

Design and Application of Mixed Teaching Model in the Training Course of Environmental Quality Evaluation

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ABSTRACT. *The mixed teaching method is applied to the training course of “Environmental Quality Evaluation”, and the teaching process is designed with the teaching mode of “simulating working state”. The practical results show that this teaching mode is conducive to improving the teaching effect of the training course. Enhance the interaction between teachers and students online and offline, and improve students' practical ability.*

KEYWORDS: *Curriculum; mixed teaching mode; practical training; teaching; design*

1. Teaching background

Since the 18th National Congress of the Communist Party of China, the Party Central Committee with Comrade Xi Jinping as the core has put forward a series of new ideas, new judgments and new requirements for the construction of ecological civilization and environmental protection. Comrade Xi Jinping emphasized that ecological environmental protection is a cause that works for the present and benefits, and we must clearly understand the importance and necessity of strengthening the construction of ecological civilization. Land is the space carrier for the construction of ecological civilization. In optimizing the land space development pattern and carrying out land and resources management, we should proceed from the basic requirements of environmental protection and run through the concept of green development. “Environmental Quality Evaluation” is a core and main course for environmental monitoring and control technology major. The training and teaching link is an important part. However, in long-term teaching practice, it is found that there is a lot of theoretical knowledge in teaching materials. The actual disconnection of work has made students less enthusiastic about studying this course and the learning effect is not ideal. In response to this situation, the basic principles of the project teaching method are used in practical training, combined with the training objectives of higher vocational colleges, and an attempt is made to organize teaching in a “simulated working state” teaching mode to allow students to simulate a working state. Under the practice of training, combined with the mixed teaching methods, the points, lines, and areas in the knowledge are organically connected in series to form an organic knowledge frame, which can change the rote learning of students and improve their interest in learning. It also allows students to fully exercise their abilities. In this training course, the work level of atmospheric environmental assessment is determined as the task of training teaching, allowing students to collect the atmosphere in the field, and at the same time applying the mixed teaching mode in the training teaching process, enhancing the online and offline communication between teachers and students Interaction to improve students' comprehensive hands-on ability.

2. Teaching analysis

2.1 Teaching content

This teaching task is selected from task one in the atmospheric environmental evaluation of module two in the course of “Environmental Quality Evaluation”: determining the evaluation level. In the seven-module teaching framework of this course, atmospheric environmental assessment is an important representative component. The determination of the level of the atmospheric environmental assessment chosen in this work is the basis for carrying out subsequent assessments and is the key link of the assessment. The specific teaching tasks of this class are divided into:

- 1) Familiar with the software interface of the atmospheric environment estimation model and determine the

relevant parameters.

2) Calculate and determine the maximum ground mass concentration of pollutants and the standard rate P_i and the farthest impact distance $D_{10\%}$.

3) Determine the evaluation level according to the classification table of atmospheric environment evaluation.

2.2 Teaching objectives

Combined with the vocational ability requirements of the post, in accordance with the professional teaching standards, determine the knowledge goals, skill goals and quality goals of the course.

2.2.1 Knowledge objectives:

- 1) Grasp the method of determining the occupation rate P_i and the farthest impact distance $D_{10\%}$.
- 2) Familiar with ambient air quality standards.
- 3) Understand the principles for determining the level of evaluation work.

2.2.2 Capability goals:

- 1) Can set software parameters of estimation mode.
- 2) Standard limits can be selected correctly.
- 3) Can determine the work level of atmospheric environment assessment.

2.2.3 Quality objectives:

- 1) Cultivate students' attention to the new rules of EIA.
- 2) Cultivate students' professional attitude of rigorous environmental assessment.
- 3) Cultivate students to establish the development concept of green environmental protection.

2.3 Teaching objects

The teaching object is second-year students of environmental monitoring and control technology majors in higher vocational colleges. Students already have knowledge abilities such as resource management and current situation investigation. However, for the first time to learn the evaluation of specific environmental elements, it is necessary to comprehensively improve the comprehensive use of students' post skills; students like to experience and Challenges, but lack of awareness of collaboration; do not love and do not read books, but good at using electronic products, it is appropriate to use information technology to assist teaching.

