Research on the Construction of Digital Textbooks for Vocational Education

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Abstract. Vocational education digital textbooks have characteristics such as benchmarking, professionalism, and process, which are in line with the type, learning situation, and teaching characteristics of vocational education. In response to the shortcomings of traditional paper-based teaching materials such as lagging information updates, limited space and weight, resource waste, limited interactivity, difficulties in personalized learning, and inconvenient teaching evaluation, the construction of digital teaching materials is carried out based on the "Cloud Creation" platform. Typical cases are used to demonstrate vocational education digital teaching materials, providing good reference and inspiration.

Keywords: Vocational education; Digital textbooks; Automotive majors.

1 Introduction

Teachers, textbooks, and teaching methods are the entry points and breakthroughs for vocational colleges to deepen their connotation construction. The reform of vocational education textbooks is the foundation of the "three education" reforms, and digital textbooks can connect with the timeliness and urgency of industrial updates, promote deep integration of industry and education, better empower new quality productivity, and enhance the characteristics of vocational education types. Since 2013, with the issuance of a series of policy documents such as the national "Internet plus Education", the "13th Five Year Plan" for the Development of National Education, the "10th Five Year Plan" for the Development of ICT in Education (2011-2020), the "13th Five Year Plan" for ICT in Education, and the "Action Plan for ICT in Education 2.0", digital teaching materials and resource applications have quickly become the research focus of ICT in education and digital transformation in education. Zhong Qiquan proposed that digital textbooks are "teaching materials that combine various forms of expression (multimedia) such as textbooks, audio, still life, animation, and films."; Wang Run proposed that the evolution of the relationship between digital textbooks and paper textbooks has gone through four stages: subordinate matching, alternative imitation, extended assistance, and collaborative cooperation. He believes that the relationship between digital textbooks and paper textbooks will gradually shift and flip; Zhang Zhusheng believes that the construction of digital textbooks should be well controlled in terms of quality

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from the author level, content level, publishing unit level, and policy document issuance. The research on digital textbooks for vocational education in China mainly focuses on the application of digital technology in the field of vocational education, including the development of teaching resources, construction of teaching platforms, and innovation of teaching modes. The research on digital textbooks for vocational education in foreign countries is more in-depth and extensive, covering the application research of cutting-edge technologies such as virtual reality, augmented reality, and artificial intelligence in the field of vocational education; Some foreign higher education institutions have launched innovative practices in digital teaching materials, introducing online courses, interactive teaching tools, etc., to provide students with a more flexible and convenient learning experience[1].

2 The Characteristics of Digital Textbooks for Vocational Education

Traditional paper textbooks have long held an important position in education and teaching, but there are also some drawbacks, mainly reflected in:

Information update lag: Traditional paper-based textbooks have long production and printing cycles, slow content updates, and cannot reflect the latest knowledge and information in a timely manner, which affects the quality of teaching[2].

Space and weight limitations: Paper textbooks occupy space such as classrooms and student dormitories when in large quantities, and carrying paper textbooks is also cumbersome, making it difficult to carry and store.

Resource waste: The printing and distribution of a large number of paper textbooks cause certain pressure on the environment, and disposable paper textbooks may cause resource waste.

Limited interactivity: Traditional paper textbooks generally present static information in a form that lacks interactivity, and cannot provide a richer learning experience and guide students to actively participate in learning.

Personalized learning difficulties: There are significant differences in the learning needs and pace of different students, and traditional paper-based textbooks are unable to provide personalized learning paths and resources, which cannot effectively meet the personalized learning needs of students.

Inconvenient teaching evaluation: Traditional paper textbooks make it difficult to monitor and evaluate the learning status of students, and teachers also find it difficult to timely understand the learning situation of students and provide timely and effective feedback[3].

Vocational education digital textbooks present teaching resources, content, and tools in digital form through digital technology, multimedia technology, and network technology, providing efficient, flexible, and personalized learning resources and teaching support for vocational education. Vocational education digital textbooks have some unique features that help improve teaching effectiveness and student learning experience. The following are some characteristics of digital textbooks for vocational education:

Multimedia content: Digital textbooks combine multimedia forms of information such as text, images, videos, and audio, presenting more vivid and intuitive forms, which helps to improve learning effectiveness and interest.

Personalized learning: Digital textbooks can provide personalized learning paths and resource recommendations based on students' learning situations and needs, helping them better engage in self-directed learning and consolidation.

