Research on the Reform of "Digital Intelligence" Experimental Teaching in Environmental Design

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Abstract. With the rapid development of digital technology, environmental design education is facing an unprecedented opportunity for "digital intelligence" transformation. This article explores the research on the "digital intelligence" reform of experimental teaching in environmental design. The aim of the study is to address the synchronization challenges between teachers and students in complex spatial experiences in traditional teaching, as well as the inadequacy of "digital intelligence" in experimental teaching resources. By constructing a virtual simulation experimental teaching platform, this article proposes a new type of teaching model. This model not only enhances the intuitiveness and interactivity of the teaching content but also provides students with more objective and free viewing and design experiences through virtual simulation technology. This article summarizes the effectiveness of the "digital intelligence" experimental teaching reform in environmental design and proposes prospects for future development directions.

Keywords: Environmental Design; Digital Intelligence; Virtual Simulation; Experimental Teaching

1 Introduction

With the rapid development of information technology, the field of education is undergoing a profound transformation. Environmental design education, as a discipline closely integrating creativity and technology, stands at the forefront of this digital transformation in education [1]. The digital transformation not only provides new tools and methods for environmental design education but also offers a broad space for innovation in teaching concepts and models. In this context, the "digital intelligence" teaching model has emerged. It integrates advanced digital technologies such as VR, AR, big data analysis, etc., aiming to enhance the interactivity, intuitiveness, and innovativeness of teaching, thereby creating richer and deeper learning experiences for students [2]. This study focuses on the reform of "digital intelligence" experimental teaching in environmental design education, exploring its theoretical foundations, practical needs, and implementation strategies.

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2 Theoretical Foundation and Practical Requirements of "Digital Intelligence" Experimental Teaching in Environmental Design

2.1 Integration of Environmental Design and "Digital Intelligence" Teaching

Environmental design education stands at the forefront of digital transformation, which core lies in combining traditional design theory with digital tools to form a new teaching model—"digital intelligence" teaching. The proposal of this model is based on a profound understanding of current educational trends and an accurate grasp of the characteristics of the design discipline.

At the level of educational theory, constructivist learning theory provides a solid theoretical foundation for "digital intelligence" teaching. This theory suggests that knowledge is constructed through activities, experiences, and social interactions in specific contexts. The "digital intelligence" teaching model in environmental design creates a near-real design practice environment for students through technologies such as VR and AR, allowing students to explore and experiment in simulated environments, thereby promoting a deep understanding of knowledge and mastery of skills.

Meanwhile, relevant theories from cognitive psychology also support "digital intelligence" teaching. For instance, the multimodal learning theory emphasizes that obtaining information through multiple sensory channels such as vision and hearing can improve learning efficiency [3]. In environmental design, students can perceive design objects from different perspectives and levels through "digital intelligence" tools, enhancing the depth and breadth of cognition.

Furthermore, the innovation diffusion theory points out that the adoption and application of new technologies or methods is a gradual diffusion process. In the promotion of "digital intelligence" teaching, it is necessary to consider the acceptance degree of teachers and students, and gradually promote the application of "digital intelligence" teaching tools through demonstration, training, and practice.

The construction of the "digital intelligence" teaching model also involves the application of instructional design theory. This model requires teachers to design reasonable teaching activities and assessment methods according to teaching goals and student characteristics, ensuring that students can obtain effective learning experiences in a "digital intelligence" environment.

2.2 Practical Requirements and Implementation Strategies of "Digital Intelligence" Teaching

The "digital intelligence" transformation in environmental design education is not only a technological innovation but also a profound change in teaching concepts and methods. In terms of practical requirements, students majoring in environmental design need to deepen their theoretical knowledge through hands-on practice, mastering professional skills such as spatial layout, material application, and lighting effects. The "digital intelligence" teaching model provides a design practice environment

without physical limitations through virtual simulation platforms, allowing students to freely explore and experiment in virtual space, thereby enhancing their comprehensive ability to use design elements. However, implementing "digital intelligence" teaching is not without challenges. Firstly, the construction of technical platforms requires substantial funds and technical support, including high-performance computing devices, professional software development, and continuous system maintenance. Secondly, teachers need to be trained in new technologies to adapt to the new teaching model and be able to skillfully guide students in using "digital intelligence" tools. In addition, students' learning habits and abilities to accept new technologies also affect the effectiveness of "digital intelligence" teaching.

