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Exploration of Blended Teaching Model for "Circuit Theory" Course Under the Background of "Internet +"

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Abstract: Under the background of "Internet +", higher education teaching has ushered in new opportunities for reform. How to more effectively cultivate students' professional literacy and comprehensive abilities has become a teaching problem troubling college teachers. In this regard, this paper takes Changjiang Rain Classroom as the technical support, conducts an in-depth study on the application path of the blended teaching model in the teaching of "Circuit Theory" course, aiming to provide valuable references for improving teaching effects and promoting teaching reform.

Keywords: "Internet +"; Circuit Theory; Blended teaching

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1. Introduction

Under the background of "Internet +", the informatization of higher education has become a trend of educational reform [1]. As one of the core courses for Electrical Engineering and Automation majors, the teaching of "Circuit Theory" not only undertakes the important task of imparting basic theoretical knowledge and skills to students but also shoulders the important mission of cultivating students' practical ability, innovative ability, and engineering thinking. However, the traditional teaching model has many shortcomings, such as being limited by teaching time and space, weak interactivity, and insufficient teaching resources, which make it difficult to meet students' diverse learning needs and affect the improvement of teaching effects of "Circuit Theory" [2]. Blended teaching is an innovative teaching model. By combining online and offline teaching, it can not only effectively stimulate students' learning interest and mobilize their enthusiasm and initiative, but also break the limitations of teaching time and space, and more effectively improve teaching effects. Applying it to the teaching of "Circuit Theory" can effectively make up for the limitations of traditional teaching, improve teaching effects, and provide students with a platform for independent learning and collaboration, laying a solid foundation for improving learning effects.

2. Significance of applying the blended teaching model in the "Circuit Theory" course

2.1. Break the limitations of teaching time and space

In previous course teaching, teaching time and space were relatively fixed, and students needed to participate in teaching activities at fixed locations within the required time [3]. This teaching model is relatively rigid and lacks flexibility, making it difficult to meet the diverse needs of contemporary college students. By applying the blended teaching model, with the help of the intelligent tool Changjiang Rain Classroom, students can break the limitations of teaching time and space according to their own needs, and obtain high-quality teaching resources such as teaching videos, preview materials, and microcourses anytime and anywhere, thereby effectively improving learning efficiency.

2.20 Promote the combination of theory and practice

"Circuit Theory" is a discipline with a strong theoretical and practical nature. It requires students to not only master solid theoretical knowledge but also have strong practical ability [4]. However, in previous course teaching, there was a lack of close integration between theory and practice. Students found it difficult to apply the learned theoretical knowledge to specific practices, which seriously hindered the improvement of their practical and problem-solving abilities. Under the blended teaching model, virtual reality, augmented reality, and other technologies can be introduced to build virtual simulation laboratories. Students can conduct practical training operations in virtual and realistic scenarios, polish their skills, understand theoretical knowledge more deeply, and gradually improve their practical and problem-solving abilities.

2.3. Meet students' diverse needs

In previous course teaching, students' individual differences were often ignored by teachers. Teachers often adopted a "one-size-fits-all" teaching model, which was difficult to meet the diverse needs of different students [5]. Under the blended teaching model, teachers can use Changjiang Rain Classroom to collect and analyze students' learning behavior data, such as homework completion, classroom interaction frequency, and classroom test accuracy, and generate objective and personalized learning reports. Based on this, teachers can adjust teaching strategies and optimize teaching content in a timely manner, thereby effectively improving the pertinence of course teaching, better meeting the diverse needs of students at different levels, and laying a foundation for their comprehensive development in the future.

3. Problems existing in the previous teaching of the "Circuit Theory" course

There are many problems in the previous teaching of the "Circuit Theory" course, such as insufficient classroom participation, disconnection between theory and practice, and a single evaluation method, which seriously affect the improvement of teaching effects [6]. In this regard, this paper conducts an in-depth analysis of the following aspects.

3.1. Insufficient classroom participation

In previous course teaching, teachers often occupied a dominant position, and the teaching method was mainly "explanation + practice." Students were often in a passive acceptance state, and the form of interaction was mainly classroom questioning, which was relatively single [7]. This makes it difficult to fully mobilize students'

enthusiasm and initiative, resulting in low classroom participation, which further affects the improvement of teaching effects.

3.2. Disconnection between theoretical teaching and practical teaching

In the previous teaching of the "Circuit Theory" course, there was a disconnection between theory and practice. Teachers paid more attention to the teaching of theoretical knowledge but ignored the cultivation of students' practical ability. As a result, although students could master professional basic theoretical knowledge, they found it difficult to apply it to actual circuit design, which hindered their future employment and development.

