

Application and Effect Analysis of Digital Teaching Resources in Preschool Education

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Abstract: This study explores the application and effect of digital teaching resources in preschool education, and analyzes its positive impact on children's cognitive development, social and emotional cultivation, learning interest and personalized learning. Digital resources enhance children's learning experience and participation through multimodal presentation and interactive design, helping them to obtain comprehensive development of cognitive and social skills in intuitive and diverse scenarios. The study pointed out that digital resources not only enrich teaching content, but also support children's personalized growth through personalization and instant feedback. However, the promotion process faces challenges such as uneven resource allocation and differences in teachers' digital literacy, and it is urgent to further optimize through strengthening teacher training and improving resource allocation. Based on this, digital teaching resources are considered to be a key tool to improve the quality of preschool education and promote the comprehensive development of children.

Keywords: Digital Teaching Resources; Preschool Education; Children's Cognitive Development; Personalized Learning; Education Quality

1. Introduction

1.1 Research Background and Importance

Currently, under the circumstances of rapid advancement in digitization of global education, digital teaching resources are playing an increasingly decisive role in preschool education. In recent years, based on the development of information technology, many kinds of digital tools are gradually introduced into the preschool education sector to raise the efficiency of teaching and improve

the learning experience [1]. Digital resources bring not only diversified learning content but also enrich the teaching methodology, which will better enable the teacher to teach the students according to their individual differences. For example, from studies, it has been shown that during preschool education in Australia, teachers generally use digital resources for designing classroom activities aimed at enhancing more learning enthusiasm among students through interactivity and fun [2]. This trend also shows that the auxiliary function of digital resources in preschool education cannot be underestimated, and it is an important way to promote innovation in education [3].

Further, there is a huge influence of digital teaching resources on the teaching methodology adopted by the teachers and interaction by students. Digital support during teaching activity can be availed for organizing and managing classes in support of collaborative and interactive learning models. These resources also enable children to participate in the class and enhance their cognitive and social capabilities in the development process [4]. Digital teaching resources have been widely applied in preschool education both in China and other countries, and they are believed to promote home-school interaction by allowing both parents and teachers to better understand the child's learning situation for targeted guidance [5]. Under the current circumstances of education informatization, the use of digital teaching resources in preschool education is not a simple teaching method, but has become an important approach to realizing equal rights in education and improving educational quality.

1.2 Research Objectives

This study aims to systematically explore the application and effects of digital teaching resources in preschool education, including the

following aspects: First, analyze the current application status of digital teaching resources in preschool education and their potential advantages. Second, focus on the impact of these resources on children's cognitive, social and emotional development, and explore their role in cultivating children's learning interests and personalized learning. In addition, this study will also summarize the key elements for the effective use of digital resources in preschool education through in-depth analysis of the application of digital resources in different countries and regions, in order to provide a more scientific and practical reference for the field of preschool education.

2. Overview of the Application of Digital Teaching Resources in Preschool Education

2.1 Definition, Classification and Characteristics of Digital Teaching Resources

Digital teaching resources refer to various resources that provide content, activity design and interactive platforms for education through information technology. These resources are used in various forms in preschool education, including e-books, educational applications, digital stories, virtual interactive tools, etc. [6]. Digital resources are usually presented in a multimodal way, integrating text, images, sounds and animations, which can enhance the interactivity and fun of the teaching process and stimulate children's interest in learning and enthusiasm for participation [7]. For example, some scholars believe that digital storytelling is an innovative teaching method that improves children's cognitive and comprehension abilities through a variety of digital tools [8]. When defining digital teaching resources, we should not only consider their technical implementation methods, but also pay attention to the content quality, applicability and fit with the curriculum objectives of the resources. These resources can be divided into device-based applications (such as educational games on tablets) and network-based platforms (such as online educational resource libraries).

The characteristics of digital teaching resources are mainly reflected in their flexibility, interactivity and personalization. Digital resources can provide differentiated

content according to children's learning progress and interests, which helps support personalized learning [9]. In addition, another key feature of digital teaching resources is their popularity and accessibility around the world, which provides educators with a rich resource library and diverse teaching options. At the same time, these resources enable children to fully experience and understand knowledge in the learning process through multi-sensory presentation, effectively supporting the interactivity and exploration in preschool education [10].