To effectively implement "digital intelligence" teaching, a series of strategies must be adopted. These include: (1) establishing an interdisciplinary teaching team to integrate professional knowledge from fields such as design, educational technology, and psychology, jointly developing and optimizing the "digital intelligence" teaching platform; (2) combining the characteristics of "digital intelligence" tools in course design to create interactive and creative teaching activities that stimulate students' interest and participation; (3) focusing on students' individual needs during the teaching process, providing flexible learning paths and differentiated guidance.

An assessment and feedback mechanism is also key to the successful implementation of "digital intelligence" teaching. By establishing an effective evaluation system, students' learning processes and outcomes can be comprehensively reflected, and teaching strategies can be adjusted in a timely manner. In addition, encouraging students to engage in self-assessment and peer assessment can enhance their critical thinking and self-learning abilities.

To ensure the sustainable development of "digital intelligence" teaching, a long-term plan for technology updates and resource maintenance must be established. This includes not only the upgrading of software and hardware but also the continuous innovation of teaching content and methods. Through constant optimization and improvement, the "digital intelligence" teaching model can be ensured to always meet the trends of educational development and the actual needs of students.

3 The Construction of the "Digital Intelligence" Experimental Teaching Platform

3.1 Technical Architecture and Innovative Teaching Models of Platform Construction

The construction of the "digital intelligence" experimental teaching platform poses a multidimensional technological challenge, requiring the integration of the latest information technology with educational theory to create an advanced yet practical teaching environment. The technical architecture is the backbone of the platform, encompassing but not limited to 3D modeling software, VR, AR, cloud computing, and big data processing. The integration of these technologies provides a highly inter-

active and immersive learning experience for environmental design education, allowing students to engage in design practices within a simulated real environment [4].

In terms of design philosophy, the platform emphasizes student-centeredness, adopting a user-driven design approach to ensure that the platform is intuitive, easy to learn, and engaging. The innovative teaching model is reflected in the platform's ability to support personalized learning paths, collaborative learning, and reflective learning, all of which are indispensable elements in modern education. Through this model, students can freely explore virtual environments, experiment with different design solutions, and learn valuable design principles and techniques.

Furthermore, the design of the platform also takes into account teaching flexibility and scalability. It allows teachers to customize teaching activities and assessment criteria according to the specific needs of the course, while also being able to evolve continuously with technological advancements and updates in educational philosophy. This forward-thinking design ensures that the platform can meet current teaching needs as well as adapt to future trends in education.

In terms of technical implementation, the construction of the platform requires interdisciplinary expertise and close teamwork. From software engineers to educational experts, from graphic designers to environmental designers, each team member contributes their professional skills and innovative thinking to the construction of the platform. Through continuous testing, feedback, and optimization, the platform gradually becomes a powerful and reliable teaching tool, providing solid technical support for the digital transformation of environmental design education.

3.2 Deep Integration of Course Content and Platform Functions

In environmental design education, achieving a deep integration of course content with the functions of the "digital intelligence" experimental teaching platform is crucial. This integration not only requires the platform to possess advanced technological features but also demands its close alignment with teaching philosophies and course objectives to ensure the effectiveness and relevance of teaching activities.

The platform must offer a rich array of design tools and resources to support the diverse needs of environmental design courses. This includes high-precision 3D modeling tools, realistic rendering engines, and an extensive library of materials and furniture. These tools and resources enable students to engage in thorough exploration and experimentation during the design process, thereby deepening their understanding of design elements.

The platform should feature flexible course management functions, allowing teachers to arrange teaching activities according to the teaching plan and student progress. This includes uploading and updating course content, as well as submitting, reviewing, and providing feedback on student assignments. In this way, teachers can monitor students' learning status in real time and offer timely guidance and support.

The platform should support collaborative learning and social interaction, encouraging communication and cooperation among students. By sharing design works and discussing design solutions, students can inspire each other and broaden their design

perspectives. At the same time, this helps to cultivate students' teamwork and communication skills, which are equally important in a real work environment.