3.3. Imperfect evaluation system

The evaluation system of some colleges and universities is not perfect, and the evaluation results are difficult to fully reflect students' comprehensive strength [8]. The evaluation method is mainly based on paper-based test assessments, such as final exams and midterm exams, focusing on summative evaluation, while lacking attention to students' dynamic learning process. To cope with exams, they have to adopt rote learning methods, making it difficult to truly master professional knowledge and skills. In addition, the evaluation standards are not comprehensive, mainly based on exam scores and project results, which are difficult to fully reflect students' comprehensive strengths.

3.4. Outdated teaching content

Under the background of the Internet era, various new technologies, new concepts, and new equipment emerge one after another [9]. However, the content of the "Circuit Theory" course in some colleges and universities has not been updated promptly, and the teaching content is outdated, leading to a disconnection between what students have learned and the development needs of enterprises, which hinders their future career development. In this regard, it is necessary for colleges and universities to keep up with the trend of the times, update teaching content promptly, and introduce emerging technologies such as the Internet of Things and big data into teaching to enrich teaching content and better meet students' diverse needs.

4. Innovative strategies of the blended teaching model based on the Changjiang Rain Classroom

4.1. Pre-class preview: Use online resources to guide independent learning

4.1.1. Share preview materials

Changjiang Rain Classroom is an intelligent teaching tool integrating a variety of advanced technologies with rich functions. Teachers can push preview materials such as teaching videos, microcourses, and exercises to students through Changjiang Rain Classroom, helping them gain a preliminary understanding and cognition of the course content in advance and laying a foundation for improving teaching effects [10].

4.1.2. Collect preview data

Rain Classroom also has powerful data collection functions, which can automatically collect students' learning behavior data, such as online duration, exercise test accuracy, and video viewing duration. By analyzing these data, teachers can understand the preview situation of each student, and adjust course content and optimize teaching strategies based on this.

4.2. Classroom interaction: Combine Rain Classroom functions to deepen knowledge and understanding

4.2.1. Electronic check-in and random roll call

Teachers can use the electronic check-in function of Rain Classroom to let students scan the QR code to check in. In this way, teachers can effectively solve the attendance problem [11]. At the same time, a random roll call can be adopted to select students to answer questions. This not only can test students' mastery of professional knowledge but also can mobilize their enthusiasm, thereby improving classroom participation.

4.2.2. Bullet screen interaction and real-time Q&A

Teachers can also turn on the bullet screen function of Rain Classroom. Students can express their ideas and viewpoints at any time, and teachers can answer questions based on the main bullet screen content sent by students to improve teaching effects [12]. For example, when explaining the content of "sinusoidal steady-state circuits," many students raised questions in the bullet screen, such as "how to select reference vectors." In this regard, teachers can answer this question to help students break through learning difficulties.

4.3. Post-class consolidation: Expand online resources to strengthen practical ability

4.3.1. Online homework and automatic correction

Changjiang Rain Classroom also has the functions of assigning online homework and automatic correction. Teachers can use this function to issue after-class homework or project tasks to students. After completion, students can submit them online through Rain Classroom [13]. The platform can automatically correct the submitted homework and generate correction results. This not only greatly reduces the workload of college teachers and improves work efficiency but also helps students find their own shortcomings and prompts them to correct them promptly. At the same time, works can be displayed through Rain Classroom to lay a foundation for promoting communication and exchange among students.

4.3.2. Virtual simulation experiments

Changjiang Rain Classroom can provide virtual simulation experiment functions, which can create a realistic and virtual experimental scenario for students [14]. Through this platform, students can access various types of circuit models and conduct practical training in virtual scenarios to polish their skills. This can not only effectively reduce the cost of practical teaching, improve the safety and reliability of practical teaching, but also effectively cultivate students' practical ability and problem-solving ability. In addition, teachers can also timely understand students' practical situation through this platform and provide targeted guidance and help to them, thereby improving the effect and quality of practical teaching.

4.4. Assessment and evaluation: Build a diversified system to comprehensively evaluate abilities

Teaching evaluation is not only an important part of teaching activities but also an important channel for teachers to understand teaching effects and promote curriculum teaching reform [15]. In response to the imperfect evaluation system in traditional course teaching, colleges and universities and teachers should fully recognize the importance of teaching evaluation and build a sound evaluation system.

