World Journal of Educational Research
ISSN 2375-9771 (Print) ISSN 2333-5998 (Online)
Vol. 10, No. 3, 2023
www.scholink.org/ojs/index.php/wjer

Original Paper

Exploring High School IT Course Teaching Resources in the Context of Educational Digital Transformation

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Received: April 11, 2023 Accepted: May 15, 2023 Online Published: June 15, 2023

doi:10.22158/wjer.v10n3p106 URL: http://dx.doi.org/10.22158/wjer.v10n3p106

Abstract

The Chinese Ministry of Education initiated the implementation of the "National Education Digitalization Strategy Action" in 2022. The digital transformation of education has become a significant strategy in China's educational reform and development in the new era, which is of great significance for the construction of high school information technology course teaching resources. This paper first introduces the concept and current situation of digital transformation and discusses the classification and existing issues of current high school information technology teaching resources. Next, it analyzes the future development direction and focus of high school information technology course teaching resources, including the development and utilization of digital educational resources, the construction and application of virtual laboratories, the development of personalized educational resources, the optimization and popularization of online education platforms, and the promotion of educational resource sharing and open education. Finally, this paper proposes development strategies and measures for high school information technology teaching resource construction, including strengthening the construction of educational informatization infrastructure, actively exploring the development and application of personalized educational resources, promoting educational resource sharing, and strengthening educational teaching management.

Keywords

High School Information Technology, Teaching Resources, Digital Transformation, Digital Educational Resources, Educational Resource Sharing, Educational Teaching Management, Personalized Educational Resources

1. The Concept and Development Status of Digital Transformation

Digital transformation is a new concept that refers to the digitization of various fields, achieving a high degree of integration between information and digitalization. This concept, utilizing cutting-edge

digital technologies such as cloud computing, the Internet of Things, and big data, creates more efficient, intelligent industries, services, and lifestyles. As human society gradually enters the digital age, the integration among people, machines, and objects will become increasingly tighter, forming a human-centric intelligent space full of computing and communication capabilities. In this new society, technology's role is not only to change the educational environment but also to transform human self-understanding more profoundly. The co-evolution between humans and technology in a world where humans, machines, and objects are integrated will receive more attention. In this new educational setting, various teaching activities, learning activities, and interactions will no longer be limited to human-to-human interactions but will also be widely present between humans and machines. In 2010, the Outline of Education Reform and Development Plan explicitly pointed out the revolutionary impact and importance of information technology on education development and incorporated educational informatization into the national informatization development strategy. The fundamental, holistic, and leading position of educational digital transformation in China has become a "fast variable" to better adapt to, support, and lead economic and social development. Digital transformation has become a common trend across industries worldwide, and academia has discussed educational digital transformation issues, consolidating new educational infrastructure and expanding digital resources as necessary prerequisites and establishing comprehensive, personalized, and user-friendly digital educational environments. Particularly in the field of information technology, the development speed of digital transformation is even faster. Digital transformation has positively impacted high school information technology education, providing students with a broader and deeper knowledge system and teaching resources and promoting the in-depth development of high school information technology education. Digital transformation also raises higher requirements, requiring educators to constantly innovate teaching methods and cultivate students' innovation capabilities and comprehensive qualities to meet the needs of modern society.

2. The Concept and Classification of High School Information Technology Course Teaching Resources

High school information technology course teaching resources refer to educational resources available for teachers and students to help students learn and master relevant knowledge and skills in information technology. According to the form and content of the resources, high school information technology course teaching resources can be divided into the following categories:

2.1 Digital Textbooks

Digital textbooks are teaching materials presented in digital form that can be used on various platforms such as computers, tablets, smartphones, etc. The advantages of digital textbooks include multimedia presentation, interactive learning, personalized learning, etc., which more accurately strengthen the bidirectional communication and exchange between teachers and students, making communication and interaction between students and teachers more extensive and further improving the comprehensiveness

of learning development.

2.2 Digital Laboratories

Digital laboratories are remote experimental platforms based on internet technology that enable remote experimentation operations and observations. The advantages of digital laboratories lie in addressing issues related to traditional laboratory space, equipment, and safety while expanding the scope of experiments and increasing experimental opportunities.

