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Analysis and research on the "online and offline" mixed teaching of reinforcement flat method reading

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Abstract: *The traditional teaching mode is limited by time and space conditions, and it is difficult to meet the needs of students' personalized learning. "Online and offline" blended teaching breaks the restriction of traditional classroom by effectively integrating online and offline teaching resources and provides students with a more flexible and independent learning path. In the teaching of reinforcement flat method reading, the hybrid teaching not only uses the online platform to provide a variety of learning materials and interactive exercises, but also combines the offline classroom to carry out in-depth explanation and practical operation, which helps students fully grasp the knowledge and skills of reinforcement flat method reading, and improves the quality of courses and teaching effects. This paper deeply analyzes the basic status quo and challenges of the online and offline hybrid teaching, and puts forward specific measures and achieved results to promote the further application and development of this teaching mode in the teaching of reinforcement plain law and map.*

Keywords: *Teaching mode; Reinforcement flat method reading; "Online and offline" mixed teaching; Interactive exercise*

1. Introduction

Reinforcement flat method reading plays a crucial role in architecture-related majors, not only being a key link to cultivate students' reading ability and practical skills, but also serving as an important cornerstone to shape students' engineering reading and steel bar calculation abilities. Especially in applied universities, this course has a direct impact on students' future career development and competitiveness in the construction industry. However, due to the close connection between the course content and the engineering site, students' limited spatial imagination, and their lack of direct understanding of the components on the engineering site, coupled with the teachers' limited engineering practice opportunities, this makes the teaching process fraught with difficulties. At the same time, the reduction in class hours caused by teaching reform, the rapid development of the construction industry and technological iteration, have made the traditional steel bar reading teaching method inadequate, further away from the goals of applied undergraduate education. In recent years, from the actual grasp of students, the teaching effect is not satisfactory, which further highlights the limitations of traditional teaching methods. In view of this, it has become an urgent task for applied universities to carry out timely reform of the steel bar reading course to improve the quality of the course and teaching effect. Based on the characteristics of the course, we explore and implement the "online and offline" blended teaching mode to provide useful guidance for solving the above problems[1-2].

2. The basic current status and challenges of reinforcement flat method reading mixed teaching

With the rapid development of information technology, the mixed teaching mode has gradually occupied an important position in the steel bar flat drawing diagram course. This teaching mode skillfully combines the advantages of traditional classroom lectures and online learning to create a flexible and diversified learning environment for students. On the online platform, students can freely access rich learning resources, engage in individualized autonomous learning and preview; while the offline classroom becomes the key venue for teacher-student interaction, deepening understanding, and problem-solving. However, the implementation of the steel bar flat drawing diagram mixed teaching has also encountered some challenges. The primary problem is the integration and optimization of teaching resources. The online platform needs to be regularly updated and improved to ensure that the

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learning materials and exercises provided are closely aligned with the core requirements of the steel bar flat drawing diagram course. At the same time, the offline classroom teaching design also needs to be carefully planned to promote students' full participation and effective interaction. In addition, the role and ability of teachers also face the pressure of transformation and improvement. Teachers not only need to have a solid foundation of steel bar flat drawing diagram professional knowledge, but also need to master online teaching techniques and methods to better guide students in mixed learning. This teaching model requires teachers to not only impart knowledge to students, but also to cultivate their ability to learn independently and innovate.

Although blended learning has shown many advantages in steel bar plan drawing teaching, such as meeting individualized learning needs of students, improving teaching quality and effectiveness, there are still some key issues to be addressed in practical application. How to effectively integrate online and offline teaching resources to ensure students' learning effectiveness and quality, as well as how to stimulate students' learning interest and motivation, are important issues that need to be solved urgently. In the future, we need to further study and analyze these issues to promote the continuous optimization and development of blended teaching in steel bar plan drawing course in applied undergraduate education.

3. The necessity of blended teaching in reinforcement flat method reading course in applied undergraduate education

The necessity of blended teaching in steel bar plan drawing course in applied undergraduate education cannot be ignored. Firstly, blended teaching significantly improves students' learning outcomes. Unlike the characteristics of traditional teaching that are limited by time and space, blended teaching provides students with extensive and rich learning resources through online platforms, enabling them to learn individually based on their own learning progress and interests. Meanwhile, offline classes have become an important venue for deepening understanding and practical operation, helping students master the knowledge and skills of steel bar flat drawing comprehensively. This online and offline combined teaching model undoubtedly greatly enhances the students' learning effect. Secondly, blended learning is of great importance for cultivating students' autonomous learning ability. Under this mode, students need to actively participate in online learning, think independently and solve problems, thus gradually cultivating the habit of autonomous learning and lifelong learning. This not only benefits the enhancement of students' innovative ability and practical ability, but also lays a solid foundation for their future career development. Moreover, blended learning is conducive to promoting communication and cooperation among students. Through the discussion area and collaborative projects on the online platform, students can interact with peers in real time, share their learning experiences and insights, thus cultivating team spirit and communication skills. This also has a positive driving effect on students' future team cooperation and career development.

