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Original Paper

Digital Textbooks in Vocational Undergraduate Education: Concepts, Classroom Integration, and Strategies for Improving Teaching Quality

Lang Zuo[1*]

[1*] Foreign Language Teaching Department, Hainan Vocational University of Science and Technology, Haikou 571126, China

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Abstract

With the advancement of technology and the widespread of educational digitalization, digital textbooks serve as the carrier of vocational undergraduate education and are the key application of deep integration of digital information technology into teaching. They directly affect the quality of talent cultivation in vocational undergraduate education. Based on clarifying the connotation of digital textbooks for vocational undergraduate education, this paper analyzes the current status and existing problems of digital textbooks application, explores how to effectively integrate digital textbooks into classroom teaching, and proposes improvement countermeasures from four aspects: quality monitoring system, digital competence of both teachers and students, information-based infrastructure, and evaluation and feedback mechanism. The aim is to provide a reference for the development and application of new-form of digital textbooks in vocational undergraduate education.

Keywords

Vocational Education, Digital textbooks, Textbooks Application, Digital management

1. Introduction

The 2024-2035 Master Plan on Building China into a Leading Country in Education clearly calls for implementing digitalization strategy in national education and accelerating digital transformation for teaching materials. With the rapid development of information technology, the digital transformation in education has become an important approach for educational reform in the new era, playing a crucial role in promoting high-quality development of education and cultivating well-round talents adapted to the digital economy era.

Vocational undergraduate education, as an critical component of China's modern vocational education system, differs from ordinary undergraduate and junior college education. Characterized by distinct vocational, practical, applied and job-oriented features, it shoulders the mission of cultivating high-level technical and skilled talents and serving the transformation and upgrading of industries. Vocational education textbooks, as one of the key elements of teaching reform, play a significant role in talents cultivation. To optimize the structure of vocational education textbook system and upgrade their overall tier, it's a must to strengthen the development of vocational undergraduate textbooks and improve their presentation format of textbooks. Developing high-quality digital teaching materials has become a key direction in the current reform of vocational undergraduate colleges. (Lin, & Ding, 2025).

2. The Connotation and Current Status of Digital Textbooks

Digital textbooks are a kind of electronic books or e-readers that are innovatively developed based on the content and framework of traditional paper textbooks. They meet the requirements of course objectives, follow students' reading patterns and conform to their cognitive characteristics, easy for teachers to organize students and carry out learning activities (Song, Liu, & Gao, 2025). With the continuous advancement of technology, the connotation and boundaries of digital textbooks have also been continuously expanded. It can break away from the static nature of traditional textbooks and pay more attention to how technical means are integrated with teaching content. Through interactive tools, virtual simulations and other digital means, it ingeniously combines a variety of interactive resources such as text, pictures, audio, video and animations (Yang, Wang, & Mo, 2025), etc.

Many kinds of digital textbook carriers have been developed to offer various forms of display and distribution for textbooks and are no longer restricted by time and place. It can help students learn at their own speed according to their own learning progress and understanding level, and meet all the diverse learning requirements of the students.

At the same time, with the help of VR/AR technology, digital books have been made dynamic, open and interactive; thus, they can provide students with an all-encompassing interactive experience that continuously stimulates their interest in learning and enhances the quality of their study (Xu, 2024). Therefore, this new form of digital textbooks can provide more realistic and authentic learning support for job scenarios and better meet the cognitive needs of students in vocational undergraduate education, thus improving the overall quality and standards of vocational education.

However, at present, the development and research of vocational undergraduate digital textbooks in our country are still in the initial exploration stage. There are still many problems with the construction and application of digital textbooks: theoretically, the boundary of vocational education digital textbooks is unclear (Xu, 2024), and a unified definition has not been established; at the practical level, there is no management system in place to guide the development and construction of digital textbooks. The Construction Standards, Application Requirements and Evaluation Mechanisms have not been set up.

Although both in theoretical and practical classes, digital textbooks and class teaching have been used so far, there has been little exploration or combination at a deeper level. This is because some teachers are used to the traditional way of teaching; they only view digital textbooks as auxiliary display tools and fail to recognize the interactive and dynamic advantages of digital textbooks. Therefore, some of the general functions of digital textbooks, such as virtual simulations and process recordings, have not been fully achieved. At the same time, there is also a tendency to rely too much on digital technology and turn the classroom into a place for "showing off" technology. Teachers have created a superficial high-tech teaching environment; in fact, it is only a simple collection and mechanical use of digital resources. The main point and essence of teaching is lost in the technical form (Guo, & Zang, 2025).