2.3 Digital Libraries

Digital libraries refer to library resources presented in digital form that can be accessed and used on the internet. The advantages of digital libraries include resource sharing, convenient retrieval, and full-text search capabilities.

2.4 Multimedia Teaching Courseware

Multimedia teaching courseware is a teaching resource based on multimedia technology, including various media such as images, audio, and video, which can be displayed and used in classroom teaching. The advantages of multimedia teaching courseware include enhancing students' learning interest, improving classroom efficiency, and interactivity.

2.5 Virtual Simulation Resources

Virtual simulation resources are virtual worlds created using digital technology, allowing students to operate and experiment within them, thereby better mastering relevant knowledge and skills in information technology.

3. Problems and Causes in High School Information Technology Course Teaching Resources

As digital transformation continues to develop, the learner-centered ecosystem created by educational digital transformation provides a broader range of services at a lower cost, accelerating the development of education suitable for everyone. However, it also presents a series of problems and challenges.

3.1 Insufficient Educational Resources

The development of educational resources requires a significant investment in human, material, and financial resources, as well as a considerable amount of time and effort. At present, due to a lack of investment, the shortage of teaching resources has become a significant problem in high school information technology education. The reasons can be analyzed as follows:

3.1.1 High cost of Teaching Resource Development

The development of teaching resources involves various aspects, such as hardware equipment, software tools, and teacher training, all of which require substantial financial support. In some areas with tight finances, there is less investment in teaching resource development.

3.1.2 Lack of Professional Talent

The development of teaching resources requires relevant technical knowledge, and currently, there is a widespread lack of professional talent.

3.1.3 Absence of Comprehensive Planning in Construction

Some regions lack overall planning and coordinated arrangements, leading to the decentralization and duplication of teaching resources, resulting in wasted resources.

3.2 Low Educational Quality

The existing high school information technology course teaching resources suffer from low quality. This is mainly due to the lack of relevant standards and norms, leading to uneven resource quality. The reasons can be analyzed as follows:

3.2.1 Lack of Standards and Norms for Educational Resources

Currently, there is a lack of unified standards and norms for educational resources in the country, resulting in an inability to guarantee resource quality.

3.2.2 Lack of Review and Evaluation Mechanisms for Educational Resources

At present, there is a lack of effective review and evaluation mechanisms for educational resources, leading to insufficient quality assurance.

3.2.3 Lack of Intellectual Property Protection Mechanisms

In the process of digital transformation, the protection of intellectual property rights for educational resources has attracted widespread attention. Due to the lack of effective intellectual property protection mechanisms, some high-quality resources are difficult to protect, resulting in a decline in educational resource quality.

3.3 Lack of Personalization and Innovation in Education

Existing teaching resources have the problem of lacking personalization and innovation. On the one hand, the development of teaching resources lacks in-depth understanding of students' personalized needs, analysis, and customized development, making it difficult to meet students' diverse learning needs. On the other hand, teaching resources lack innovation, and most resources are developed based on traditional education models, making them difficult to adapt to the needs of digital transformation. The reasons can be analyzed as follows:

3.3.1 Lack of in-Depth understanding of Students' Personalized Needs

In the development process of existing teaching resources, there is often a lack of in-depth understanding and analysis of students' personalized needs, leading to teaching resources being unable to meet students' diverse needs.

3.3.2 Outdated Educational Concepts and Methods

Currently, in some areas, educational concepts and methods are still at the traditional teaching stage, lacking awareness and practice of teaching innovation and transformation, leading to a lack of innovation and personalization in teaching resources.

3.3.3 Lack of Sharing and Communication Mechanisms for Educational Resources

The development and sharing of teaching resources require interdisciplinary, cross-regional, and cross-institutional collaboration and communication. The lack of effective resource-sharing and

communication mechanisms makes it difficult for teaching resources to achieve personalization and innovation.

