

# Development and Application of New Form of Water Purification Treatment Engineering Technology under the Background of Digital Teaching Reform

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**Abstract:** Water purification treatment engineering technology is the core course of water supply and drainage engineering technology major in higher vocational colleges, which has the characteristics of fast technology update and iteration, complex practical operation, and difficult practical training and teaching. Relying on the construction of provincial vocational education teaching resource database project as an opportunity, in order to solve the problem of lack of relevant teaching materials resources, the development of loose-leaf and work manual teaching materials is of great significance to the promotion of "water supply treatment, technology" course, digital teaching reform and enrich the content of teaching resources. Based on the development path and promotion and application of the new loose leaf and manual textbook of Water Purification Treatment Engineering Technology, the development strategy of loose leaf and manual textbook and their value and significance in the reform of "three religions" are discussed.

**Keywords:** "Water Purification Treatment Engineering Technology"; new form of teaching material; teaching material development

## 1. Introduction

In 2019, the State Council issued by the national vocational education reform implementation plan for the first time to teacher reform, teaching material reform and teaching reform (hereinafter referred to as the "three teaching" reform), teachers, teaching materials, mutual promotion, mutual restriction, in the teaching material construction clearly said "timely new technology, new technology, new specifications into teaching standards and teaching content" "construction of a large number of university-enterprise" dual "cooperation development of national planning teaching material, advocating the use of new loose leaf type, manual teaching materials and supporting development of information resources". Digital education is to use computer technology and network technology to replace the traditional teaching mode, realize the efficient and efficient classroom paperless, and explore the interactive zero-distance innovative teaching method. In order to let students learn to learn, teachers guide students to discover independently and explore actively with the help of paperless technology in class. The teaching goal of cultivating talents with strong social adaptability and competitiveness puts forward a higher challenge to the reform of digital technology in the teaching process.

It can be seen that the state attaches great importance to the construction of vocational education teaching materials, and the development of new forms of teaching materials is an important embodiment of the implementation of the national vocational education reform policy requirements [1]. In 2020, our school by, water supply and drainage engineering technology, joint national dozen higher vocational colleges, water supply and drainage engineering professional teachers team, in Guangxi city water supply and drainage industry association coordination, and combined the Guangxi greentown water co., LTD., Guangxi environmental protection investment group and other enterprises technical backbone, formed the collaborative teaching team, developed the first water purification treatment engineering technology new loose leaf type, work manual materials, at the same time the construction of water purification treatment engineering technology online open courses. The teaching material in December 2022, the central university for nationalities, publishing house, in the higher vocational colleges water supply and drainage engineering technology professional use, colleges and universities with the water purification treatment engineering technology new loose, the use of working manual materials as an opportunity to explore the "who processing technology" course teaching reform, has achieved good results.

## **2. The development background of new loose leaf and manual textbooks of Water Treatment Engineering Technology**

### ***2.1 Rapid development and iteration of water treatment engineering technology***

Water purification treatment engineering technology is an important part of environmental resources and people's livelihood security technology, with the development of water treatment industry, water purification treatment engineering technology development innovation has become a set of modern biotechnology, resource utilization and recycling, health care, and implementation in the urban residents of drinking water safety measures, optimize the digital operation management, strengthen the construction of intelligent water supply and application. In recent years, the water treatment technology application market demand expanded dramatically, new technology, new methods, environmental protection water treatment practitioners scale is explosive growth, water purification treatment engineering technology has become a water supply and drainage engineering technology students must master professional skills, is also one of the core courses of water supply and drainage engineering technology.

### ***2.2 Binding type and work manual type textbooks are suitable for the teaching of water treatment engineering technology courses***

Work manual textbook is a kind of teaching book for vocational colleges characterized by "learning by doing". It has the common characteristics of work manual and teaching materials. The content of the teaching material meets the needs of students' posts, and provides concise and easy to understand technical knowledge and processing technology requirements[2]. Binding teaching materials have the characteristics of disassembly and combination, and can flexibly add new teaching content according to the needs, which meets the needs of the rapid change of knowledge and skills in modern society. With the development of urban water supply and drainage industry and wisdom water, water purification treatment engineering technology has formed the technology diversity, technology update fast, high operation process specification, safety consciousness, the characteristics of high technical precision requirements, very suitable for real technology projects, typical tasks as the carrier organization teaching unit of new loose leaf type, manual teaching materials.

