

Practice and Research on the Construction of Online Course Resources for "Water Treatment Technology"

Chunyi Duan

Guangxi Polytechnic of Construction, Nanning, 530000, China

Abstract: *In response to the characteristics of students' online learning, the online course teaching team of "Water Treatment Technology" has focused on building course standards that meet the requirements of water treatment positions, teaching content that integrates "post course competition certification", supporting resources to improve teaching efficiency, and industry technology development case libraries. In the context of the development of information technology and the transformation of communication forms, online courses, as a product of the combination of the Internet and education, have broken the temporal and spatial boundaries of teaching and overturned the traditional methods of classroom teaching and learning. Their flexibility, sharing, and other characteristics are becoming increasingly prominent, especially in some general courses, their application value is more directly reflected.*

Keywords: *Teaching reform; Water Supply Treatment Technology; Online courses; Resource construction*

1. Introduction

The field of water treatment, as one of the current key areas of national environmental protection, is of great significance in building a community with a shared future for mankind, harmonious coexistence between humans and nature, and sustainable utilization of resources. Water Supply Treatment Technology "is a knowledge guarantee system for drinking water safety in the field of environment, and is also a core professional course for students majoring in water supply and drainage engineering technology in vocational colleges. Knowledge of treatment principles and logical thinking of process flow are also beneficial for personal development and scientific formulation of job and career plans. The online course on thinking guidance and case analysis of "Water Supply Treatment Technology" has professional characteristics, and its construction and application further provide reference application cases for the sharing of teaching resources in the field of water supply and drainage engineering technology in vocational colleges.

2. The Value of Online Course Resource Construction for "Water Treatment Technology"

The construction of online course resources for "Water Supply Treatment Technology" is integrated with the current digital teaching reform and optimization of information technology teaching methods, which can effectively improve the teaching quality and efficiency of the course. At the same time, it takes into account the learning needs of vocational water supply and drainage engineering technology majors and enterprise technical personnel, and more widely meets the needs of learners with different needs.

2.1 Following the trend of educational development

In recent years, with the rapid development of information technology represented by mobile communication technology, network technology, and integrated circuit technology, the mobile internet has been widely applied, overturning people's lifestyles and profoundly changing the form of education. The high-quality digital online courses jointly constructed by experienced professional teachers and industry experts can effectively expand teaching time and space, conform to the learning and media contact habits of student groups, and the open and shared nature of the courses provides conditions for the expansion of the benefits of high-quality educational resources.

2.2 Improving the Quality of Curriculum Education

Online courses mainly complete corresponding online learning tasks in the form of individuals or groups. By participating in group learning activities, it can significantly promote learners' behavioral efficiency and also serve as a social catalyst. The collaborative participation of learners in completing learning tasks and engaging in online communication activities enhances their awareness of being evaluated by others, thereby increasing their level of excitement and reducing their sense of monotony and psychological fatigue caused by loneliness. An online course that is free and open to the public, and its course construction teachers, including professional and technical personnel from enterprises and universities, will be more attentive, cautious, and pursue excellence in both teaching content and methods. The online course "Water Treatment Technology", carefully designed and carefully crafted by the teaching team, has further improved the teaching quality of the course with better quality.

2.3 Improve course learning efficiency

The online course of "Water Treatment Technology" is a professional course offered in an open and shared format. The construction of the online course provides a guarantee for the effective implementation of the mixed teaching mode of "Water Treatment Technology" course. Before class, teachers guide students to learn the basic concepts and knowledge of the course through online courses, allowing them to enter the classroom with questions, improving their self-learning ability, enabling them to have more initiative in learning, and stimulating their learning enthusiasm. This can also break the limitations of time and space, connecting pre class, in class, and post class, effectively improving students' learning efficiency.