In summary, as shown in Figure 1, existing teaching resources have problems such as insufficient quantity, low quality, and lack of personalization and innovation. These problems hinder the development of digital transformation in the field of high school information technology education. Therefore, it is necessary to strengthen the development and utilization of educational resources, establish a sound educational resource management mechanism, promote the sharing and communication of educational resources, and promote the digital transformation and modernization of high school information technology education.

4. Development Strategies and Measures for Constructing High School Information Technology Curriculum Teaching Resources

As the digital transformation continues to deepen, the importance of strategies and measures for the development of teaching resource construction grows increasingly vital. To bolster the connotative development of the national digital education strategy, comprehensive governance should be implemented, focusing on the construction of educational information infrastructure, the development and application of personalized education resources, resource sharing, and educational teaching management, with the aim of advancing the construction of high school information technology curriculum teaching resources.

4.1 Delve Deeply into the Potential of Personalized Educational Resources to Foster Educational Innovation and Development

4.1.1 Establish a Personalized Education Resource Development Center

Drawing inspiration from the success of the American Knewton online learning platform, which employs big data and artificial intelligence to offer personalized learning resources and pathways for students, a specialized center for personalized education resource development can be established in our country. This center would bring together interdisciplinary research teams, including experts in education, psychology, and computer science, to investigate the creation of personalized resources based on students' interests, abilities, and needs.

4.1.2 Adopt a "Learner-Centric" Educational Approach

The British "learner-centric" educational model emphasizes catering to the unique characteristics and needs of each student. Schools and teachers can provide personalized learning resources and services through methods such as case studies and project-based learning. For example, teachers can create research topics based on students' interests, enabling them to develop inquiry and problem-solving skills through hands-on activities.

4.1.3 Utilize Artificial Intelligence for Learning Behavior Analysis and Diagnosis

Leveraging technologies such as artificial intelligence, the analysis and diagnosis of students' learning behaviors can be conducted, providing precise learning resources and services. Renowned online

education platforms, like China's "Xueba Jun" offer personalized learning recommendations and resource suggestions by tracking and analyzing students' learning behaviors. For instance, by examining students' online learning activity records, weak areas can be identified and appropriate supplementary learning materials can be recommended. Such practices contribute to the promotion of educational innovation and the realization of personalized utilization of educational resources.

4.2 Vigorously Promote the Sharing of Educational Resources to Improve Their Utilization Efficiency

4.2.1 Establish an Educational Resource Sharing Platform

Drawing from the example of the University of California's "California Digital Library", this platform integrates high-quality educational resources from around the world, providing free access for students and teachers. Our country can build a unified educational resource sharing platform in collaboration with partners such as education authorities at all levels, schools, educational research institutions, and publishers. This platform would consolidate and share high-quality resources from both domestic and international sources, available at no cost for students and teachers.

4.2.2 Develop Educational Resource Sharing Policies and Standards

For instance, the European Union's "Open Educational Resources Policy Handbook" offers guiding principles and operational suggestions on educational resource sharing for member countries. Our country should establish and refine related policies and standards, including promoting the creation, dissemination, and use of open educational resources, ensuring resource quality, and protecting intellectual property rights. Government departments can develop corresponding policy measures to guide the healthy development of educational resource sharing.

4.2.3 Strengthen the Promotion and Dissemination of Educational Resource Sharing

Taking inspiration from South Korea's "Educational Sharing Content Project", the South Korean government actively promotes the sharing concept and raises awareness and usage of shared resources among teachers and students through online and offline activities. Our country can increase promotional efforts by involving government departments, schools, and educational institutions in hosting online and offline events, such as organizing educational resource sharing weeks and conducting training on educational resource sharing. These initiatives will help foster a culture of sharing, heighten awareness and usage of shared resources among teachers and students, and ultimately improve the efficiency of educational resource utilization.

4.3 Strengthen the Construction of Educational Informatization Infrastructure

The construction of educational informatization infrastructure is the foundation of teaching resource development, and its importance cannot be overlooked. Strengthening the construction of educational informatization infrastructure, building networked teaching platforms and virtual laboratories, and enhancing the digital level of education and teaching are crucial.

