

Research on the Construction of a Three-dimensional Textbook System for “Optical Fiber Communication Technology” Based on First-class Professional and Gold Course Construction

Li Luo*^{corresponding author}, Jie Li, Chuan Chen, Yu He, Wenjuan Wu, Xiuying Gao

College of Optoelectronic Engineering(Chengdu IC Valley Industrial College), Chengdu University of Information Technology, Chengdu, Sichuan, China, 610225

Abstract: This study aims to integrate the goals of cultivating applied and innovative talents in universities and construct a three-dimensional textbook for “Optical Fiber Communication Technology” that corresponds to the connotation of first-class curriculum construction in terms of content, methods, and characteristics. In terms of content composition, it not only reflects traditional knowledge points and logical thinking, but also integrates modern optical fiber communication technologies corresponding to “dual-degree” levels, such as optical quantum communication, terahertz communication, big data, cloud computing, and the Internet of Things (IoT). Based on the principle of prominent advantages and distinctive features, we will focus on supporting the construction of a teaching system centered on first-class courses and first-class majors, creating three-dimensional teaching materials with distinctive characteristics of the school’s major. Based on the international version of the curriculum advocated by the Ministry of Education, which represents the international level of Chinese characteristics, we will optimize the overall teaching platform and resource construction, and improve the overall teaching level of characteristic majors.

Keywords: Three-dimensional textbook system; Optical Fiber Communication Technology; First-class curriculum construction

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1. Introduction

Due to the relatively short development history of applied universities, it is difficult for teachers to find high-quality textbooks that suit the curriculum. Existing “applied” textbooks are mostly written by teachers from high-level universities, emphasizing theoretical and academic aspects excessively, with poor integration of theory and practice, and lacking prominent features of ideological and political education in courses.

1.1 Insufficient coordination in textbook content. The current lack of coordination between textbook content and the development of optical fiber communication technology hinders the synergy between theory and practice. This is mainly manifested in slow updates of textbook content and insufficient research and application of new teaching forms, technologies, and methods, which fail to meet the needs of cultivating applied talents.

1.2 Textbooks do not pay enough attention to students’ individual differences. Existing textbooks can comprehensively introduce the basic knowledge of optical fiber communication technology, but often overlook the individualization of students and their different abilities. They lack sufficient focus on fostering students’ autonomy and research-oriented learning, as well as nurturing their innova-

tive and creative abilities. They fail to provide adequate support for personalized autonomous learning. By introducing teaching models such as flipped classrooms and blended groupings, the traditional teacher-centered teaching model is changed, placing students at the center of educational activities. Taking into account differences in students' individual cognitive styles and learning methods, appropriate methods are chosen to stimulate students' initiative in inquiry and self-learning abilities.

1.3Lack of accompanying textbook resources for online courses. The course is primarily taught through online open course “Fiber Optic Communication Technology” produced in 2023, and adopts a blended teaching approach. However, there is currently a lack of seamlessly integrated new forms of teaching materials and digital resources to complement online courses, which hinders the full potential of online open courses. Developing digital resources for this course based on existing online open courses can leverage the functions of the course website and facilitate both “teaching by teachers” and “learning by students.”

2. Construction Content

The digital resources of “Optical Fiber Communication Technology” are primarily supplemented by four aspects: “promoting innovation,” “expanding forms,” “high positioning,” and “OBE (Outcome-Based Education),” as shown in Figure 1.

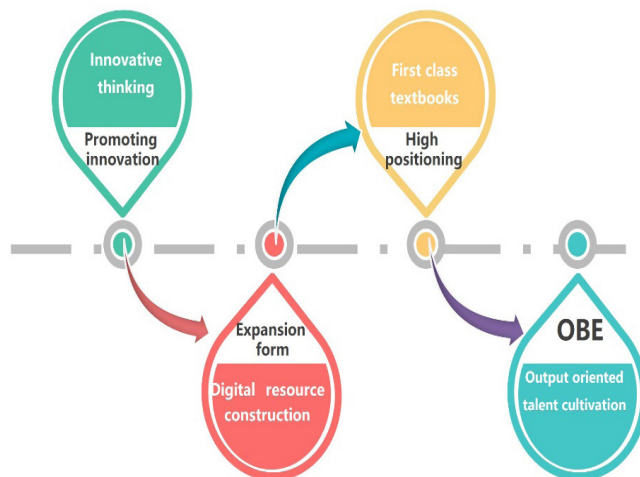


Figure 1: Digital Resource Construction Based on Stereoscopic Textbook of Optical Fiber Communication Technology

2.1 Innovative Thinking Perspective

The digital resources of “Optical Fiber Communication Technology” innovate from new situations, new technologies, and new methods, guiding students in innovative learning, research, and practical thinking, focusing on cultivating students' abilities to think independently, analyze, and solve problems. In the process of problem-solving, students are gradually cultivated to form information and professional literacy, and learn to use innovative thinking and disciplinary advantages to solve technical problems related to their majors.