## **3. The implementation of the new type of loose leaf and work manual textbook development of Water Treatment Engineering Technology**

### ***3.1 Set up a school-enterprise dual writing team to realize complementary advantages***

According to the relevant provisions of the Measures for the Management of Teaching Materials of Vocational Colleges of the Ministry of Education, the project team selected the textbook compilation team across the country. Bai Ting, the director of the compilation committee of the University, is a member of the textbook compilation committee of Guangxi Greentown Water Co., Ltd. The responsibility of college teachers is to ensure the correctness of the political direction of the teaching materials and the structure of the teaching objectives, the content structure of the teaching materials, the structure of the writers and the rationality of the compilation progress. The responsibility of enterprise personnel is to put forward the basic requirements of craftsman spirit and enterprise culture; propose the requirements of professional quality of water supply treatment; provide typical teaching cases, provide images and video materials; provide corresponding professional standards and job responsibilities; participate in the preparation and production of cases, illustrations and micro lessons. The school-enterprise cooperation team exchanges and complements each other to ensure the efficient development of the textbook compilation work.

### ***3.2 Design the teaching material structure with the starting point of post vocational skills training***

Members of the textbook compilation team, together with the national teachers of water supply and drainage engineering and senior technicians, analyzed the professional ability of water supply treatment, and organized the structure and content of the professional ability training, optimize the content of each teaching unit, make the relationship between knowledge and operation closer, and the integrated teaching is easier to operate; Through the teaching treatment of water treatment vocational ability, the teaching content is more in line with the training rules of technical skills and students' cognitive characteristics.

Finally, the textbook is divided into two parts: basic theoretical knowledge and skill training. The basic theoretical knowledge section discusses and introduces the relevant principles, influencing factors of physics, chemistry, biology and biological chemistry.

### ***3.3 Organize the content of the textbook based to the needs of learners***

For water supply and drainage engineering technology professional students, graduates and water enterprises, environmental protection industry, construction field practitioners of extensive research, insight into the water treatment in the process of learning learners' demand for learning resources, their different learning habits and learning preferences, through communication with enterprise line operating personnel, determine the teaching difficulties. On the basis of research, the content of the teaching materials is organized to meet the needs of the industry development, education reform and student development, adapt to the needs of the technological development and update of China's water treatment industry, timely integrate new knowledge, new technology and new methods, and keep up with the technological progress[3]; To meet the needs of deepening the reform of vocational education in China, reflect the needs of work-study combination, integration of industry and education, deep application of information technology and transformation of online and offline mixed teaching mode; to meet the needs of students 'lifelong learning, it not only highlights job skills teaching and attaches importance to knowledge and technology, but also integrates ideological and political contents such as professional attitude, innovation ability, learning ability, quality awareness, quality awareness, standard consciousness and safety awareness to facilitate the development of learners' career.

### ***3.4 Design the textbook in the leaflet binding form***

In order to better adapt to the teaching needs of vocational education, this textbook has designed the binder binding form. The biggest advantage of the leaflet textbook is to reduce the revision cost and realize the dynamic adjustment of the teaching content. The form of the textbook is binded according to the teaching unit, so that the textbook has the following functions: (1) dynamic generation: the content of the textbook is dynamically adjusted with the development of technology; (2) easy to carry: convenient for students to use in the training base inside and outside the school; (3) reduce the cost: reduce the revision cost and shorten the revision cycle.

