Research and Application of Digital Classroom Teaching Development in the Post-Pandemic Era

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Abstract

With the continuous development of information technology, digital classrooms are becoming more adapted to the demands of talent cultivation in the modern era. The digital classroom teaching model is a reform of traditional teaching methods, and constructing a digital classroom allows for more flexible organization of instructional design, fostering students' creative thinking and enhancing their overall qualities. Seizing the opportunity for the development of applied universities, our school is constructing a locally distinctive path of information technology. This article takes higher mathematics as an example to elaborate on the practical application experience of digital classroom teaching development. In conclusion, this article summarizes the shortcomings in the process of digital classroom construction, which holds certain reference value and significance for future work.

Keywords: Big data technology; Digital classrooms; Advanced Mathematics; Student-centered; Multimedia teaching

1.Introduction

In today's society, we have entered the era of informationization and continuous development towards digitization. Computer-based information tools, which include functions such as information acquisition, transmission, processing, regeneration, and utilization, are constantly changing people's ways of production, work, learning, communication, lifestyle, and thinking, leading to profound changes in human society. The digitalization of education has become an important strategy for promoting educational modernization in our country. With the deepening of educational reforms, digital technology and classroom teaching content will be more deeply integrated. With the support of national education sector policies and the wave of educational reform, complex information technology means have been integrated into mobile devices to construct smart classrooms. Applying digital teaching in classrooms has become an effective supplement to traditional teaching methods, and the development of educational informatization cannot be separated from the driving force of new technologies and media. Such new digital teaching models will become a major driving force for the reform of quality education[1、2、4、10].

The rapid development of information technology is having a significant impact on traditional educational concepts and teaching models while providing technological support for the realization of educational modernization. Digital classrooms provide strong support for modern teaching, optimizing classroom instruction and offering advantages that other teaching methods cannot compare to, such as scene reproduction, atmosphere rendering, instant interaction, and simplified steps. Digital classrooms play a more significant role as intermediaries in teaching, effectively cultivating students' abilities to discover and solve problems and integrating theory with practice. Digital classrooms have been widely used for teaching assistance, but there are still certain issues regarding their application and effectiveness. How to apply modern teaching methods to create scenarios and provide abundant teaching resources for students? How to effectively utilize digital classrooms to organize lessons, highlight teaching focuses and difficulties, and improve teaching quality?These are ongoing issues that need to be continuously addressed and improved. The development of digital classroom construction can enhance teaching quality, strengthen the timeliness, pertinence, vividness, and effectiveness of teaching, and face the new situation of educational reform. Changing classroom teaching methods, updating teaching strategies and methods, and transforming students' learning methods are key factors in improving teaching quality[3、6、7、11].

Our school has already installed advanced multimedia equipment and provided network support in most classrooms, introducing advanced digital information technology into classrooms and lessons. Through the construction of digital classroom teaching, on the one hand, students are engaged and their thinking is cultivated in digitally assisted classrooms, enabling them to better grasp the knowledge points of the course, improve problem-solving abilities, and develop self-learning and innovation skills to meet the requirements of talent in the new era. On the other hand, it enhances teachers' ability to use digital services in classroom teaching, integrates information resources with subject teaching, brings advanced concepts and the latest teaching resources into the classroom, and serves students and teaching needs. Through the digital construction of the curriculum, we continuously explore effective ways and methods of using digital technology in teaching, build diverse and abundant teaching resources, and improve teachers' professional quality. Nowadays, fully utilizing digital information technology is not only a requirement for the development of educational informatization and curriculum reform but also a need for the transformation and development of applied universities.