2.4 Matching the needs of vocational education

According to the "Statistical Bulletin on the Development of National Education in 2022" released by the Ministry of Education in July 2023, there are a total of 3013 higher education institutions in China, including 1489 vocational (vocational) colleges, with an average size of 10168 students. Compared to undergraduate education, vocational education places more emphasis on the practicality and practicality of courses. Based on this, the leader of the teaching team for the online course "Water Treatment Technology" has established a team through cross school cooperation and school enterprise linkage to jointly build online course resources for water treatment technology. From the selection of content to the design of teaching methods, consideration is given to the learning characteristics of vocational students, allowing the online course to be more widely shared and connected with learners from different regions.

3. Content of online course resource construction for "Water Treatment Technology"

3.1 Develop course standards for bench marking water treatment job requirements

A scientific and reasonable curriculum standard not only allows the online teaching team of "Water Treatment Technology" to have a clearer understanding of teaching tasks, but also enables students to have a comprehensive understanding of the course content and learning objectives, which is an important component of the standardized construction of the course.

The teaching team first clarifies that through the online course "Water Treatment Technology", students need to have a certain knowledge of water treatment principles, correct operational management thinking, be able to grasp the new trends, technologies, and methods of water treatment, have a sense of social responsibility, innovation, collaboration spirit, labor spirit, and craftsmanship spirit, and become proficient in brand and planning, capable of doing things, and capable of being a person, High quality applied talents who can comprehensively analyze and solve the problems of "Water Supply Treatment Technology". Based on this overall direction, the teaching team has conducted in-depth research on the relevant positions of "Water Treatment Technology" and developed course standards for the specific needs of the positions, including refining the training objectives of quality, knowledge, and ability, clarifying the course content outline, creating new forms of teaching materials, and providing specific explanations on the methods and methods of course assessment.

3.2 Integrating "Post Course Competition Certificate" to Restructure Teaching Content

The online course "Water Supply Treatment Technology" is a professional skill course aimed at university students, enterprise employees, and social learners majoring in water supply and drainage

engineering technology. In order to achieve the comprehensive education goal of "job course competition certificate" integration, the teaching team must break away from the original theoretical course content arrangement. On the basis of in-depth research, the teaching team has aligned with various standards and requirements: firstly, the talent training standards for the Water Supply and Drainage Engineering Technology major; The second is the occupational standards for positions related to "Water Treatment Technology"; The third is the professional certificate standards for water treatment operation administrator certificate, 1+X sewage treatment professional skill level certificate (intermediate), etc; Fourth, China International "Internet plus" Undergraduate Innovation and Entrepreneurship Competition, National Vocational Skills Competition and other related competition requirements. At the same time, the teaching team injects innovative and entrepreneurial thinking, and restructures the course teaching content. The restructured course teaching content is divided into 7 scenarios and 31 typical job tasks, providing systematic knowledge and ability training on "Water Treatment Technology", focusing on students' understanding and practical operation of "Water Treatment Technology", ensuring the practicality and cutting-edge of the content.

3.3 Provide supporting resources according to learning needs

Rich course resources can better enhance the value of courses and enhance learning outcomes. The teaching team, based on years of teaching experience and a grasp of the learning characteristics of the student group, designs a large number of supporting resources according to the course content for students to choose to learn [1]. The supporting resources for the online course "Water Treatment Technology" mainly include four categories: first, learning consolidation and testing, mainly including unit tests and final exams; The second is interactive communication themed discussions, where corresponding discussion topics are set at the end of each module to guide students to combine knowledge and skills with practical applications; The third is to expand the learning category, including industry information, supplementary reading, and team teachers sharing the latest industry trends, new technologies, new ideas, etc. in a timely manner, so that students can obtain practical and effective industry information from online course learning, and also subtly cultivate students' habits of paying attention to the environment and society, forming a sense of keeping up with the times; The fourth is skill application, including the certification center and the competition area. The certification center mainly publishes the certification standards, relevant learning materials and certification information, such as vocational skill grade certificate (intermediate). The competition area gathers the latest information about the China International "Internet plus" College Students Innovation and Entrepreneurship Competition, the National Vocational Skills Competition and other related events, and shares the past excellent entries or examples to provide students with learning references.