For steel bar flat drawing comprehension, a core course in architecture-related majors, the cultivation of practical ability and professional ethics is particularly important. Hybrid teaching combines online and offline modes to simulate real-life scenarios, case studies, etc., enabling students to have a more intuitive understanding of the industry's current situation and development trends, thus enhancing their professional competence and practical skills. At the same time, through close ties with industry enterprises and partners, hybrid teaching can provide students with more practice opportunities and employment channels, further enhancing their employability. The application of hybrid teaching in the steel bar drawing recognition course for undergraduate applied universities not only helps improve students' learning outcomes and autonomous learning ability but also promotes communication and cooperation among students, enhancing their professional competence and practical skills. Therefore, the implementation of mixed teaching is of great significance to this course and the whole applied undergraduate education[3-4].

4. Concrete measures for online and offline mixed teaching of reinforcement flat method reading

4.1 Reconstruction of curriculum knowledge system

A total of 32 class hours are arranged, including 12 class hours in practice. The teaching focuses on practice, and the assessment direction also focuses on students' knowledge point practice and application ability. If all online teaching is adopted, teachers will not be able to timely understand students' mastery of knowledge points, and students will be prone to relax and not study carefully,

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which will lead to more difficult courses and a serious decline in students' learning enthusiasm. If the original teaching mode is used, offline classroom teaching will inevitably lead to boring learning process. At the same time, the lack of single learning resources and low utilization of resources will lead to a great discount in teaching quality. Explore the online + offline mixed teaching mode, the number of hours arranged online and offline, the proportion of teaching resources, and the choice of teaching methods for different teaching contents need to be taken into account. Based on this, the teaching mode reform reconstructs the knowledge system of the original course content. The whole course is divided into six parts, and the teaching content is divided into introduction, basic component, beam component, plate component, column component and shear wall component. Each part has a class schedule, and the class schedule is adjusted according to the importance and difficulty of the course content.

4.2 Reconstruction of online and offline teaching modes

The teaching design of Rebar plain method is mixed online and offline. Some class hours require students to study online, and the class notice is issued before class, so that students can conduct "in-depth preview" online. Part of the conceptual knowledge content is put online for students to learn independently. In addition, the questions that need to be asked in the next class will be posted online, and the discussion will be posted to students. After students finish online learning, they can discuss the knowledge points that they do not understand in the discussion area. The flipped classroom is adopted in the course. Before class, students' online learning is checked by asking questions, and then they are divided into groups for discussion according to the questions they have concentrated on. Then a representative from each group is selected to give answers, and the teacher makes comments and starts to explain. Open all teaching resources after class, students can review and consolidate the knowledge points, deepen the understanding and memory of the knowledge points. At the same time, it also uploads some knowledge points to broaden the scope of knowledge, and the students with better learning can be improved and effectively strengthen the ability of students.

4.3 Reconstruction of teaching evaluation methods

In the early stage, the evaluation method has always been 4-6, and the usual score accounts for 40% plus the final exam score accounts for 60%. The usual score consists of three parts: attendance, homework (practice in class) and class performance. The online and offline mixed teaching mode focuses on process evaluation, adopting 3-7 evaluation methods and paying more attention to the assessment of practical links. This course will implement the process assessment from the last semester. The assessment will be carried out from five modules: foundation component, beam component, plate component, column component and shear wall component. According to the importance of each module, each module will account for 20%, 30%, 10%, 25% and 15% of the final score respectively. Each module is composed of three parts: regular attendance (10%), in-class practical training (20%), and stage examination (70%). The phased assessment is divided into theoretical examination (closed book, online examination) and practical examination (open book examination), with the score accounting for 40% and 60% respectively. The theory examination mainly examines students' knowledge of picture recognition. There are four types of questions: single choice, multiple choice, fill in the blank and judgment. The answer is completed within the specified time, and the score is calculated automatically by the system. The practical examination is mainly based on the calculation of steel bar engineering quantity, mainly assessing the connection structure of important nodes of each component, as well as the calculation of steel bar engineering quantity. The examination is carried out in the way of paper, and the scores of all the examinations are recorded by the safety percentage system.

5. The results achieved by the online and offline hybrid teaching of reinforcement flat method reading

5.1 Improved the teaching model design

The online + offline mixed teaching mode is explored, and the number of hours arranged online and offline respectively, the proportion of teaching resources, and the choice of teaching methods for different teaching contents need to be taken into account. Based on this, the teaching mode reform reconstructs the knowledge system of the original course content. The whole course is divided into six

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parts, and the teaching content is divided into introduction, basic component, beam component, plate component, column component and shear wall component. Each part has a class schedule, and the class schedule is adjusted according to the importance and difficulty of the course content. Each part of cognitive knowledge points (introduction, simple components of map recognition, etc.), mainly in the way of online teaching; The knowledge of skills (the calculation part of the engineering quantity of important components and rebar) is mainly based on the offline teaching method. Case combat module adopts online plus offline mode.