Strong interactivity: Digital textbooks support students to interact with the content of the textbooks, enhancing their learning initiative and participation through simulation experiments, online discussions, personalized Q&A.

Real time updates and iterations: The content of digital textbooks can be updated and adjusted at any time, reflecting industry development and technological progress in a timely manner, and maintaining the novelty and timeliness of the textbook content.

Teaching evaluation and feedback: Digital textbooks can collect student learning behavior and data, assist teachers in teaching evaluation and academic performance analysis, and provide support for teaching improvement and personalized guidance.

Cross platform use: Digital textbooks can be used on different devices, such as computers, tablets, mobile phones, etc. Students can choose suitable devices for learning according to their own needs and habits, improving flexibility and convenience.

In summary, digital textbooks for vocational education have the characteristics of multimedia content, personalized learning, strong interactivity, real-time updates and iterations, teaching evaluation and feedback, and cross platform use. They are important tools for modern vocational education teaching, helping to optimize the teaching process, improve learning effectiveness, and improve teaching quality.

3 The Path of Digital Textbook Construction Based on the "Cloud Creation" Platform

3.1 Introduction to the "Cloud Creation" Platform

The "Cloud Creation" platform for digital textbooks is a teaching material production and creation tool independently developed by Higher Education Press with its own intellectual property rights, which can assist in the intelligent, professional, and systematic writing of textbooks. This achievement has been selected as a technology innovation achievement in the 2023 Publishing Industry Technology and Standard Innovation Demonstration Project. Based on this platform, Higher Education Press has established a full process ecosystem from topic selection, production, review to online publishing and operational services. Relying on the open and collaborative production environment of "Cloud Creation", the collaborative work of authors, content editors, digital editors, and typesetters is achieved, which is constantly visible in the textbook production process. As of 2023, the "Cloud Creation" platform has compiled over 360 textbooks, officially published and launched 33 of them, and achieved sales of over 5000 copies[4].

3.2 The Basic Path of Digital Textbook Construction

The construction of digital textbooks for vocational education is a systematic project that requires planning and implementation from multiple aspects[5].

Requirement analysis: Firstly, conduct a demand survey in the field of vocational education to understand the needs and expectations of students, teachers, and the industry, and determine the development direction and focus of digital textbooks.

Planning and Design: Based on the results of demand analysis, develop a detailed plan and design scheme for the construction of digital textbooks, clarify key elements such as textbook content, teaching objectives, and technical support.

Content development: Hire professional education experts, field experts, and technical teams to promote the development of digital textbook content, including the integration, production, optimization, and customization of teaching resources.

Technical support: Build a technical platform and system support suitable for vocational education digital textbooks, ensuring the stable operation, data security, and user experience of digital textbooks.

Test improvement: Test and evaluate digital textbooks in actual teaching scenarios, collect feedback from teachers and students, and adjust and improve the content and functions of the textbooks in a timely manner based on the evaluation results.

Promotion and application: Actively promote digital textbooks, provide training and support for teachers, encourage teachers and students to use digital textbooks, and promote the application and promotion of digital textbooks in vocational education.

Continuous improvement: Regularly update and improve digital textbooks, timely obtain industry trends and user needs, maintain the freshness and practicality of digital textbook content, and continuously improve the quality and effectiveness of educational textbooks.

The basic process of constructing digital textbooks based on the "Cloud Creation" platform is shown in Figure 1.