3.4 Keeping up with the forefront of the industry and building a brand case library

Water Supply Treatment Technology is a highly practical course. The improvement of students' water supply treatment operation and management ability needs to accumulate experience from practice under the guidance of theory and absorb essence from the classic practices of typical tasks. To this end, the teaching team closely followed the forefront of the industry, collected and integrated relevant data at the first time through WeChat official account, Tiktok number, magazine columns and other media, and created a continuously updated case base of new projects and new technologies of Water Supply Treatment Technology.

4. Strategies for the Construction of Online Course Resources for "Water Treatment Technology"

4.1 A teaching team with tripartite collaboration between schools and enterprises

The leader of the teaching team for the online course "Water Treatment Technology" broke the limitations of the school and conducted cross school and cross-border collaborations. The teaching team members come from enterprises, universities, and industry associations, all of whom have high teaching standards; There are two professional practitioners who are leading enterprises in their respective fields within the province. They have rich experience in "Water Treatment Technology" and a teaching team jointly formed by the school and enterprise to leverage their respective advantages, making the course teaching both vocational and expanded; There is both a systematic knowledge framework and operational application guidance to promote the comprehensive educational goal of "combining theory with practice, cultivating morality and technology together, and integrating knowledge and action".

4.2 Curriculum positioning of combining education and training

In June 2023, the National Development and Reform Commission, the Ministry of Education, and other eight departments jointly released the "Implementation Plan for the Empowerment and Enhancement of Vocational Education Industry Education Integration (2023-2025)", which emphasizes "deepening the integration of industry education and school enterprise cooperation". Only by adhering to the principles of "complementary advantages, resource sharing, mutual benefit, and common development" can the cooperation concept between schools and enterprises be implemented and deepened. The newly revised "Vocational Education Law of the People's Republic of China" clearly states that vocational school education and vocational training should be equally emphasized, and the legal responsibility of vocational colleges to implement both academic education and training should be implemented simultaneously. The online course of "Water Treatment Technology" clearly defines the course positioning of combining education and training. In the course design, it combines the "education" style training objectives of students with the "training" style service attributes of socialized talents, so that the online course is not only aimed at students on campus, but also meets the job skills training needs of enterprise employees. The school enterprise jointly builds a high-quality online course on "Water Treatment Technology", which feeds back to the industry and improves the quality of technical and skilled talent training, making online courses an effective channel for deep cooperation and collaborative education between schools and enterprises.

4.3 Granular presentation of curriculum system

High quality online courses do not directly upload traditional classroom teaching content to the internet after recording, but rather consider the fragmented reading habits of students in the online media environment. In order to adapt to the characteristics of online learning for students, the teaching team has reorganized and carefully designed the content that was originally taught for 45 minutes, transforming it into several granular content of about 5 minutes. Each granular content explains a relatively independent knowledge point, committed to explaining the knowledge points in detail and thoroughly, which is conducive to students using fragmented time to learn, absorb, and understand, and also facilitates students to selectively learn according to their own needs[2].