2.4 Key teaching points and difficulties

The teaching emphasis of this class is to determine the parameters of pollutants, correctly select standard limits, determine the evaluation work, etc. The teaching difficulty is to determine the farthest impact distance $D_{10\%}$.

2.5 Teaching Strategies

- 1) Content organization: Organize the teaching content based on the determination of the actual working process of the atmospheric environmental assessment work level, and make the knowledge problematic and problematic.
- 2) Teaching method: using task-driven, group discussion teaching methods and inquiry learning, cooperative

learning learning methods, with students as the main body, through self-study inquiry before class, middle school practice experience, and intensive improvement after class, students' reactions and reflections will be continuously stimulated. And feedback, highlighting learning by doing and teaching by doing.

3) Informatization means: With the help of video live streaming, animation, jigsaw puzzle and other information means to optimize the teaching process, to visualize abstract problems, stimulate students to participate in interest, improve the learning effect of students, and achieve the teaching goals of building knowledge, development ability, and improving literacy .

3. Teaching organization and implementation

3.1 Teaching Links

1) Inquiry before class: Students read the textbooks in advance, learn micro-video and other resources, complete mind maps, and test feedback online.

2) Middle school practice: Embedded in the classroom with real work tasks, students practice knowledge and skills in a simulated professional environment.

3) After-class promotion: Students conduct intensive online testing and study through fragmented resources such as the course website platform.

3.2 Teaching Resources

1) Environmental resources: The virtual simulation training room is equipped with computers, electronic whiteboards, and video live broadcast equipment. The campus wireless network is fully covered and supports mobile learning.

2) Information resources: questionnaire star online test platform, classroom pie online management platform, course website learning platform, animation, etc.

3) Software resources: Atmospheric environment estimation model software, environmental protection think tank software.

3.3 Teaching implementation process

1) Guided inquiry before class: Teachers and students communicate using mobile terminals. One week before the lesson, use the "Classroom" to publish a task list to provide learning resources such as micro-video. Driven by tasks, students pre-read textbooks, watch micro-videos, and draw mind maps. Based on the above learning prerequisites, students can easily scan the code to complete the online test to understand the weak points in time. Teachers can use the online platform to analyze the test results and carry out targeted classroom teaching.

2) Lesson learning experience: The lesson-learning experience, that is, the organization of the classroom, can be divided into three levels: the introduction of tasks, the first experience of learning, consolidation, and promotion. The first level is to introduce Ming tasks. The actual work tasks determined by environmental accident videos, pre-class test results and project evaluation levels of the cement clinker production line are introduced into the classroom to guide students into roles, and the idea of clearing the work tasks is based on the EIA technical guidelines and determined with the aid of estimation model software The maximum ground mass concentration of the pollutants, in turn, determine the occupation rate P_i and the farthest impact distance $D_{10\%}$, and then determine the working level according to the classification table.

The second level is the first experience of learning and practicing, that is, the above-mentioned classroom introduction tasks are completed in middle school and middle school teaching. According to the technical guidelines of environmental impact assessment, objective setting parameters, accurate calculation criteria, and reasonable grading must be completed sequentially.

Step 1: Set parameters objectively. Based on the estimation model software, the pollution source parameters, pollutant parameters and prediction parameters are set in order, and the results of pollutant concentration at different distances are obtained. This part involves the determination of pollutant parameters for teaching emphasis. Combining students' cognitive foundation and cognitive characteristics, it is difficult for students to understand the source of the parameters, and due to objective conditions, it is inconvenient to participate on-site.

With the help of live video technology, real-time interaction with front-line technicians of environmental monitoring companies can break the constraints of time and space, visualize abstract issues, and intuitively resolve teaching priorities.

Step 2: Calculate the criteria accurately. According to the technical guidelines, the criteria include the occupation rate P_i and the longest impact distance $D_{10\%}$ of the pollutant. Students first show their mind maps, and teachers summarize the key points. Among them, C_i can be obtained from the calculation result of the estimation mode. If you want to determine P_i , the correct selection of the environmental standard C_{0i} is the key and the teaching focus. Students often do not know where to start, and it is difficult to distinguish the authenticity of online materials. With the help of information technology-the environmental protection think tank mobile program can be quickly and easily searched, the information is accurate and reliable, and the teaching focus is easily resolved. The students consolidate what they have learned through timely tests to determine the bid rate P_i of the cement clinker production line project.