2.2 Application Scenarios of Digital Teaching Resources in Preschool Education

In preschool education, digital teaching resources have a wide range of application scenarios, covering cognitive development, language learning, social interaction and other aspects. First, digital teaching resources can promote children's cognitive development through interactive learning activities, such as using educational games or virtual reality tools to guide children to explore and discover knowledge [11]. Studies have shown that digital resources can effectively present abstract knowledge in a concrete form, helping children better understand complex concepts [12]. Secondly, in terms of language learning, digital resources can help children master vocabulary and basic language structures at an early stage. Especially in foreign language teaching, the use of digital resources can enhance children's interest in foreign languages and learning motivation [13]. In addition, digital resources can also be used to cultivate social skills, such as promoting interaction and communication skills among children through collaborative interactive games [14].

2.3 Current Status of Digital Teaching Resource Application at Home and Abroad

Globally, the application of digital teaching resources in preschool education shows different promotion and popularization situations. In some developed countries, the application of digital teaching resources is relatively common, especially in Europe and the United States. Many preschool education institutions have been equipped with modern digital equipment and incorporated them into regular teaching activities. For example, a

study in Norway showed that preschool teachers gradually demonstrated high digital literacy in the process of using digital resources and were able to effectively use these tools to provide children with rich learning experiences [15]. In addition, in some European countries, teachers use digital storytelling and other methods to improve children's language skills and creative thinking, proving the value of digital resources in improving the quality of education [16].

In contrast, in developing countries, the application of digital teaching resources still faces certain challenges. Taking Kenya as an example, due to the lack of equipment and technical support, the popularity of digital resources in some preschool education institutions is relatively low, and teachers' ability in digital teaching needs to be improved [17]. Therefore, preschool educators and policymakers in many developing countries have begun to pay attention to the construction of digital educational resources and are committed to providing fair and high-quality educational services for children. This difference in the application of digital resources at home and abroad reflects the importance of the balance of educational resources and technological development, and also provides possibilities and development space for future global educational cooperation.

3. Analysis of the Application Effect of Digital Teaching Resources

3.1 The Impact of Digital Teaching Resources on Children's Cognitive Development

Digital teaching resources have played a positive role in promoting children's cognitive development (Figure 1). First, digital resources combine images, sounds and animations through multimodal presentation, making the transmission of knowledge more vivid and interesting, which helps young children better understand and remember complex concepts. For example, virtual reality (VR) and augmented reality (AR) technologies allow young children to intuitively experience natural science or social knowledge in virtual scenes, which enhances the fun and intuitiveness of learning. In addition, highly interactive educational games and software

can adjust the content and difficulty according to the children's reactions. This dynamic feedback mechanism not only enhances the learning experience, but also helps young children gradually master and consolidate knowledge. At the same time, digital resources usually have instant feedback functions, so that children can understand their progress in time during the learning process and deepen their understanding of knowledge. In general, digital teaching resources not only enrich the presentation of cognitive content, but also promote children's cognitive development through multi-sensory stimulation, which helps them establish a positive sense of self-efficacy in learning.

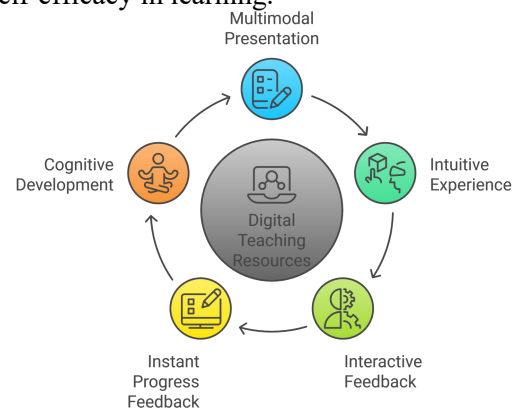


Figure 1. The Role of Digital Teaching Resources In Promoting Children's Cognitive Development

3.2 The Impact of Digital Teaching Resources on Children's Social and Emotional Development

In the preschool education stage, digital teaching resources have also had a significant impact on children's social and emotional development. Many digital resources are designed to focus on interactivity and collaboration, encouraging children to complete tasks through collaboration, thereby cultivating their sense of teamwork. For example, multi-person digital games or virtual learning communities can provide children with a safe interactive platform, encouraging them to communicate with others in a virtual space, thereby improving their social skills. Digital resources can also help children find new ways to express their emotions. For example, emotion recognition games can help children identify and manage their emotional reactions and gradually improve their emotional regulation ability. In addition, the

instant feedback characteristics of digital resources can allow children to experience a sense of accomplishment and belonging in social interactions, thereby enhancing their self-confidence and emotional stability. In general, digital teaching resources not only provide children with rich social opportunities, but also play a positive guiding role in emotional development.

