Mixed Teaching Practice of "Installation, Operation and Maintenance of Smart Electric Energy Meters" Under the Background of Internet+

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Abstract: Today, the traditional teaching methods and contents can no longer meet the requirements of students, and the vocational education classroom under the Internet+ background has gradually focused on online education resources and means. Therefore, this paper aims at the core course of Power Supply and Consumption Technology "Installation, Operation and Maintenance of Smart Electricity Meters", and carries out reform and exploration from the perspective of ideological and political education, teaching content and teaching strategies. It provides beneficial practice for enterprises to cultivate high-quality technical talents. The specific practice shows that the exploration of this course has certain practical significance.

1 INTRODUCTION

The rapid development of Internet+ has brought new multiple advantages to the traditional classroom, such as mobile teaching and online resource sharing, which has effectively improved the quality of students to some extent. Shandong Electric Power College relies on enterprises to run the school (ZHANG, 2018), pays attention to integrating moral education and technical training into the whole process of professional teaching, attracts excellent experts and talents from power enterprises to participate in teaching, and creates a "academic" and "practical" classroom atmosphere. School teachers ensure the systematization of theory and the rationality of teaching methods. Industry teachers integrate new technologies, new processes and new norms on the job site into classroom teaching. Forming complementary advantages between theory and practice, and ensuring the scientificity and timeliness of teaching content. In addition, by optimizing and integrating innovative online and offline teaching integration teaching design, we can fully meet the needs of classroom teaching and extracurricular expansion learning (HUANG, 2022).

Accurate measurement of electric energy is a powerful hand to help energy conservation and emission reduction achieve the carbon peaking and carbon neutrality goals. "Installation and Operation and Maintenance of Smart Electric Energy Meters" is the core courses of power supply and consumption technology. How to integrate theory with practice and understand the course content is the key direction of teaching. Therefore, this paper focuses on the design and implementation of the installation and operation and maintenance of intelligent electric energy meters

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to achieve accurate measurement, and explores the cultivation of high-quality technical and skilled talents in power supply and consumption technology with comprehensive development in morality, intelligence, physique, beauty and labor.

2 MIXING MULTIMEDIA ONLINE AND OFFLINE TEACHING AND INNOVATING TEACHING STRATEGIES BASED ON "TASK ORIENTATION"

Under the background of Internet+, multimedia technology has become the main way of teaching. Teachers can use new technologies to enrich the classroom. Through video, VR, intelligent robots and other ways, students can deepen their understanding of the curriculum, pay more attention to student-student interaction, teacher-student interaction, and effectively improve the communication between students and teachers.

By offering online and offline mixed teaching courses, and based on the "dual system" model of schools and enterprises, we have innovatively developed a multi-dimensional teaching resource system to support the implementation of classroom revolution. Through the sharing of teaching achievements between schools and enterprises, we will create "high-quality curriculum resources". Jointly develop the loose leaf teaching material, work order, standardized work flow series video at the work site, and safety warning series video based on the typical work tasks of the installation of meters, power connection and power use inspection. The national level teaching resource library courses and provincial quality resource sharing courses of power supply and consumption specialty are used to select high-quality course resources from the staff training platform of power enterprises to meet the needs of students for independent, ubiquitous and personalized learning in and after classes. Through the joint construction of seven theory and practice integrated training rooms, including meter connection, fault troubleshooting and wiring analysis, with a building area of more than 1800 square meters, equipped with simulation operation equipment consistent with the site, supplemented by power VR, power metering device wiring and inspection virtual simulation system, AI electronic judgment system, holographic projection, AI intelligent robot, power user big data platform, a full cycle, full time and space, all elements Teaching facilities and resources managed in the whole process. Multi-dimensional teaching resources are shown in Figure 1.

