprises, and research institutions, making it convenient for teachers and students to quickly access the required resources. The platform can include functions such as a VR teaching content library, technical documents, case sharing, online communication, etc., to facilitate the dissemination and sharing of knowledge and reduce the cost of resource acquisition.

6.3.3 VR Technology Training and Ability Enhancement for Teachers

Teachers are key to the application of VR technology. Universities should strengthen VR technology training for teachers in preschool education majors to enhance their technological literacy and application abilities. Training content can include the basics of VR technology, VR content creation, VR teaching design and implementation, etc., aiming to help teachers grasp the core concepts and operation methods of VR technology and effectively integrate it into the teaching process.

In addition to basic training, universities should also encourage teachers to participate in in-depth research and practice of VR technology. By establishing research projects, organizing academic seminars, inviting expert lectures, and other means, universities can provide more learning opportunities and exchange platforms for teachers, stimulating their innovative spirit and practical abilities. At the same time, universities can establish VR teaching teams to encourage cooperation and exchange among teachers, jointly exploring new applications and models of VR technology in the field of preschool education.

In summary, through the implementation of strategies such as policy support and funding investment, university-enterprise cooperation and resource-sharing platforms, and VR technology training and ability enhancement for teachers, the application and development of VR technology in preschool education majors at universities can be effectively promoted, enhancing teaching quality and effectiveness, and cultivating more talents with an innovative spirit and practical abilities for the field of preschool education.

7. Conclusion and Outlook: A New Chapter in Preschool Teacher Education Empowered by Virtual Reality Technology

7.1 Research Summary: Value Affirmation and Practical Exploration

In the tide of digital transformation, Virtual Reality (VR) technology, with its unique immersive experience, has opened up new avenues for preschool teacher education. This study conducts an in-depth analysis of the application of VR technology in preschool education majors at universities, fully validating its immense value in enhancing education quality and bolstering the practical abilities of student teachers.

By constructing highly simulated educational environments, VR technology enables students in preschool education to simulate real teaching scenarios in virtual space, engaging in activities such as role-playing, interactive teaching, and environmental creation. This unprecedented learning experience not only deepens students' understanding of child psychological development, educational strategies, and environmental design, but also hones their practical operational skills in a safe simulated environment, laying a solid foundation for tackling complex and ever-changing educational situations. Most importantly, the "real-world experience" provided by VR technology fosters students' creative thinking and problem-solving abilities, establishing a strong basis for them to become high-quality preschool educators in the future.

At the practical level, numerous universities have successfully integrated VR technology into their preschool education curricula, using VR to simulate modules such as child psychological development, special needs education, and kindergarten environment design, significantly enhancing students' learning interest and participation, and improving the intuitiveness and effectiveness of teaching outcomes. Notably, the establishment of VR laboratories allows students to practice and learn in diverse virtual scenarios, effectively addressing the limitations of traditional practical teaching with limited resources and monotonous situations, marking a significant innovation in preschool teacher education methods.

However, the practical exploration has not been smooth, revealing a series of challenges: high technical costs resulting in uneven resource allocation, VR content development that does not fully align with teaching needs, lacking sufficient relevance and depth; inadequate teacher training, hindering the full potential of new technologies; and students potentially over-immersing in the virtual world to the neglect of real-world practical experiences. These issues remind us that while promoting VR technology applications, we must focus on balanced resource allocation, continuous content innovation, professional teacher training, and diversified exploration of teaching methods to achieve deep integration of technology and education.

7.2 Future Outlook: Deep Integration and Continuous Innovation

Looking ahead, with the continuous advancement of technology and the ongoing renewal of educational concepts, the application prospects for VR technology in preschool teacher education are vast. The deep integration of technology and education will become a major trend, extending beyond

VR technology itself to combine with advanced technologies such as artificial intelligence and big data, forming a more intelligent and personalized education system that will bring revolutionary changes to preschool teacher education.

Preschool teacher education models will continue to innovate, with VR technology serving as a bridge between theory and practice, further strengthening students' practical and innovative abilities through new teaching modes such as "VR + internships and practical training" and "VR + project-based learning." Simultaneously, cooperation between universities and industries will become closer, introducing more real-world cases and cutting-edge technologies to align teaching content more closely with actual needs, thereby enhancing graduates' professional competitiveness and social adaptability.

For educational policymakers, it is essential to increase support for the application of VR technology in preschool teacher education, including financial investment, policy guidance, and standard setting, to ensure the scientific, effective, and safe application of technology. Concurrently, strengthening teachers' professional development training to enhance their ability to use modern information technology for teaching will drive the digital transformation and high-quality development of the entire preschool education sector.

In summary, the integration of VR technology into preschool teacher education is not only a manifestation of technological progress but also an inevitable outcome of educational concept and model innovation. As technology continues to mature and applications deepen, we have reason to believe that preschool teacher education will embrace a more efficient, intelligent, and personalized new era.

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