The platform should integrate assessment and feedback mechanisms to ensure the quality and effectiveness of teaching activities. This includes evaluating student design works as well as reflecting on and adjusting teaching processes. By collecting feedback from students and teachers, educators can continuously optimize teaching methods and platform functions to better meet teaching needs.

The deep integration of course content and "digital intelligence" experimental teaching platform functions not only enhances the learning experience and design capabilities of students but also promotes innovation in teaching methods and improvement in teaching effectiveness. This integration is key to the successful digital transformation of environmental design education.

3.3 Feedback Loop in Teaching Practice and Continuous Iteration of the Platform

In the "digital intelligence" transformation of environmental design education, the feedback loop in teaching practice is crucial for ensuring the continuous iteration and optimization of the teaching platform. This process involves ongoing evaluation and reflection on teaching activities, student learning outcomes, and teaching methods.

The feedback loop in teaching practice requires establishing a systematic evaluation mechanism to collect and analyze students' performance and experiences while using the "digital intelligence" teaching platform. This includes student engagement, the quality of design work, and their satisfaction with platform functions and course content. Comprehensive understanding of students' learning needs and their experience with the teaching platform can be gained through various forms such as questionnaires, interviews, observations, and self-evaluations by students.

Teacher feedback is equally important. As direct participants and guides in teaching activities, teachers provide valuable perspectives on the practicality of the teaching platform, the effectiveness of teaching methods, and the assessment of student learning outcomes. Teacher feedback helps identify strengths and weaknesses of the teaching platform in practical applications, providing a basis for functional improvements and adjustments to teaching strategies.

Based on this feedback, the teaching platform needs to undergo continuous iteration and optimization. This includes not only improvements to the user interface, enhancements of functionality, and updates to resources but also adjustments to teaching methods and course content. During the iteration process, new features and teaching models should be continually tested to ensure they effectively support student learning and teaching activities.

Moreover, continuous iteration needs to pay attention to technological developments and changes in educational trends. As new technologies emerge and educational philosophies update, the teaching platform should be able to flexibly adapt to these changes to maintain its relevance and appeal in teaching. This may involve integrating new technological tools, exploring new teaching methods, or introducing new course content.

The feedback loop in teaching practice and the continuous iteration of the platform is a dynamic process that requires close cooperation and communication among educators, technology developers, and students. Through this collaboration, the "digital intelligence" teaching platform can always meet educational goals, satisfy students' learning needs, and support innovative teaching by teachers. This ongoing optimization and improvement is key to the successful "digital intelligence" transformation of environmental design education.

4 Conclusions

Looking to the future, the "digital intelligence" transformation of environmental design education heralds profound changes. Technological advancements, especially breakthroughs in artificial intelligence, machine learning, virtual reality, and augmented reality, will bring revolutionary innovations to teaching methods. These technologies can not only provide richer and more authentic learning experiences but also enable the customization of personalized learning paths to meet the diverse needs and styles of different students.

During this transformation process, educational strategies must adapt to emerging technological trends [5]. Educators need to update their technological knowledge and teaching methods to better utilize these tools for promoting learning. Educational institutions should strengthen cooperation with technology developers to ensure that teaching platforms and tools are continuously updated to keep pace with technological development. Policymakers must recognize the importance of "digital intelligence" education and provide necessary support at the policy level, including investment in funding, technological infrastructure construction, and professional development opportunities for teachers.

Schools and higher education institutions should rethink and redesign curricula to integrate "digital intelligence" tools and methodologies. This involves not only updating course content but also innovating teaching methods and assessment approaches. "Digital intelligence" tools will make learning more flexible and accessible, supporting individuals in continuously updating and expanding their knowledge and skills throughout their careers, thus making the concept of lifelong learning even more important.

Facing the challenges and opportunities of future education, we need to adopt a comprehensive and forward-looking perspective. By actively embracing technological change, continuously optimizing educational strategies, and innovating at the policy and practical levels, we can ensure that "digital intelligence" teaching can fully realize its potential, providing a solid foundation for cultivating the next generation of environmental design professionals.

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