This course takes "self-study before class + guidance in class + learning after class" as the fulcrum, and carries out classroom revolution along the reform main line of "sensibility before rationality, practice before theory, and prediction before knowing why". Adopt a variety of teaching methods, innovate teaching strategies according to "task orientation", and realize "online and offline hybrid" teaching. Before class, the online resources are divided into three learning paths according to the requirements of the initial, middle and high levels of the X certificate for students to choose independently, so as to achieve hierarchical teaching. In the course, the real tasks of enterprises are introduced into the classroom. The teaching process integrates new technologies such as "Ai electronic judgment", fault finding virtual simulation system, "new process of" live replacement of electric energy meters ", and new specifications such as" newly issued six standardized work instructions ". The task-oriented teaching mode of" exploration, knowledge, learning, practice and strength "is adopted. Teaching is carried out in a hierarchical and progressive manner from basic to intensive tasks, At the same time, provide targeted guidance according to the learning situation of online x certificate resources, and pay attention to individual development. After class tasks are extended to strengthen knowledge and skills. Safety education and labor education run through the whole process, and accurately train high-quality technical and skilled talents with comprehensive development in morality, intelligence, physique, beauty and labor. The teaching strategy is shown in Figure 2.

Figure 1: Multimedia Teaching Diagram

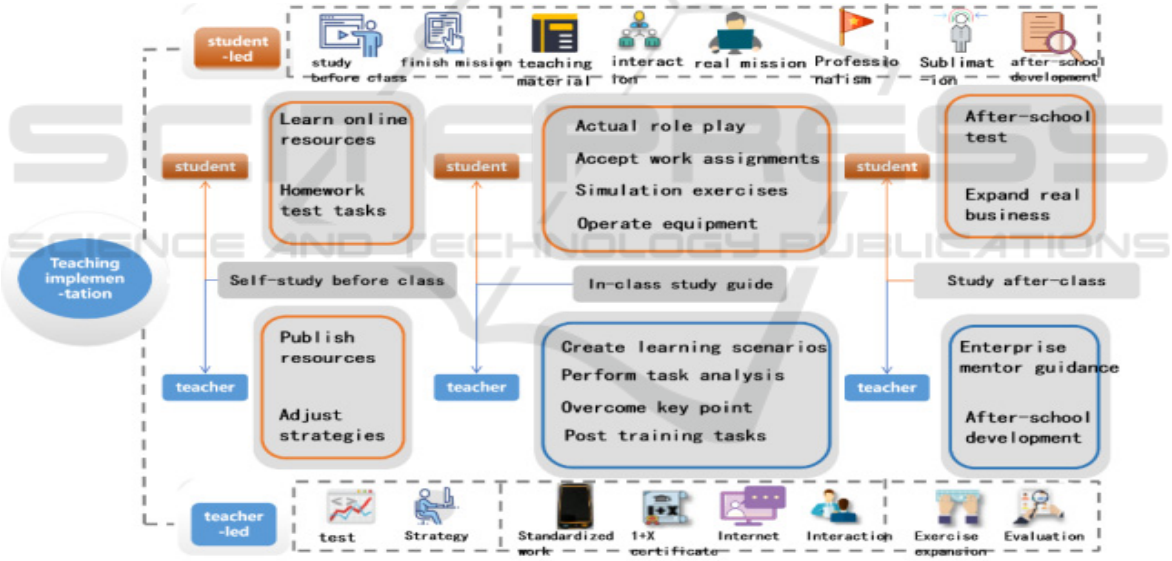

Figure 2: The Teaching Strategy of The Course

In the pre class self-study link, teachers issue guidance tasks, students learn online resources with questions, complete pre class tests, and achieve teacher-student interaction and student-student interaction through the learning community. Through the pre class self-study link in the teaching class, students can independently learn the relevant content of the course online, understand the basic knowledge required for the implementation of the course, and lay a foundation for the implementation of the course. Through the pre class assessment, teachers can master the learning effect of students and adjust the teaching plan and content according to the assessment.

In the learning guidance link in class, teachers create work situations and release work tasks, so that students can quickly enter the role of posts. Students perceive the key points of task knowledge in practice according to the preview before class, and practice before learning theory. In view of the key and difficult points in teaching, teachers make breakthroughs in the form of demonstration, group discussion, virtual simulation, practical training and

drills to guide students to master knowledge and principles. According to the evaluation standards such as 1 + X certificate and skill competition, students will carry out upgraded actual combat drills with the real tasks of enterprises, and strengthen their skills through re practice.

In the after-school extension link, teachers provide typical cases for students to deeply understand the importance of correct measurement and expanding knowledge. Through exchanges and sharing of experiences, the cultivation of professional ethics and the improvement of moral quality of students are promoted, and students' understanding and understanding of principles are deepened through homework.