### ***3.5 Explore the mode of efficient and dynamic update of teaching material content***

How to keep up with the development of technology and balance the relationship between technology dynamics and the stability of teaching materials is a difficult problem of teaching materials. The teaching materials should timely sort out new technologies and new methods in the field of urban water supply treatment, make them into textbook resources and publish them online, so as to make the content of the textbook updated in real time and efficiently. At the same time, relying on the reader interaction function of the book chain platform, we can timely understand the feedback of learners' needs in the use of textbooks, and timely adjust and update the online textbook resources to maximize the needs of learners.

### ***3.6 Build a complete online course***

In order to adapt to the development of contemporary "Internet + vocational education" demand, teaching material team members in the teaching material development at the same time, relying on the Guangxi zhuang autonomous region vocational colleges teaching resource library construction project, the construction of the system of water purification treatment engineering online open courses, published in vocational education, and provide learners with teaching syllabus, teaching plans, PPT, unit assignments, teaching video, teaching animation, also opened a work display platform, convenient learners to carry out online interaction between teachers and students, raw interaction. At present, the online open course of water purification treatment engineering technology has been operating for 3 semesters, with a total of 389 registered students. In cooperation with the book chain platform, digital resources are embedded in paper textbooks, which makes a convenient switch between online and offline learning, greatly stimulate the enthusiasm of learners for learning, help them better understand and master the content of textbooks, and realize the deep integration of paper textbooks and online textbook resources. The construction of the online open course of water purification treatment engineering technology has effectively promoted the promotion and use of the textbook "Water purification Treatment Engineering Technology".

#### **4. Take the development of new loose leaf and manual materials of Water Treatment Engineering Technology as an opportunity to promote the curriculum reform**

After the publication of Water Treatment Engineering Technology, the water supply and drainage engineering technology majors in many higher vocational colleges across the country. With the help of the new leaflet and manual textbook, the course teaching of online and offline mixed teaching and flipped classroom, which has achieved good teaching results.

#### **5. Take the promotion of the new leaflet and work manual textbook of water Treatment Treatment Engineering Technology as an opportunity to improve the social service ability of higher vocational colleges**

The work manual characteristics of the textbook "Water Treatment Treatment Engineering Technology" are very suitable for water treatment technology practitioners to learn technology improvement in the working situation. After the publication of the textbook, the textbook was used under the promotion of Guangxi Urban Water Supply and Drainage Association in combined with the training and appraisal of technical jobs. Teaching material writing group members with the help of book chain platform of social learners interactive function, learning guidance for water treatment practitioners, to improve the technical level of water treatment engineering technology practitioners and service ability contributed, promote the industry technology progress, the social influence of water supply and drainage engineering technology and social service ability to further improve.

#### **6. Summary**

##### ***6.1 The school-enterprise collaborative teaching material writing team still needs to be optimized***

Due to the short establishment of the school-enterprise dual textbook writing team, the number of senior technical talents or experts from the production or management line in the team is limited, which leads to the lack of development and production manpower for typical cases and skill operation videos in the textbook resources, which affects the quality of the textbook construction. Although the first edition of the textbook published by the teachers and students, water treatment industry practitioners, teaching material influence gradually improve, but the future will further select more qualified enterprise line senior technical personnel to join the team, the second edition of the revision, increase the typical work case and the development of practical skills teaching resources.

##### ***6.2 The promotion of the new teaching mode reform of "loose leaf, working manual textbooks + online digital resources + online teaching platform" is still in its early stage***

The exploration of the teaching mode of "loose leaf, work manual textbook + online digital resources + online teaching platform" is only carried out in the major of water supply and drainage engineering technology in a few higher vocational colleges in China, and the exploration time is only 4 periods, which is still in the early stage. After the textbook is published, the time is short, and there are some shortcomings in the construction of online open courses relying on intelligent vocational education. The next step with the improvement of the online teaching platform construction, online digital teaching material resources development, will actively to the national water supply and drainage engineering professional promotion "loose type, work manual materials + online digital resources + online teaching platform" teaching mode, promote the new teaching material in water supply and drainage engineering technology curriculum reform and play a bigger role in professional construction.

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