Therefore, it is necessary to study how to effectively integrate new forms of digital textbooks into vocational undergraduate classroom teaching and how to comprehensively improve the application quality of digital textbooks to promote the high-quality development of digital textbooks in vocational education.

3. Implementation Methods for Integrating Digital Textbooks into Vocational Undergraduate Classroom Teaching

Although their forms have changed, the basic idea of digital textbooks for fostering and nurturing talents in education remains the same. They aim to transmit knowledge, improve abilities, and promote the all-round development of people by organising teaching activities efficiently and cleverly. Classroom teaching is the main battlefield of vocational undergraduate education and also the foundation where digital textbooks will be used. Therefore, in order to implement digital textbooks effectively in class, it is necessary to introduce new teaching methods, construct teaching platforms and promote data-driven teaching. By integrating all kinds of digital resources, interactive tools and learning data in the teaching process, it is possible to optimise the teaching structure and change the teaching model in vocational education.

3.1 Innovate Teaching Methods and Restructure the Classroom Teaching Process

Teachers in the traditional classroom mainly focus on the content in textbooks and teach through lectures; students are passive learners who only listen. Vocational education digital textbooks have incorporated many kinds of digital learning materials and support various teaching methods, such as task-based learning, outcome-oriented instruction and situation-based teaching. Instead of the fixed chapters of traditional paper textbooks, these organise the learning content based on projects and practical problems in real work situations. Students can learn better and be more active in class, as well as explore and cooperate in groups more easily. Thus, the purpose of digital textbooks is to promote student-centered teaching and learning.

Teachers are free to use the materials in the digital textbook to create a continuous learning path and link the preparation before class, exploration during class, and follow-up activities after class. Through

this way, students can learn by doing and use what they have been taught in daily life to improve their own learning results.

Teachers use the digital textbook platform to organise learning activities and give some homework before class. These can be micro-lecture videos, extra audio and reading materials, pre-class worksheets, online quizzes, etc. The above materials can help the students learn some basic knowledge on their own first. Based on the learning records and quiz results of students before class in the monitoring system of the platform, teachers can identify where students need more help and promptly adjust teaching materials and classroom activities.

During class, the teacher organises the teaching around the main learning goals and forms groups according to students' pre-class learning results and individual learning requirements. Therefore, we can implement differentiated teaching. With the interactive functions of digital textbooks and the support of learning platforms, many kinds of activities can be conducted by students, such as task analysis, group discussion and role-playing. The above will help the students participate more actively in class. Through group work, students can share ideas and different views, cooperate to achieve the learning goals, and develop skills in independent study, communication and collaboration. At the same time, the teacher will also ask some questions to help students think and discover the problems on their own. Thus, it is hoped that the students will be more interested in class, more active in learning, and achieve better educational results.

After class, teachers will use the students' pre-class learning data, their classroom performance and feedback, to plan the next day's teaching activities. Students work in groups to solve more difficult inquiry problems, and teachers assign differentiated homework and supplementary study materials according to the different needs of the students. The above activities help the students master what they have learned and apply it in daily life. With the addition of digital textbooks and the flipped classroom model, learning is no longer limited to what is taught in class or just learning theoretical knowledge. Instead, it combines the acquisition of knowledge, the cultivation of practical skills and professional qualities, etc., to all-roundly develop students.

3.2 Strengthen the Supporting Platform for Digital Textbooks and Diversify Human–Computer Interaction

Digital textbooks for vocational education are not the same as those in general higher education. Considering that vocational education is more practical and skills-oriented, it should make full use of digital technology to create an ideal learning environment and offer technical support for presenting and transmitting knowledge. Videos, animations, virtual simulations, and so on can be employed to show abstract ideas, complex structures, and possibly dangerous working environments in an understandable way for more people outside of traditional classrooms. The above visual and interactive methods can help students learn difficult material better and feel more interested in studying. Therefore, the digital textbooks will not be used alone for teaching. Otherwise, they can be linked with printed textbooks, smart classrooms, and other online learning platforms, Chaoxing Learning and Rain

Classroom, etc. All of the above resources will be collected in one place to enable the institution to share resources effectively, improve cooperation among staff, and achieve the goal of digital textbooks.