3 TAKING IDEOLOGICAL AND POLITICAL EDUCATION AS THE MAIN LINE, LITERACY EDUCATION IS IN THE MIND AND HEART

Ideological and political education is a task that must be carried out consistently in current vocational education. Vocational colleges need to comprehensively promote the construction project of ideological and political education to educate people for the party and the country. The task of ideological and political education is becoming increasingly severe (MU, 2022). Strengthening the pertinence, timeliness and effectiveness of cultivating the soul in ideological and political class is of great significance to improve students' sense of identity. In 2004, Shanghai took the lead in exploring curriculum ideological and political education. In 2017, curriculum ideological and political education has become a national education strategy and an important part of vocational education (ZHAO, 2022). By inviting Haijun Qian, a model of the times and a national labor model, Jinjuan Huang, a great craftsman and winner of the National May Day Labor Medal, and Chuanzi Xu, a national labor model, and other electrical energy measurement experts to appear in the "Sanxin lecture hall", this course conveys their dedication and love for the cause, sets an example for students. Embedding the seeds of innovation in students' hearts, takes root in subsequent learning, and promotes students to "believe in the way" while "loving their teachers". To reach the realm of "respecting and being taught", so that students can have a clearer understanding and understanding of the "craftsman spirit".

In the teaching process, this course attaches importance to cultivating students' core qualities in emotion, attitudes, character and values. Through safety disclosure before practical training, watching safety warning videos to clarify the risks of illegal operations, and conducting "somatosensory" power safety education with the help of power VR, students can deeply understand the importance of safety. The training sites adopts "6S" management. The items are positioned and placed. After the operation, the work site is cleaned up. With a clean training environment and standardized operation process, students are imperceptibly guided to develop good working habits and improve their professional quality.

4 RECONSTRUCTING TEACHING CONTENT TO CONNECT WITH TYPICAL WORK TASKS

Starting from the post group of the power supply and consumption technology specialty, the typical work tasks and core professional abilities of the post are clarified through in-depth front-line investigation and questionnaire survey. At the same time, the modular course content is reconstructed in combination with the corresponding vocational skill level requirements of the X certificate and the competition standards of students and employees. Taking the course "Installation and Operation and Maintenance of Smart Electric Energy Meters" as an example, the course content is divided into 4 tasks, 16 lessons. Clarify the teaching objectives of each task, realize the granulation of teaching content, and lay a good foundation for the development of corresponding online teaching resources, the course content design diagram is shown in Figure 3.

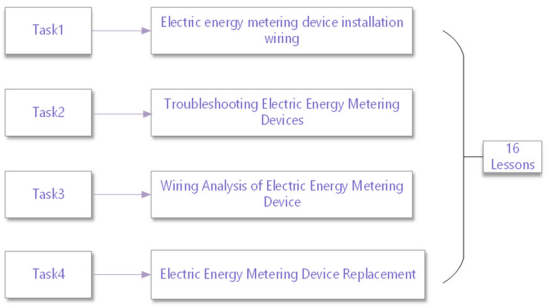

Figure 3: Design of The Course Content

By sharing teaching tasks, teaching achievements and training bases with enterprises, we have

innovated and developed a multi-dimensional teaching resousystem. School teachers have ensured the systematicness of theory and the rationality of teaching methods. Industry experts have timely integrated new technologies, new processes and new norms on the job site into classroom teaching, forming complementary advantages in theory and practice.

5 IMPROVING THE EVALUATION SYSTEM ACCORDING TO THE "INFORMATION CARRIER"

In the teaching process, comprehensive evaluation is carried out by means of information and data, relying on the intelligent vocational education platform. First, the whole process evaluation, which evaluates the teaching process in the three stages: before, during and after class, so as to master the dynamics of students' knowledge and skills improvement. Second is multi-agent evaluation, with school teachers, enterprise tutors and student groups as the main body, plays an encouraging role in evaluation. The third is multi-dimensional evaluation, which integrates attendance, labor performance, industry standards and competition standards into the evaluation system for multi-dimensional evaluation. In the evaluation process, we pay attention to tapping the shining points of students whose performance is temporarily behind, give more encouraging evaluations. To explore the value-added cultivation of different groups with learning needs and pay attention to individual development potential. Exploring value-added evaluations including competency evaluation, social evaluation and developmental evaluation, and guiding students to "surpass themselves and strive for excellence" for sustainable development.

