

Research on Online and Offline Hybrid Teaching Mode of Power System Relay Protection Course

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Abstract: Blended teaching is elaborated, combined with teaching practice, focusing on the application of blended teaching methods to a specific teaching process, that is, the teaching design of the network platform of *Power System Relay Protection*, the main contents are: the design of online teaching objectives, the construction of online teaching activities, the implementation plan of online teaching and the evaluation of online teaching. According to the requirements of hybrid education, combine “online” and offline”; According to the characteristics and teaching objectives of the course *Power System Relay Protection*, combined with the hardware conditions of the classroom in the school, the combination of theory and practice is adopted, and the online teaching platform is used to better realize the integration of theory and practice. This paper focuses on the construction of the “double integration” online teaching platform of the *Power System Relay Protection* course, and makes use of online teaching resources and classroom activities.

Keywords: Power system; Relay protection; Online and offline; Blended teaching

Power System Relay Protection is a highly theoretical and technical course, and it is a highly technical professional course. In the traditional teaching mode, especially in vocational colleges, students have certain difficulties in mastering this course, and after completing all the theoretical courses, they will go to practical training, which is difficult to combine theoretical knowledge with practical skills. With the strong support and promotion of education and teaching reform by the Ministry of Education, some new teaching models, such as project-based teaching, action-oriented teaching, and integrated teaching of theory and reality, are widely used in colleges and universities [1]. Under the background of “Internet +”, the course construction of universities has shown a development trend of networking and informatization. Therefore, how to achieve “hybrid” online teaching in the *Power System Relay Protection* course is a very meaningful work.

1. Teaching Status and Trend of Traditional Power System Relay Protection Courses

In the traditional teaching model, the teacher dominates, instills knowledge in the students, and assesses the students in the form of final exams. This way of teaching has many shortcomings. First of all, it cannot give full play to students’ subjectivity and cannot effectively stimulate their enthusiasm for learning; Secondly, a single final exam cannot reflect students’ learning attitude, learning ability and mastery of knowledge, and lacks the evaluation of classroom teaching and the evaluation of classroom teaching. In particular, for vocational colleges, its career orientation is very strong, students’ learning preparation is relatively less, in the process of learning, they are more inclined to intuitiveness and application, therefore, the traditional classroom teaching method can no longer meet the educational needs of students. With the development of information technology, information technology and course teaching are integrated to form online and offline hybrid teaching. This is a teaching method that integrates the advantages of traditional classroom mode and Internet, which requires teachers to organically combine Internet teaching with traditional teaching in curriculum design and knowledge transfer, and match students’ learning skills and learning styles at the right time, so as to achieve the best learning effect. With blended teaching, students can give full play to their learning initiative, enthusiasm and creativity in the process of learning. The blended teaching method emphasizes both situational and active learning, combining traditional learning methods with online learning, and combining the advantages of both methods to achieve better learning outcomes [2].

2. Course Teaching Mode Design

The offline teaching activities of *Power System Relay Protection* mainly include: group discussion, explaining key and difficult points, and conducting practical exercises on skill objectives; The content of the online course includes broadcast units, classroom

questionnaires, Q&A discussions, class assignments, online quizzes, and discussion boards. On this online platform, each chapter contains different course activities, each course activity can add or delete topics, different teachers can choose different course activities according to their own teaching ideas and teaching concepts, or add their own activity topics to the course activities^[3].

2.1 Unit-oriented Research

In the unit tutorial, the learning of distance security tuning is realized through sub-activities such as video tutorials, questionnaires, and discussion boards. On this basis, a new teaching method is proposed, and on this basis, a new teaching method is proposed. For example, videos of work tasks such as on-site staff value modification, protection and debugging are filmed, and then edited and uploaded to online education platforms as tutorial videos. The topics of the questionnaire and discussion board are derived from the questionnaire question bank and discussion question bank.

2.2 Design a Questionnaire Library

In order to achieve certain teaching orientation and teaching goals, design relevant questions, compile detailed and thorough questionnaires, and store all questionnaires in the questionnaire database. Teachers should take different chapters as the basis, for different teaching tasks, before class, during class, and after class, quote questionnaires from the questionnaire database, and students should carry out questionnaire surveys realistically based on their existing knowledge and their own situation, so as to achieve the purpose of teachers designing questionnaires. In the classroom teaching, the pilot learning method is adopted, and through the questionnaire survey, students can have a strong interest in the learning of this course; The use of questionnaire survey method in the classroom can enable students to have a better grasp of the content they have learned, so as to achieve the expected teaching effect; Outside the classroom, classroom teaching is evaluated in the form of questionnaires, which helps teachers reflect on classroom teaching and promotes the improvement of classroom teaching quality^[4].

2.3 Design Teaching Tasks

For each chapter, the teacher will design an assignment for each lesson according to the requirements of the knowledge and skills learned. After completing the text, students will complete the practice of the text according to the requirements of the text, so as to consolidate the content learned and lay the foundation for the learning of the next knowledge point. The homework done by students in the classroom is a kind of inspection and feedback on the effectiveness of classroom teaching. Students should try to avoid duplication of homework and teach them according to their aptitude.

2.4 Compilation of Online Examination Question Banks

Put the online quiz questions in the question bank, students can test and practice by chapter, and the system can also randomly combine a set of questions for students to conduct real mock test training. The question types are multiple-choice, and each set of question types covers all the knowledge of the course. Each exam should conduct a detailed analysis of the test results and analyze the weak knowledge in the exam for students' future study reference.

2.5 Setting up the Discussion Area

Based on the experience of the previous class, the teacher classifies the questions raised by the students around the major difficulties in the course and the students' learning interests, and selects some questions with a certain depth, breadth and complexity, so as to form a topic in the discussion area, guide students to think deeply and express their own opinions, so that different views collide with the spark of wisdom, thereby stimulating students' interest and enthusiasm for participation. In the discussion board, students can interact, which makes the content of the discussion area richer, and also promotes students' learning and communication.

3. Evaluation of Course Teaching Effectiveness

Power System Relay Protection is a blended teaching-based course that focuses on courses that students can truly experience and experience, not only traditional learning outcomes, but also "process". In the teaching of *Power System Relay Protection*, various forms of teaching evaluation are adopted, including the combination of online and offline, and the combination of process evaluation and final evaluation. The online education platform can track the entire learning process in an all-round way, and the background can conduct statistics and analysis of each student's cumulative learning time, resource access and use, chapter practice, online interactive discussion, and course test. Students can inquire about their learning progress, learning results, and existing problems at any time, and teachers can also grasp students' learning at any time, so as to help students solve problems, improve learning methods, and obtain better learning results. At the same time, the evaluation results are updated and analyzed in real time to achieve the purpose of the whole process

evaluation. The final evaluation is based on the learning summary of the online test course, and the real electrified operation carried out in the school training room online and offline, which is the evaluation of the final effect of the course and is used to evaluate the achievement of teaching goals.

4. Conclusion

In the course of *Power System Relay Protection*, the hybrid teaching mode is adopted, and an online teaching platform is built to teach teachers according to their aptitude and improve the teaching effect. Students can carry out online learning based on their own knowledge and the requirements of teachers, regardless of time and place, which is very helpful for giving full play to students' learning initiative and improving students' teamwork ability.

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