New technologies in the integrated platform should be utilised more effectively; for instance, augmented reality (AR), virtual reality (VR) and speech recognition can be employed to provide more flexible and convenient learning options for students and teachers. Many interactive and learning-supportive tools can be created, such as intelligent error correction, AI-assisted homework grading, personalised study aids, etc. These tools can help teachers meet the different learning needs of students and provide learning materials at various levels according to students' own ability. At the same time, they can have easier communication with teachers and other students to increase students' participation in learning. Through these forms of interaction, students can learn better by being more involved in the material and experience it more vividly.

In addition, a good organisation system for online resource libraries should be set up to support teaching and learning. A teaching resource library should store teaching materials, courseware, teaching methods and teachers' practical experiences, and a student learning resource library can provide study plans, supplementary materials, etc., and give students a platform for study sharing. By putting these resources on the integrated platform, we can promote communication and cooperation among teachers and students, foster the sharing of high-quality teaching materials, and thereby improve the quality of education for all.

3.3 Adopt a Data-Driven Approach to Promote Intelligent Digital Teaching

A Digital Textbook Platform can collect and store data on students' learning behaviour automatically before, during and after class. The above data include the student's learning progress, the time spent on learning activities, degree of participation in class, test scores, etc. By bringing together data from both classroom and independent learning activities, the platform enables teachers to monitor students' learning throughout the entire teaching process. More importantly, this information can help teachers find out what problems students are having in learning and change their teaching methods accordingly. Thus, a continuous loop will be formed to collect learning data, analyse students' learning results, adjust teaching methods according to this analysis, and then evaluate the results of learning. It will help promote the development of data-driven and intelligent teaching.

Based on the study of students' learning records and behaviour in class, teachers can better understand their study habits, difficulties in learning, and general comprehension. Therefore, they know how to change the content of teaching and other ways to run a class. For example, teachers can divide the students into small groups according to their differences in ability, give different tasks of varying difficulty, conduct group activities, and offer individual assistance. The above will help us respond better to the different abilities and learning speeds of the students. In combination with the learning process data, post-class evaluation results can also be used to better track the progress of all students. Teachers can observe students' ways of thinking and studying, understand how these students learn, and thus provide more tailored support for any difficulties students may be encountering in their studies.

Therefore, teachers can tailor the selection and presentation of teaching materials according to the actual needs of the students. It is no longer about teaching by experience; now, we use data to help students improve gradually and grow in their own ways.

4. Strategies for Improving Classroom Teaching Quality through the Integration of Digital Textbooks

For digital textbooks to become an effective part of vocational undergraduate education and contribute meaningfully to teaching quality, their development and application need to be supported by more than practical implementation measures. A sound system of institutional policies, educational resources, and technological support is also essential.

4.1 Establish a Comprehensive Quality Assurance System for Digital Textbooks

Digital textbooks are a relatively new type of educational material in vocational education, and their design, development and use in the classroom are still in their infancy. Therefore, a general quality assurance system should be established to guarantee the quality of the content and its effectiveness in teaching practice. The relevant department should establish a uniform standard for the design and development of digital textbooks, specify what should be included in them, and set clear requirements for content selection, interactive design, data organisation and presentation of learning materials, etc.

On the one hand, digital textbooks should have appropriate political and educational aims, guarantee the accuracy of content and data security, and meet the particular demands of vocational undergraduate education. They should also keep up with the changes in the industry and incorporate new technologies, professional standards, production processes and workplace conditions into teaching materials. In addition, the interaction functions should meet the different teaching and learning needs of teachers and students.

At the same time, the use of digital technology should be in service of education, not for its own sake. Too many multimedia effects and interactive functions can distract students from learning the actual content and hinder their deep understanding and systematic development of knowledge. Therefore, it is necessary to choose technologies that truly support teaching and learning and not add digital features merely for the sake of innovation. Clear technical specifications need to be set for the development and application of digital textbooks. The following are examples of such requirements: selection of development tools, technical standards and compatibility conditions for all kinds of learning resources, virtual simulations, audio and video materials, interactive exercises, etc. Such measures would help ensure consistency in the development, application, and management of digital textbooks.