3.3 The Role of Digital Teaching Resources in Cultivating Learning Interest and Personalized Learning

Compared to traditional teaching, digital teaching resources have unique advantages in the cultivation of children's interest in learning and personalized learning. Due to the interaction and fun of digital resources, young children can maintain a high degree of participation in the process of exploration; therefore, they can develop a strong interest in learning. Some learning applications and games use gamification design, which could cause happiness and satisfaction in the learning process for young children through reward mechanisms and level systems. Normally, one of the important characteristics of digital resources is that they are offered with personalized learning. They could normally accommodate their content according to the learning progress and interests of young children in order to meet the needs of different children. Personalized learning helps young children find the joy of knowledge in independent exploration and gradually builds up self-management and autonomous learning. Besides, digital resources can track and analyze children's learning data and feed this valuable feedback back to teachers to help them make timely adjustments in teaching. In all, the digital teaching resources are powerful tools and platforms that serve to nurture children's interest in learning and support personalized learning, and effectively promote innovative development in preschool education.

3.4 Case Analysis: Application of Augmented Reality Technology in Preschool Education

In preschool education, augmented reality (AR) technology has been widely studied, and its application in children's learning has shown significant results. For example, a study by

Madanipour and Cohrsen (2019) compared the learning performance of 60 5-6-year-old children with traditional teaching tools and AR-based digital resources [18].

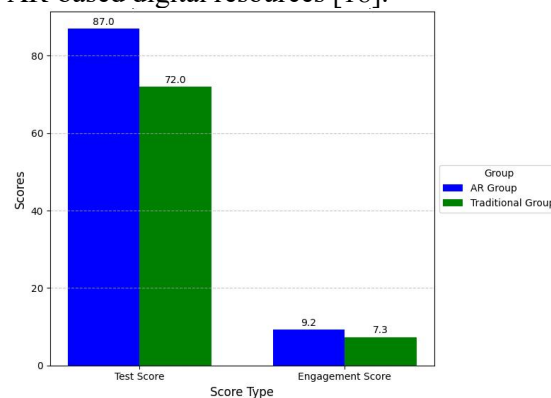


Figure2. AR vs Traditional: Test and Engagement Scores

As shown in Figure 2, in the study, the augmented reality (AR) group performed better than the traditional group in two key indicators: test scores and engagement scores. The AR group scored an average of 87 points in the test, an increase of 20.8% compared to the 72 points of the traditional group, showing that digital resources can more effectively support the depth of children's knowledge mastery. At the same time, in terms of engagement scores, the AR group scored 9.2 points, while the traditional group only scored 7.3 points, indicating that augmented reality technology significantly improved children's learning interest and classroom participation through its immersive learning environment.

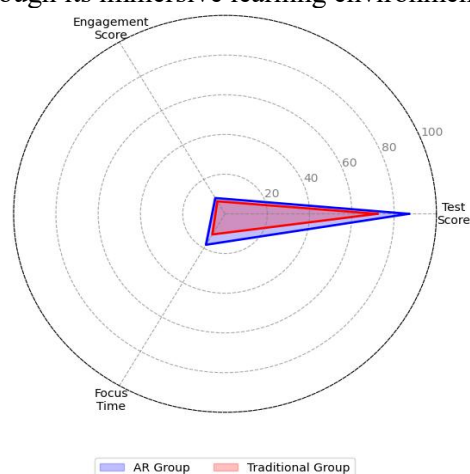


Figure3. Performance Comparison of AR and Traditional Groups Across Multiple Dimensions

In addition to test scores, the study also quantified through observational behavior analysis (such as concentration time and

interaction frequency) (as shown in Figure 3), and found that the average concentration time of children in the AR group was 18 minutes (20 minutes per class), while the traditional group was only 12 minutes.