4.4 The subtle effect of practical education

The goal requirement of the new Vocational Education Law of the People's Republic of China for the cultivation of vocational education talents is to cultivate people with moral character and cultivate both moral and technical skills. The online course of brand management is closely related to social development and student growth. It plays an important role in expanding students' knowledge, optimizing their ability structure, improving their cultural quality, helping them establish correct values, and guiding them to have lofty ideals. In order to fully leverage the main channel role of cultivating morality and talents, and cultivate comprehensive talents with both morality and technology, the teaching team of the online course "Water Treatment Technology" pays attention to highlighting the three major characteristics of the course in teaching. One is to deeply explore the teaching content and achieve seamless integration of ideological and political elements with professional knowledge. This course organically integrates knowledge points such as principles, applications, technologies, operations, management, fault analysis and resolution, with corresponding ideological and political elements such as values, ideas, thinking, logic, emotions, etc., achieving a subtle educational effect. The second is to use innovative teaching methods to gradually solidify students' sense of learner ownership. This course is student-centered and teacher led, implementing teaching methods such as theoretical guidance from teachers on campus, industry experts speaking through personal examples, typical case demonstration and infiltration, internalization of exploration and discussion, and externalization of task experience in practice. The third is to incorporate ideological and political awareness into the course assessment content, effectively urging students to combine moral and technical skills. This course constructs a multi-dimensional assessment mechanism that combines the learning process and results, professional abilities, and ideological and political awareness, which can promote the improvement of students' comprehensive quality and abilities, and achieve comprehensive and all-round education.

4.5 Diverse teaching methods in various forms

In order to enhance the learning effectiveness of the online course "Water Treatment Technology", the teaching team emphasizes close contact with reality, avoids theoretical indoctrination, abandons rote teaching, and refuses to be obscure and tasteless. They focus on using typical, novel, and vivid cases in teaching, and present them in multiple dimensions through information technology such as

images, videos, animations, and simulations to stimulate students' interest in learning. Online courses cannot achieve face-to-face communication with students, so online interactive discussions are particularly important. Each knowledge module of the online course 'Water Treatment Technology' has set up communication topics, with students actively participating and the teaching team following up in a timely manner. In addition to text display, there are also various forms such as image display and article recommendation, making learning not only in the "video area" but also in the "discussion area".

5. Conclusions

Continuous updating is an important factor in maintaining the vitality and vitality of online courses. Firstly, the teaching team of the online course "Water Supply Treatment Technology" adheres to the principle of applying, thinking, and improving, constantly identifying and filling in gaps, and improving the quality of the course. Secondly, the learning of the online course "Water Treatment Technology" requires mastering new thinking, methods, and methods. The teaching team should maintain a sense of keeping up with the times, timely understand the new developments in the industry and new requirements for job abilities, update teaching content, adjust teaching methods, supplement teaching resources, and always maintain the forefront of the course, continuously improve knowledge increment, and maintain the credibility of the course. Once again, the teaching team updates typical cases every semester to stimulate students' interest in learning and enhance the experience of the course. Finally, the teaching team attaches great importance to the role of the discussion area, responds promptly to students' questions, actively guides and promotes the atmosphere of the discussion area, and effectively drives the enthusiasm of new members to participate in learning, forming a virtuous cycle of course vitality.

By connecting online course learning platforms and social media sharing platforms through QR codes, we can achieve multi-dimensional linkage and strengthen communication with students through educational and entertainment methods. The quality of the online course 'Water Treatment Technology' has been recognized by university teachers and loved by learners, and has been selected by multiple universities. The online course 'Water Treatment Technology' has been constructed in both online and hybrid courses.

Acknowledgment

2022 Vocational College Informatization Teaching Guidance Committee of the Ministry of Education - Practical Research on the Construction of Professional Digital Teaching Resources for Teaching Innovation (KT22146); The first batch of teaching innovation teams in the Water Supply and Drainage Engineering Technology major of Guangxi Polytechnic of Construction, Gui Jian Yuan Ren [2022] No. 15; Guangxi Polytechnic of Construction's 2022 school level online high-quality courses.

References

- [1] Lian Chaofeng. *Research on the construction of high-quality online open courses for college Chinese language based on a hybrid online and offline "golden course"*. *Journal of Shangqiu Vocational and Technical College*, 2021
- [2] Zhao Ying; Guo Xuxin; Huo Haixia. *The Practice of Constructing Online Excellent Courses in Vocational Education under the Background of the "Double High Plan" - Taking the Course "Irrigation and Drainage Engineering Technology" as an Example*. *Journal of Yan'an Vocational and Technical College*, 2021