2.Digital Classroom Teaching Model

Digital teaching refers to the bilateral activities of educators and learners in an informationized environment, using modern educational media, educational information resources, and educational technology methods. The characteristics of digital teaching are that it is supported by information technology and guided by modern educational theories, emphasizing the construction of new teaching models. The teaching content has stronger timeliness and richness, and the teaching is more suitable for students' learning needs and characteristics. Digital teaching is not just a change in teaching media and methods based on traditional teaching, but a series of reforms and changes in the overall teaching system based on modern information technology. Digital classroom teaching uses a systematic approach, with students at the center, fully utilizing modern information technology and information resources, scientifically arranging various aspects and elements of the teaching process to optimize the teaching process. By using information technology to build an informationized environment, acquire and utilize information resources, support students' independent inquiry-based learning, cultivate students' information literacy, and enhance students' interest in learning, the teaching effect can be optimized.

Although digital information technology has changed the traditional teaching model, the role of teachers as learning guides and the concept of "student-centered" as the starting point to promote students' comprehensive development will not change. Digital education is no longer limited to the fragmented application of information systems but uses information technology to form a "learning ecosystem," constructing a learning environment marked by mobile internet and smart terminals, and using cloud computing, social technology, and big data to support personalized interactive learning systems and blended learning models that integrate online and offline learning. In the digital teaching model, students' learning resources become richer, and the learning space is no longer limited to the classroom. It provides students with more flexible, personalized, and independent learning opportunities. From the perspective of teachers, students' literacy, and new teaching informationization models, various new concepts, micro-courses, and other digital classrooms are widely used throughout China [12–14].

Therefore, the current teaching situation has shifted from teacher-centered to student-centered, and information technology has transitioned from multimedia teaching to digital teaching. When students use terminals, schools can collect all data from students' learning processes in real-time, and teachers can analyze students individually based on this data. For students, evaluation has shifted from being solely based on exam results to evaluating the learning process, which is essential for truly individualized instruction. These are the fundamental differences brought about by digital learning.

3.Digital Teaching in the Classroom

The renowned mathematician Hua Luogeng once said, "The main reason students find mathematics dull, mysterious, and difficult to understand is because it is disconnected from reality." However, digital classrooms can provide rich teaching resources. They not only allow students to see the relevance between what they learn and the problems they encounter in their lives but also greatly stimulate students' interest in learning, making them realize that there are abundant mathematical problems hidden in real life.

The traditional classroom teaching model revolves around the teacher, textbooks, and the classroom. This model often leads to a situation where the teacher passively imparts knowledge, and students passively receive it. It is evident that the deficiencies of the traditional teaching model are significant. The key issue is that students, as cognitive beings, always find themselves in a position of passive knowledge absorption throughout the entire teaching process. The student's autonomy in learning is ignored, and even suppressed. Clearly, this does not align with the requirements for talent cultivation in modern society. Such a model cannot bear the burden of nurturing highly qualified creative talents. Therefore, it is imperative to change the traditional teaching model and create an efficient classroom model that meets the requirements of the new era[15–16].

Multimedia teaching is an important component of modern teaching. It combines the teaching functions and effects that regular classrooms, audio-visual classrooms, and computer rooms can provide. It not only allows teachers and students to fully share the abundant teaching resources of computers and multimedia but also facilitates real-time interaction between students and teachers, as well as students themselves. This sharing brings forth infinite knowledge and wisdom. An efficient classroom must first understand the students' learning situation. In the learning process, students need to adhere to the important principle of "timely feedback." This is difficult to achieve in traditional educational models. Nowadays, it is as simple as using platforms like "Learning Assistant" and "Rain Classroom" to perfectly realize digital classrooms. The key to whether a digital classroom is effective lies in the students' learning situation. It is essential to utilize digital information technology to build a platform with a complete teaching structure, including micro resources, learning activities and their arrangements, learning outcome assessments, and course learning certification. For example, using the "Rain Classroom" mini-program, teachers can upload their well-prepared course materials to the WeChat classroom, which can be accessed anytime using a mobile phone. Students can synchronously view the teacher's course materials and mark each page whether they understood it or not. Teachers can analyze students' learning situations in real-time .