2.2 Construction of Diversified Digital Resources

The flexibility of digital resource content, diverse forms of presentation, and emphasis on student individual development are the trends in the development and reform of textbooks in China and are significant breakthroughs in the traditional textbook reform of universities. The construction of digital resources under the new form of stereoscopic textbooks is shown in Figure 2.

2.2.1 New Forms

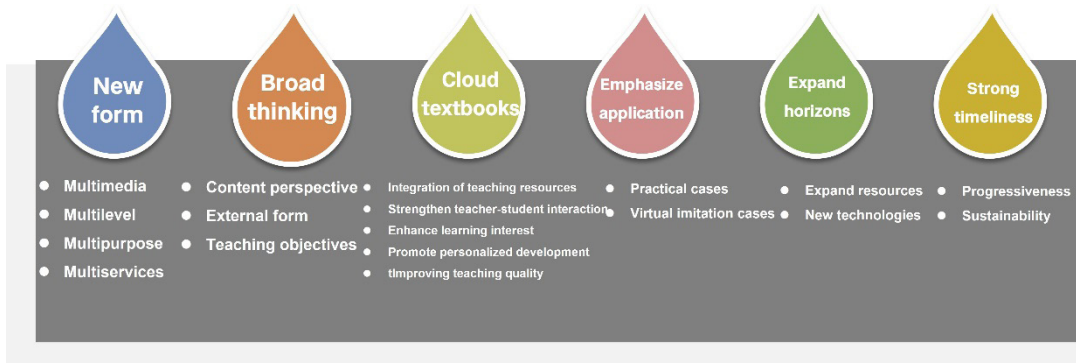


Figure 2: Construction of Digital Resources under the New Form of Stereoscopic Textbooks

Constructing new forms of digital resources for “Optical Fiber Communication Technology,” integrating multimedia, multi-mode, multi-purpose, and multi-level teaching resources, and various teaching services. Adding visually strong QR code micro-videos, supplementing updated practical cases, expanding content to meet the personalized characteristics of students, reflecting integration, correlation, openness, and interactivity, enhancing educational functions, and breaking the limitations of paper textbooks.

2.2.2 Broad Vision

The content is more comprehensive, including main knowledge, cases and case analysis, exercises, question banks and answers, teaching plans, courseware, and other content. The external form is richer, including main textbooks, accompanying electronic materials, teaching websites (such as MOOCs on Xuetang online Online), and online publications. The teaching objectives are more specific, focusing on both “teaching” and “learning,” promoting mutual learning, providing teaching references for teachers, and offering learning guidance for students.

2.2.3 Cloud Textbooks

The advantage of cloud textbooks lies in better integration of teaching resources, strengthening interaction between teachers and students, increasing students’ interest in learning, promoting personalized development, and improving teaching quality. After unremitting efforts by the course team, the MOOC for “Optical Fiber Communication Technology” has been successively launched on the international and domestic versions of Xuetang online in 2023. Utilizing this MOOC resource to develop cloud textbooks supplements classroom teaching activities for teachers and enables students to engage in independent learning after class.

2.2.4 Emphasis on Application

Write practical cases that are easy to understand and close to real-life situations, select those with practical value and representativeness as typical cases to increase students’ interest in learning and achieve better teaching results.

2.2.5 Broadening Horizons

Add “Expanded Resources” and “Empowering New Technologies” sections in online and offline teaching using QR codes, allowing students to learn anytime and anywhere using mobile internet, giving life to the course, and broadening students’ learning horizons.

2.2.6 Timely Relevance

Digital resources select basic teaching content while also appropriately introducing the latest developments such as optical quantum communication, terahertz communication, cloud computing, Internet of Things, blockchain, and popular new technologies like 3D printing, AR, ensuring the advanced nature of course content and the sustainability of textbook development.

3. Conclusion

This study actively constructs digital resources for the course and organically integrates them with printed textbooks, fully leveraging the complementary advantages of different information technologies and online media resources. For example, the material library can facilitate student browsing and downloading, while teaching packages and course groups can assist teachers in completing teaching tasks and improving teaching quality. By organically combining printed textbooks, audio-visual materials synchronized with the cutting-edge development of optical fiber communication technology, and online materials as the main teaching resources, a three-dimensional and integrated teaching mode is formed, better meeting the needs of talent cultivation in the era of educational informatization, fully embodying the principle of “student-centered,” highlighting the integration of “learning” and “doing,” and promoting the construction of first-class course materials. This lays a solid foundation for further planning and publishing of digital courses and new forms of teaching materials by leading publishers such as higher education publishing houses, scientific publishing houses, and machinery industry publishing houses.

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