The second criterion is the longest impact distance $D_{10\%}$. This part is a teaching difficulty. $D_{10\%}$ needs to be screened and judged in conjunction with the calculation results of the estimation model. Faced with different concentration values at different distances from the calculation results, students are prone to embarrassment, it is difficult to construct concepts based on words, it is difficult to determine the exact concentration range, and then $D_{10\%}$ is determined. Teachers use animation to solve face-to-face doubts that they have not understood through self-study before class. Animation resources can be viewed at any time multiple times, effectively breaking through teaching difficulties and improving classroom efficiency. Based on what they have learned, students determine the $D_{10\%}$ of the cement clinker production line project.

Step Three: Reasonably rank. Different logic relationships in grade criteria make students easily confused and difficult to remember Recall, use the jigsaw puzzle to organize students' on-site interaction to stimulate and strengthen memory. The student determined from the previous step P_i and $D_{10\%}$, practically complete the task of determining the evaluation level of the cement clinker production line project.

The third level is consolidation and promotion. Teachers point out the key points, and arrange expansion and promotion tasks, that is, the evaluation work level is determined when the project emits multiple pollutants. Students practice in groups and collaborate to complete expansion tasks.

3) Strengthening after class: The third stage: strengthen after school. Through students' perfect mind map, intensive online test, and fragmented learning of the course website platform, they can consolidate the easy points and the difficult points in time.

3.4 Comprehensive Assessment

Performance evaluation focuses on process assessment. This module consists of three parts: before, during, and after class. It adopts a multi-evaluation model that combines teacher evaluation and peer evaluation.

Dynamic evaluation function to judge results, and conduct knowledge, skills, and quality from multiple perspectives such as autonomous learning and professional cooperation Comprehensive assessment.

4. Teaching reflection

4.1 Teaching Features

The characteristic of this instructional design lies in “321 + N” information-based teaching methods: “3”: using three major platforms to support classroom teaching and improving classroom efficiency; “2”: using two major softwares to enhance professional capabilities and help career growth “1”: using live video technology to break through classroom restrictions and shorten professional distance; “N”: using multiple website resources to penetrate professional concepts and learn the industry's forefront.

4.2 Teaching effect

What is the effect of the above information-based teaching? In terms of knowledge and skills, pre-class test statistics show that Self-study before class, students basically master simple knowledge, but there are still misunderstandings about individual knowledge points. Before class The post-test statistical comparison chart shows that with the help of information technology, students can conveniently and efficiently internalize

knowledge and test positive results. The accuracy rate has been greatly improved, and both knowledge and skills have been improved. In terms of professional literacy, embed real work tasks into classroom teaching, highlight middle school, middle school education, and integration of rationality and practicality, and continue to infiltrate environmental protection awareness and green development concepts. Students' professional experience is more real, shortening school study and actual work Professional distance.

5. Task summary

To sum up the above mixed teaching design, it can be summarized in three words: the first word “clear”, the teaching idea is clear, and the students have exercised logical thinking; the second word “multiple”, the teaching methods are diverse, and the students have improved the learning efficiency; The three words “live”, the teaching method is flexible, and the students develop professional ability. The above three-pronged approach makes the students move, the classroom is alive, and the effect is better, which greatly enhances the students' sense of gain.

6. Conclusion

In this teaching example, the specific application of the project teaching method-”simulation of working state” teaching mode is used for the design of practical training courses. This teaching mode breaks the restrictions of original teaching materials, teaching locations, and teaching methods in teaching, and designs modules for curriculum content based on real working conditions. Taking the atmospheric sampling and collection of cooperative enterprises as the work task, the students' knowledge and content were organically combined through the steps of designing plans, consulting materials, group discussions, organizing implementation, and effect evaluation. By using the online teaching platform, the online and offline blended teaching is applied to the experimental courses. The blended teaching mode is effectively tried in the practical training courses, which not only cultivates students' autonomous learning ability and vocational skills the team consciousness of cooperating with each other fully reflects the “modern apprenticeship” talent training model.

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