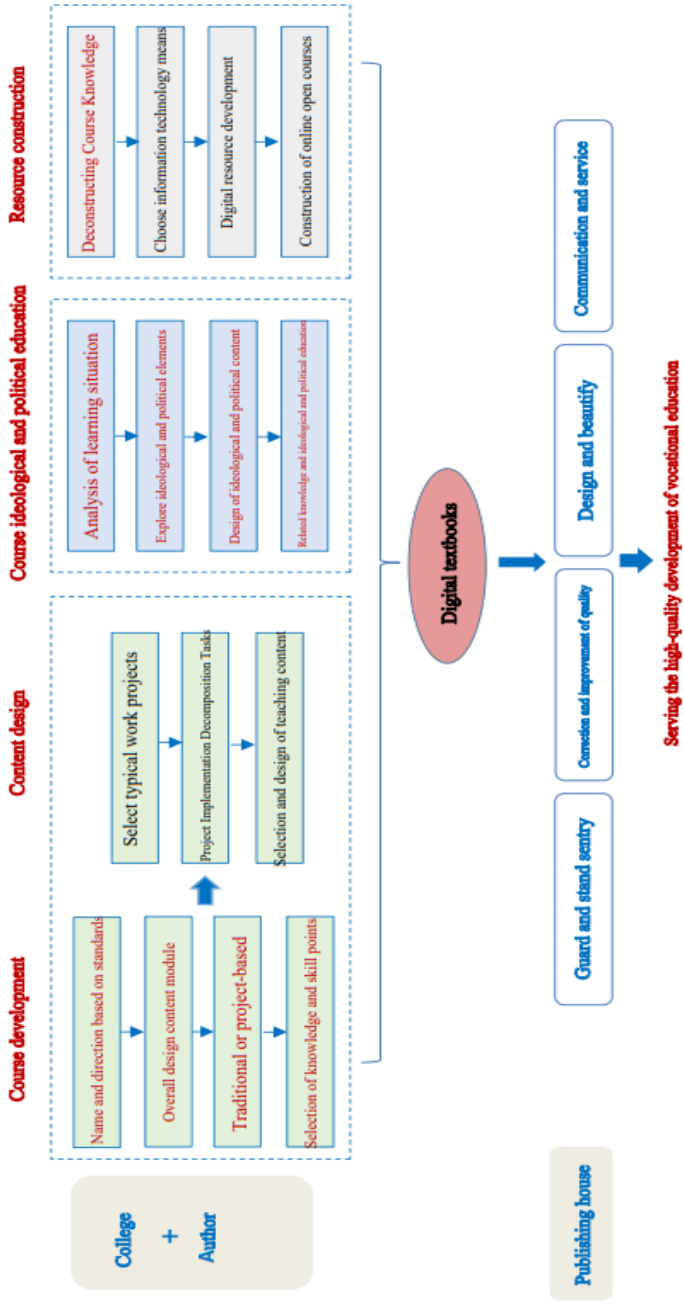

Fig. 1. Basic process of the construction based on the "Cloud Creation" platform

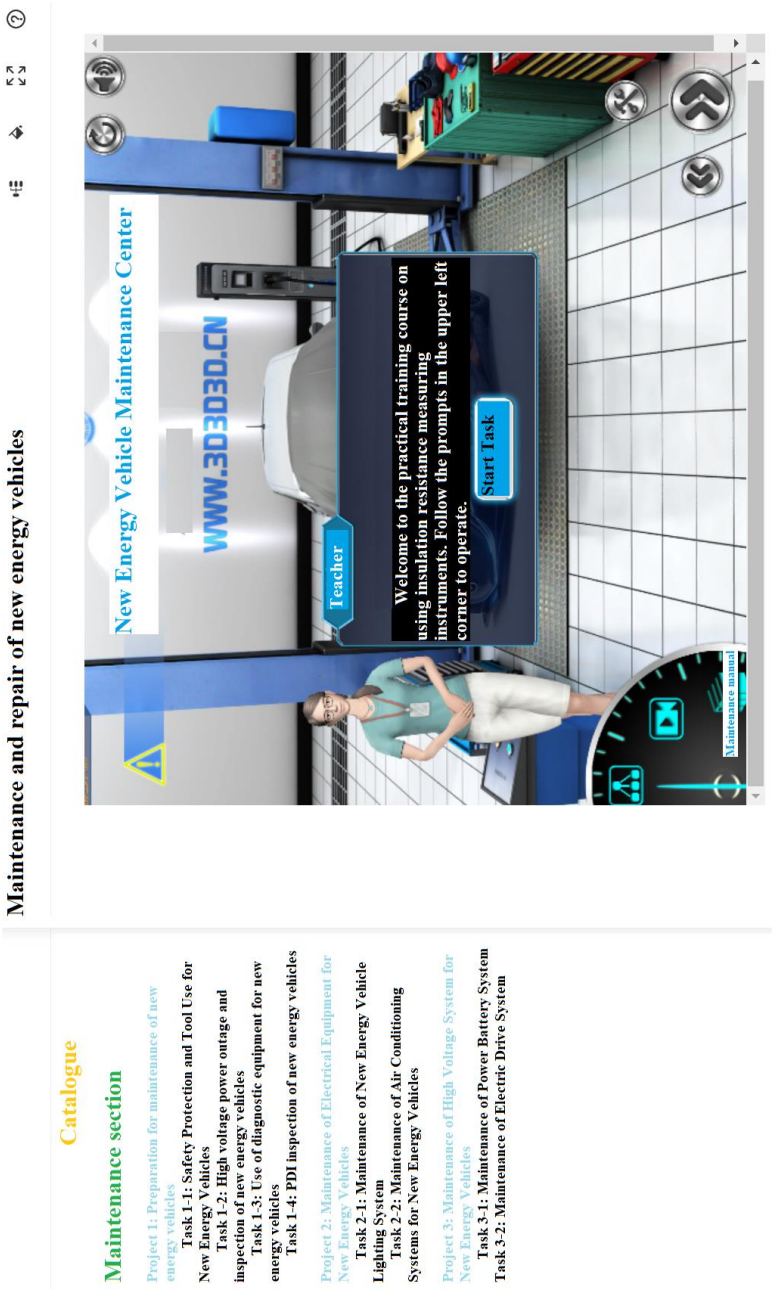

Fig. 2. Digital textbook display of "Maintenance and repair of new energy vehicles".

3.3 The Classic Case

Taking Hunan Automotive Engineering Vocational College as an example. In June 2023, the National Training Conference on the Construction and Application of Digital Textbooks for Vocational Education was held at Hunan Automotive Engineering Vocational College for the Promotion of Information Literacy among Teachers and Students. The school actively carries out a large number of digital transformation practices for paper-based teaching materials, with "5 new, 2 active, and 3 integrated" (that is, according to the requirements of the new curriculum standards, comprehensively using 5 new elements such as new ideas, new goals, new courses, new methods, and new evaluations, emphasizing the unity of cultivating students' knowledge, abilities, and qualities, and emphasizing activities and practices in education and teaching) as the characteristic of new forms of loose leaf teaching materials and integrated media digital teaching materials, which are popular among students[6]. In response to the difficult to concentrate observation of components, principles and structures that affect teaching effectiveness in classroom teaching, Hunan Automotive Engineering Vocational College has applied APP+AR technology to scan knowledge point images in textbooks, digitize corresponding teaching videos, 3D models, 3D animation principles, virtual interactive content, and develop a series of new forms of integrated digital textbooks. In classroom teaching, teachers can use the tablet app to scan the intelligent icons on books to call up corresponding video courses, 3D models, 3D animations, and realistic training sub tasks[7]. By using projectors to demonstrate teaching, mechanical structures, principle animations, disassembly and assembly videos, virtual simulations, and other course resources can be used for real-time interaction among students in the classroom, filling the gap in the flat presentation of textbooks and making the content in books more intuitive and vivid. Figure 2 shows the display of the digital textbook "Maintenance and Repair of New Energy Vehicles".

4 Conclusions