By making full use of information technology to complete the connection of various evaluation data, form an information-based teaching evaluation system that matches the information-based teaching model of curriculum reform, and include daily performance, team quality, labor practice and innovation ability into the evaluation indicators, improve the evaluation system, and create an "effective" classroom with real-time and effective evaluation data; Before, during and after class, through the feedback of teaching activities and questionnaire survey results, timely adjust the teaching strategy, and provide personalized guidance according to the online hierarchical resource learning feedback to achieve accurate classroom management.

6 THE EFFECT OF STUDENTS LEARNING

By online and offline mixed teaching and platform data tracking, the results of the project evaluation results are generally above 90 points, and each student has made great progress on the original basis. The teaching process is integrated into the content of the X-certificate assessment of power system marketing services, and the assessment standards of the two certificates are included in the teaching evaluation. Through the completion of online hierarchical tasks, targeted training, guidance, and assessment help students improve forensic rate. After the completion of this module, 23 students performed outstandingly in the mock exam organized by the department, 12 students reached the intermediate level of the certificate of meter installation and connection, 7 students reached the intermediate level of the power system marketing service certificate, and 5 students reached the intermediate level of dual-certificate certificates. The proportion of each student is more than 10% higher than that of other classes in the same department. Figure 4 shows the excellent rate of comprehensive grades in the course tasks.

Through the "knowledge learning practice" inquiry chain, the real tasks are connected in depth, and the ideological and political elements such as craftsmanship spirit and responsibility consciousness are flexibly integrated into the teaching process, so that students can participate in the task implementation as "field operators". The classroom atmosphere is active and orderly, and students' enthusiasm for participation is high. From the actual operation process, they have experienced the happiness of progress, standardized the operation habits, and honed their will quality. He practiced the craftsmanship spirit of striving for perfection with practical actions, had a deeper understanding of the post, and his professional identity was significantly improved.

On the basis of ensuring that students systematically master key skills, they constantly strengthen the safety awareness of live working and improve their ability to solve practical problems on site. Their skill level has been greatly improved compared with previous students. At the same time, students with a strong sense of innovation were included in the innovation team jointly built by the

University and the enterprise. Two students won the first prize of the "national college student smart car competition", nine students participated in the QC group activities led by industry instructors, and six students prepared for the "Internet +" college student innovation and entrepreneurship competition guided by teachers. Their innovation and entrepreneurship ability was effectively exercised, which cultivated reserve strength for the R & D team of enterprises and was highly recognized by cooperative units.

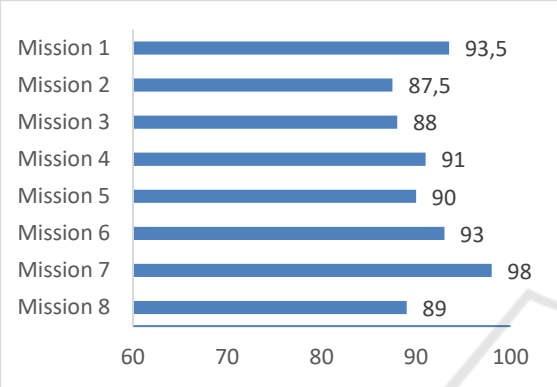

Figure 4: The Excellent Rate of Comprehensive Grades

7 CONCLUSION

The "Installation and Operation and Maintenance of Smart Electric Energy Meters" is a practical basic professional course. The installation and connection of meters is also an extremely important link in electric power marketing (GU, 2021). In view of the practical application of the course, this paper re integrates the course content and uses on-site examples to help students integrate theory with practice and better understand the course content. The research and practice of this paper have important guiding significance for promoting the development of electric power higher vocational education, highlighting the basic characteristics of vocational education such as "cross-border cooperation between enterprises and schools, demand integration between industry and education, and Framework Reconstruction of commonness and individuality". It provides reference for electric power education in brother colleges and training of employees in the industry, and has promotional value and leading role.

However, with the rapid development of professional development, it is necessary to establish and improve a mechanism for updating teaching resources to keep up with the pace of professional development. In terms of continuously deepening the co-construction and sharing of teaching resources, we adhere to the principles of combining with the industry and combining teaching and scientific research, and jointly develop more new forms of teaching materials and teaching resources.

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