4.2 Enhance the Digital Literacy of Teachers and Students

Teachers and students are the main users of digital textbooks, so their ability and willingness to learn new technologies will affect how well these resources are utilised. Teachers' training in the application of digital textbooks should be included in their continuous professional development. The institution can arrange regular training for teachers, set up professional learning communities to learn about

relevant theories and share practical experiences among teachers, organise teaching competitions and experience-sharing activities, etc. The above will help the teachers learn some new technologies and feel more comfortable using digital textbooks. Teachers should be motivated to try new teaching methods and improve their skills in integrating various kinds of digital resources in class. By making good use of the dynamic, interactive and attractive characteristics of digital textbooks, we can create richer learning experiences and enhance the quality of teaching.

Students' Digital Literacy is also a problem; it affects how well and deeply they can learn with digital textbooks. Therefore, the relevant departments should take systematic measures to foster students' ability to use digital technology in learning. It may also offer courses in information technology and artificial intelligence and provide practical training to improve students' technical knowledge and operating skills. Universities can also hold workshops and lectures on the effective use of digital textbooks to introduce their main features and show how to access learning materials, use virtual simulation tools and take part in interactive classes. Periodically assess the students to find out what they have learned and where they need more help. Clear rules need to be released on when and how to use digital textbooks in class and other training. The above provisions can help students avoid the superficial and unproductive use of digital resources, cultivate good digital learning habits, and make full use of technology to enhance their theoretical knowledge and practical skills.

4.3 Strengthen the School's Overall Digital Infrastructure

The quality of a university's hardware facilities and network environment will directly affect how well digital textbooks can be used for teaching and learning. To create a good environment for using them, institutions need to increase investment in digital infrastructure and improve the overall teaching environment. Provide a stable, high-speed campus network, offer sufficient mobile phones, build good smart classrooms, establish digital training facilities and online teaching platforms with many functions, provide a large number of digital resource libraries and reliable technical services, etc. All of the above facilities and services will provide the necessary technological basis for the effective use of digital textbooks in vocational college education.

Improve the physical environment of the university, and at the same time, all-weather digital platforms should be built to integrate electronic textbooks with the existing teaching management system and practical training management platform. Standardise the data in all the systems and integrate the resources so that different departments can share information and use the teaching data together. Improvements will be made in the compatibility and interoperability of all the supporting platforms. Such integration would make digital textbooks easier to incorporate into different teaching and training activities and support their wider and more effective use in vocational undergraduate education.

4.4 Improve the Evaluation and Feedback Mechanism for Digital Textbook Use

A well-designed evaluation and feedback mechanism is essential for understanding how digital textbooks are used and identifying areas for improvement. Administrators should regularly evaluate how teachers and students use them and make full use of the data collected in teaching and learning.

Other related indicators are: how much time students have been studying from textbook materials, their opinions on teaching materials and courses, the teachers' teaching experience, and students' performance in practical training, such as their ability to follow operating procedures. The above analysis provides some clues as to how digital textbooks are used in actual teaching, and can be used to improve the content and presentation of these textbooks.

Gather feedback from teachers and students regularly via questionnaires, interviews, etc., through all sorts of means. Their experiences and suggestions can help universities identify practical difficulties and make timely adjustments to the ways digital textbooks are used. Universities can also organize workshops or experience-sharing sessions for teachers to discuss the good points and problems of using them in the classroom. Then, the good ways can be optimised and recorded for use in other classes or teaching situations. At the same time, we should also learn about changes in related technology and industry practices. Update the content of the digital textbooks as needed, and enhance the functions of the platform according to the demands of users and teachers. Through the continuous process of evaluation, feedback and correction, the quality of digital textbooks will be improved, and their application in vocational undergraduate education will be enhanced.

5. Conclusion

The development and use of digital textbooks have become an important part of the ongoing digital transformation of education. Their significance, however, goes beyond the introduction of new forms of teaching and learning resources. More importantly, they create opportunities to rethink the learning environment, enrich instructional approaches, and reshape the way teaching and learning take place. For vocational undergraduate institutions, the key is not simply to adopt digital textbooks, but to make meaningful use of them in response to the needs of vocational education. This calls for continued efforts to improve their design and application, integrate them into everyday teaching and practical training, and explore teaching approaches that make effective use of their digital features. When supported by appropriate infrastructure, capable teachers, and well-designed learning activities, digital textbooks can contribute to more engaging and effective learning experiences, strengthen students' theoretical knowledge and practical skills, and support the high-quality development of vocational undergraduate education.

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