The case shows that AR technology can significantly improve children's learning outcomes through immersive learning scenarios and multi-sensory interactions. It not only improves their ability to master knowledge, but also enhances their learning motivation and sense of participation in class.

4. Challenges and Future Development Directions

4.1 Main Challenges Facing Current Applications

There are several major problems in the promotion process of digital teaching resources in preschool education. First, there is uneven equipment and resources. Especially in many remote or economically underdeveloped areas, preschool education institutions often face great difficulties in obtaining sufficient digital equipment and the technical support necessary for the comprehensive expansion of application of digital resources. More importantly, some obstacles are based on the different kinds of digital literacy among teachers. Some teachers are unfamiliar with it, which means it's hard for them to know how to use digital resources in actual teaching. Moreover, parents' anxieties about young children using digital devices too much aggravate the problem even more. Some parents are worried that early exposure to screens may have an influence on their children's health and social abilities. Finally, because of the diversified types and inequity quality of digital teaching resources, the lack of uniform appraisal criteria also raises barriers in resource selection for teachers as to what is appropriate for early childhood education. Therefore, in actual application, the promotion and management of digital resources still face many problems that need to be solved.

4.2 Optimization Strategies and Development Suggestions

In order to better promote the application of

digital teaching resources in preschool education, it is necessary to optimize and improve from multiple aspects (see figure4). First, digital literacy training for teachers should be strengthened, and teachers' ability to integrate digital resources in actual teaching should be improved through regular professional training and resource sharing. Secondly, the government and educational institutions should increase support for remote and resource-poor areas to ensure that children in these areas can enjoy equal access to digital educational resources. In addition, in the selection and application of digital resources, it is recommended to formulate unified evaluation standards to help teachers screen out high-quality educational resources to ensure that they are suitable for the cognitive and emotional development of young children. At the same time, in response to parents' concerns, schools can help parents better understand the role of digital resources in early childhood education through publicity and family education guidance, promote home-school cooperation, and jointly support the all-round development of young children.

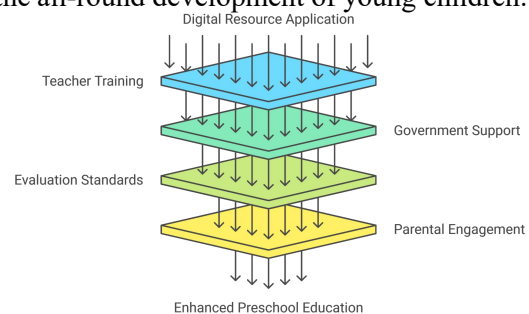


Figure4. Ways to Strengthen the Application of Digital Resources in Preschool Education

5. Conclusion

In summary, the application of digital teaching resources in preschool education has shown multiple advantages and broad prospects. Through multimodal and interactive design, these resources effectively support children's cognitive development, social and emotional growth, enhance learning interest and promote personalized learning. Especially in children's cognitive development, digital teaching resources provide a variety of presentation methods, making the transmission of knowledge more vivid and intuitive. At the same time, through interactive games and simulation of virtual situations, children can

exercise their communication and cooperation skills in real social scenes, and gradually improve their emotional expression and social skills. In addition, personalized and customized learning content not only enhances children's learning autonomy, but also better meets the unique needs of each child. These characteristics make digital resources gradually become an indispensable teaching method in preschool education, which helps to cultivate children's adaptability in the era of diversity and digitalization.

However, in the process of promotion, digital resources still face challenges such as uneven equipment resources, uneven digital literacy of teachers, and lack of resource evaluation standards. In order to make digital resources truly an effective tool to promote the progress of preschool education, it is necessary to further improve the allocation of educational resources, enhance teachers' digital capabilities, and formulate a scientific resource evaluation system. At the same time, cooperation between parents and schools is also crucial to correctly guide children to use digital resources reasonably. In the future, with the continuous advancement of technology and the innovation of educational concepts, digital teaching resources are expected to play a more active role in early childhood education, promote the modernization of preschool education, and lay a solid foundation for the comprehensive growth of children.

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