(1) Enrich evaluation standards. In addition to grades and scores, students' innovative ability, teamwork ability, communication ability, etc., can also be included in the evaluation system to evaluate students

from multiple angles and levels, thereby improving the objectivity of evaluation results.

(2) Adopt diversified evaluation methods. A combination of process evaluation and summative evaluation can be used to evaluate students, focusing not only on students' learning outcomes but also on their dynamic learning process. In this way, the accuracy of evaluation results can be improved.

(3) Diversified evaluation subjects can be adopted. In the past, teachers often served as the evaluation subject, but teachers are easily affected by external factors, making the evaluation results lack objectivity. In this regard, in addition to teachers, students, enterprise experts, and other subjects can also be introduced as evaluation subjects. Through various methods such as student self-evaluation, peer evaluation, and enterprise evaluation, the accuracy of evaluation results can be improved.

5. Conclusion

In summary, under the background of "Internet +," the blended teaching model based on Changjiang Rain Classroom provides a new direction and idea for the teaching reform of the "Circuit Theory" course. In this regard, teachers should fully recognize the value of blended teaching and, with the help of the powerful functions of Rain Classroom, adopt various methods and means to improve the teaching effect of the "Circuit Theory" course, more effectively cultivate students' professional literacy and comprehensive abilities, and lay a solid foundation for their comprehensive development in the future.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Sun H, Ran H, Liu X, et al., 2024, Exploration of a Multi-Dimensional and Whole-Process Ideological and Political Teaching System for "Circuit Theory". Education Teaching Forum, 2024(44): 105–108.

[2] Zhou J, Wang Y, Yang R, et al., 2024, Teaching Reform and Practice of "Circuit Theory" Based on the Five-Star Teaching Principle. Education Teaching Forum, 2024(05): 85–88.

[3] Zhang P, 2024, Research on the Innovation of Undergraduate Course Construction Based on Information Technology—Taking the Basic Course of Circuit Theory as an Example. University Education, 2024(02): 17–19 + 28.

[4] Jiang X, Huang H, Rewan W, 2023, Reform and Practice of Blended Teaching Model for "Circuit Theory" Course—Taking Xinjiang Institute of Engineering as an Example. The Science Education Article Collects, 2023(22): 90–94.

[5] Zhang M, Xing L, Guo L, et al., 2023, Exploration of Blended Teaching Model for "Circuit Theory" Course. China Electric Power Education, 2023(10): 65–66.

[6] Huang K, Guo Y, Peng Y, 2022, Research on the Application of "Internet + Fragmented Learning" in the Basic Course of Circuit Theory. Learning Weekly, 2022(25): 6–8.

[7] Yang Y, Zhang R, He H, et al., 2022, Ideological and Political Teaching Design and Implementation of Basic Engineering Courses—Taking "Circuit Theory" Course as an Example. Curriculum Ideological and Political Teaching Research, 2(01): 145–157.

[8] Zhang T, Wu Y, Zhang L, et al., 2022, Blended Teaching Design of Circuit Theory Course. Application of IC, 39(10): 63–65.

[9] Sun J, Li Z, Li Y, et al., 2021, Reform and Practice of Online-Offline Blended Teaching Model—Taking "Circuit Theory" Course as an Example. Journal of Hunan Institute of Engineering (Social Science Edition), 31(04): 100–105.

[10] Zhou J, Wang Y, Jiang L, et al., 2021, Exploration and Practice of Teaching Reform of "Circuit Theory" Based on Engineering Certification. Education Teaching Forum, 2021(48): 109–112.

[11] Gao X, Xie Q, 2021, Teaching Practice of the Basic Course of Circuit Analysis Based on the Internet. Application of IC, 38(05): 146–147.

[12] Tian L, Hu H, Li Y, 2021, Application of BOPPPS Teaching Model Based on "Rain Classroom"—Taking "Circuit Theory" Course as an Example. Journal of Hunan Institute of Engineering (Social Science Edition), 31(01): 104–108.

[13] Jiang F, Chen C, Huang R, et al., 2020, Reform and Practice of Innovative Model for Electrical and Electronic Courses Based on "Internet +". Higher Agricultural Education, 2020(06): 85–89.

[14] Liu S, 2020, Exploration of Blended Teaching Model for "Circuit Analysis" Course. Science and Technology Innovation Herald, 17(14): 193–194.

[15] Wang G, Feng Z, 2020, Reform and Innovation of Theoretical Teaching of "Fundamentals of Circuits and Electronic Technology" Course Under the "Internet +" Model. Science and Technology Communication, 12(07): 141–142.