With the continuous development and popularization of information technology, our school teachers have transitioned from traditional chalk and blackboard teaching to true "multimedia teaching." This transformation

from "lecturer-centered" teaching to "innovative" teaching is all made possible through the application of information technology. The school encourages the construction of digital classrooms, encourages teachers to explore innovative teaching models, and cultivates teachers to use various information technology means to develop teaching resources. Based on the digital classroom as a carrier, information technology is used to change students' learning methods, making them willing and more energetic to engage in real-life and exploratory learning activities. With the rich and unique methods provided by the digital classroom, such as text, language, animation, video, and audio, it provides abundant educational resources to teachers and students, innovating teaching models and continuously improving teaching quality.

4.Guarantee Conditions

Our school fully recognizes the importance of information technology in education and promotes the level of educational informatization at the school, combining traditional teaching with digital technology to promote the development of modern education. We establish and improve rules and regulations to promote standardized and precise management. A network and technology education center has been specially established to promote information technology construction and assist teachers in the construction of digital classrooms, with clearly defined responsibilities. Regular communication and consultation are conducted to seek new ideas for innovation and development. Precise management is implemented to ensure the effective achievement of our school's information technology construction. Detailed rules and regulations on information technology management are formulated based on the actual situation of our school. This includes the usage regulations for dedicated classrooms, multimedia equipment, computer rooms, recording classrooms, network control centers, monitoring centers, etc. The Information Technology Center personnel regularly inspect and maintain the equipment to ensure the normal operation of the digital classroom.

The school increases investment in hardware and software construction. A campus network layout is carefully planned. In recent years, relying on school-enterprise cooperation and laboratory construction, the school has invested a large amount of funds to improve the level of school informatization, enabling classrooms to access the Internet. Network monitoring systems and smart classroom systems have been installed in classrooms. The school continuously improves software development and provides various genuine office software for free. Regular professional training for curriculum development is conducted to enhance teachers' information literacy. Teachers are encouraged to carry out various forms of teaching activities, such as teaching reforms, curriculum construction, and online course development. The school organizes teacher lecture competitions every year and actively encourages teachers to participate in various information technology teaching competitions. Based on the practicality of information technology in the classroom, emphasis is placed on cultivating students' interests.

5.Application of Digital Classroom in Advanced Mathematics

In the digital classroom, it is more conducive to the cultivation of students' abstract thinking and spatial imagination abilities. The digital classroom enhances the intuitiveness of mathematics teaching. Through multimedia means, concepts such as the Cartesian coordinate system, cylindrical and rotational surfaces, quadratic curves, and plane and spatial lines can be presented vividly and concretely, giving students a more intuitive impression of abstract mathematical models. The digital classroom turns the intangible into tangible, providing a thinking bridge for students' thoughts. At the same time, the intuitiveness of the digital classroom can help implement the mathematical idea of combining numbers and shapes.

The digital classroom reduces the need for teachers to write on the board during class, especially when it comes to example problems and exercises, thus saving teaching time and increasing classroom capacity. This allows for ample time for students to think and participate in teaching activities, address specific issues raised in teaching feedback, and extend and expand their knowledge, broadening their horizons. In the digital classroom, students' motivation can be stimulated and their interest in learning mathematics can be cultivated. The low interest of students in learning mathematics is the biggest obstacle to improving the quality of mathematics education. By using various teaching aids, the digital classroom greatly enriches the methods, forms, and content of classroom teaching, allowing students to participate in the mathematics teaching process in an imaginative, lively, intuitive, and passionate manner. The digital classroom enables more timely and accurate understanding of students' learning situations, and facilitates interaction and assessment, overcoming the limitations of traditional teaching methods in mathematics education.

6.Conclusions

The integration and construction of teaching resources need to be based on abundant resources. The digitally equipped classroom, supported by modern information technology, provides teachers with more choices and allows for appropriate teaching design. However, it is important to recognize that there are still many shortcomings in our school's digital classroom construction process, such as low server capacity and configuration, weak educational information distribution functions, and the need for further strengthening of students' abilities to use information technology and their awareness of participating in online learning. The school's information technology construction is an ongoing and systematic project that needs to be gradually advanced, continuously creating high-quality digital courses and improving teaching quality.

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Conflicts of Interest

All authors disclosed no relevant relationships.

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