5.1.1 Online teaching mode

Relying on the Super Star learning platform to carry out online teaching, online teaching is mainly divided into teaching plans, chapters, teaching materials, notices, homework, exams and discussions of several modules, covering three aspects of pre-class preview, learning in class and testing after class. Online teaching will sort out the learning materials in the early stage, make and sort out the key and difficult micro-videos, explaining PPT, drawings, question bank, after-class expansion content, chapter mind map, and key and difficult lecture notes of the course; Then, the introduction of the course and after-class development content are uploaded to the data module, the presentation PPT and chapter mind map, the lecture notes of the important and difficult points of the course are uploaded to the teaching plan, and the micro-videos and drawings of the important and difficult points are uploaded to the chapter module. Task points can be set in the chapter module, after which each student must complete the knowledge points to complete the study. If there are documents that students need to watch to complete the study, they can also upload them to the chapter module. Through the "in-depth preview" of students before class. Part of the conceptual knowledge content is put online for students to learn independently. In class, teachers review and check online learning content, and carry out classroom teaching activities with more discussions, exercises or other students' participation activities. Open all teaching resources after class, students can review and consolidate the knowledge points, deepen the understanding and memory of the knowledge points. At the same time, it also uploads some knowledge points to broaden the scope of knowledge, and the students with better learning can be improved and effectively strengthen the ability of students.

5.1.2 Offline teaching

Offline teaching is mainly for the reinforcement engineering quantity calculation part of each module, relying on smart classroom and BIM software and modern teaching methods. This course focuses on the teaching of practical ability. After the completion of each online theoretical course, the corresponding offline practical course is carried out. The practice guide is prepared before class and distributed to students. Students can discuss in groups according to the pre-class preview and online learning, and ask questions, and the teacher will answer them on site. In this process, students can discuss with classmates, can ask the teacher at any time for the problems encountered in practice, and the teacher can summarize the common problems of everyone.

5.2 Reform of assessment methods

This course will implement the process assessment from the last academic year. The assessment will be carried out from five modules: foundation component, beam component, plate component, column component and shear wall component. According to the importance of each module, each module will account for 20%, 30%, 25% and 25% of the final score respectively. Each module is composed of three parts: regular attendance (10%), in-class practical training (20%), and stage examination (70%). The phased assessment is divided into theoretical examination (closed book, online examination) and practical examination (open book examination), with the score accounting for 40% and 60% respectively. The theory examination mainly examines students' knowledge of picture recognition. There are four types of questions: single choice, multiple choice, fill in the blank and judgment. The answer is completed within the specified time, and the score is calculated automatically by the system. The practical examination is mainly based on the calculation of steel bar engineering quantity, mainly assessing the connection structure of important nodes of each component, as well as the calculation of steel bar engineering quantity. The examination is carried out in the way of paper, and the scores of all the examinations are recorded by the safety percentage system. From the final effect, the assessment after the reform is more comprehensive, and the overall performance has been significantly improved. It is mainly reflected in the average score and high score, indicating that students' understanding of knowledge points and comprehensive application ability have been significantly improved[5-6].

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6. Conclusion and prospect

6.1 Conclusion

As an innovative teaching mode, the online and offline hybrid teaching of the course of reinforcement flat method reading has fully demonstrated its significant advantages and great potential in the current educational environment. It breaks the time and space limitation of traditional classroom and gives students more flexible and independent learning space. Through the richness of online resources and the interaction of offline classes, blended teaching not only optimizes the allocation of teaching resources, but also significantly improves the teaching effect. During the implementation process, we observed a significant increase in students' learning enthusiasm and engagement, and they actively used the online platform for independent learning and interactive communication, while the offline classroom became an important platform for deepening understanding and discussing issues. At the same time, this teaching mode also promotes the transformation of teachers' roles and the improvement of teaching skills, so that they can better adapt to the needs of the information education era.

6.2 Outlook

Looking forward to the future, the online and offline mixed teaching of rebar plain law and graph reading course has a broad development prospect. With the rapid progress of information technology and the deepening of education reform, blended teaching will be further popularized and perfected. We expect that the future teaching will pay more attention to the personalized needs of students and differentiated teaching, with the help of advanced technologies such as big data and artificial intelligence, to achieve accurate analysis and personalized guidance of students' learning behavior. At the same time, blended teaching will further strengthen practicality and innovation by introducing more practical projects and innovative activities to cultivate students' practical ability and innovative spirit.

In general, the combination of online and offline teaching is a teaching mode with great advantages and development potential. We should continue to deepen the research and practice of this model in order to better meet students' learning needs and improve teaching quality. However, the implementation of blended teaching also faces many challenges, how to design attractive and interactive online exercises and simulation operations to stimulate students' interest in learning? How to design inspiring offline classroom activities, such as case studies, group discussions, hands-on activities, etc., to promote deep interaction and knowledge internalization between teachers and students? How to collect and analyze students' learning data in time, provide teachers with targeted teaching feedback to optimize teaching strategies and so on. These problems need us to continue to explore and solve in order to improve and optimize this teaching model.

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