Firstly, strengthening the construction of network bandwidth ensures network stability and smoothness. Taking Singapore's development of educational informatization as an example, its comprehensive layout of high-speed network coverage provides schools with a high-speed, stable network

environment, allowing the smooth implementation of educational informatization applications. Our country should draw on its successful experience, optimize network infrastructure, and ensure the efficient advancement of the educational informatization process.

Secondly, improving educational hardware equipment enhances the quality of the digital teaching environment. Taking Finnish education as an example, it fully promotes the application of smart terminal devices in teaching, such as tablets and interactive electronic whiteboards, to meet various teaching needs. Our country should, in line with actual conditions, increase investment and improve the level of educational hardware equipment to enhance teaching quality.

Lastly, constructing virtual laboratories provides students with more realistic and vivid experimental experiences. Emulating Stanford University's online experimental platform in the United States, we can use virtual reality technology, simulation technology, and other means to build interdisciplinary, multi-level virtual experimental environments, providing students with practical operation opportunities. Analysis shows that virtual laboratories can improve students' experimental operation capabilities, cultivate innovative thinking, and possess high educational value.

4.4 Focusing on Strengthening Educational and Teaching Management to Improve Educational Quality

Educational and teaching management serves as a crucial pillar in ensuring the quality and effectiveness of teaching resources and plays a vital role in enhancing educational quality. To strengthen educational and teaching management, we need to adopt a series of specific measures to ensure the high quality and efficient operation of teaching resources.

Firstly, it is essential to establish a comprehensive teaching resource management mechanism. This includes formulating standards for the development, use, management, and evaluation of teaching resources. Taking Singapore's education management system as an example, a dedicated education management committee is established, responsible for creating clear teaching resource management norms and guiding principles, ensuring the quality and effectiveness of teaching resources are adequately reflected. Moreover, appropriate management strategies should be developed for different types of teaching resources to meet diverse educational needs.

Secondly, enhancing the evaluation and monitoring of teaching resources plays a crucial role in improving resource quality. We should learn from Australia's teaching resource evaluation system, establish a robust teaching resource evaluation and monitoring mechanism to timely identify and resolve issues in teaching resources. Australia's education department regularly invites experts to assess teaching resources, rectifying or eliminating non-compliant resources, ensuring high-quality and effective teaching resources are maintained.

In addition, strengthening teacher training and guidance is a crucial aspect of improving educational and teaching management quality. Finland's education system, for instance, emphasizes the professional competence and teaching abilities of teachers, providing them with extensive training and guidance resources to help them better manage and utilize teaching resources. Our country should

follow this example, increasing investment in teacher training and guidance, and enhancing teachers' educational and teaching management capabilities.

In summary, as shown in Figure 2, the development strategies and measures for teaching resource construction need to be gradually improved and implemented under the promotion of the digital transformation of education to adapt to the future development trends and demands of digital education.

5. Conclusion and Outlook

The digital transformation has undeniably become the key driving force for the growth of the educational sector, with the construction of high school information technology teaching resources being a crucial component of this shift. This article initially delineates the concepts and classifications of high school information technology teaching resources, delving profoundly into the pressing issues of resource scarcity, the need for enhancing educational quality, and the inadequacy of individualized and innovative education. Building on this foundation, the paper investigates the emerging trends and focal domains of future high school information technology curriculum teaching resources, encompassing innovative development and efficient utilization of digital educational resources, the establishment and practical application of virtual laboratories, the research and implementation of personalized educational resources, the optimization and promotion of online educational platforms, and the popularization of resource sharing and open education principles.

In summary, looking ahead, the advancement of digital education will continue to deepen, and the development and utilization of digital educational resources will constantly innovate. The future of high school information technology teaching resource construction will focus more on the development and application of personalized educational resources, while the optimization and popularization of online education platforms will also become an essential direction for development. Educational resource sharing and open education will gradually become widespread, promoting the sharing and exchange of educational resources and driving the rapid development of digital education. Therefore, we need to strengthen the construction of educational informatization infrastructure, actively explore and apply new technological means, improve the level of educational and teaching management, provide robust guarantees and support for the development of digital education, and promote the healthy development of high school information technology course teaching resource construction.

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