Compared with traditional textbooks, digital textbooks have gradually become an important tool in the teaching process due to their unique advantages. However, digital textbooks for vocational education also face some challenges in the development process, mainly including the following aspects:

Insufficient technical equipment: In some regions and schools, there is a lack of necessary digital equipment and network support, which limits the practical application and promotion of digital textbooks.

Insufficient teaching staff and technical support: Some teachers are not familiar with the development and application technology of digital textbooks, lacking training and support, which affects the quality and effectiveness of digital textbooks.

Difficulties in resource integration and sharing: The production of digital textbooks requires the integration of multiple resources, including text, images, videos, etc. However, there are still obstacles to obtaining and sharing resources, which affect the production and improvement of digital textbooks.

Lack of standardization in educational content: Some digital textbooks have uneven content quality, lacking standardization and authority, which restricts the application effect of digital textbooks in teaching.

Personalized learning is difficult: Digital textbooks need to provide different learning paths and resources according to the personalized needs of students, but achieving personalized learning still faces technological and resource challenges.

Teacher acceptance and willingness to use: Some teachers are accustomed to traditional teaching methods, have a low acceptance of digital textbooks, and have a weak willingness to use them. Therefore, it is necessary to strengthen teacher training and support.

The teaching evaluation mechanism is not perfect: the evaluation system for the teaching and learning effects of digital textbooks is not yet sound, making it impossible to comprehensively evaluate the actual role of digital textbooks in teaching.

Faced with the above challenges, it is necessary for educational institutions, industry enterprises, and government departments to work together to provide better technical support, teaching and training, resource sharing, and policy support, and promote the standardized development and application of digital teaching materials in vocational education.

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