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Research on the Online and Offline Hybrid Teaching Mode Based on "Internet +"——Taking Digital Logic and Digital Circuit as an Example

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Abstract: Under the normalization of epidemic prevention and control, in the face of changes in teaching and learning, teachers must complete teaching tasks as planned, achieve the teaching goals stipulated in the syllabus, and achieve "stop classes without stopping teaching, and students will learn online", "Online courses" must rebuild suitable for special periods. "Internet +" online and offline hybrid teaching has become a new teaching mode adopted by many colleges and universities. By carrying out "student-centered", the practice activities of reconstructing the teaching mode of digital logic and digital circuit courses. Reforms have been carried out in terms of pre-class knowledge transfer, classroom knowledge internalization and after-class knowledge consolidation, which have improved students' enthusiasm for autonomous learning and ensured the quality of classroom teaching.

1. Introduction

The sudden outbreak of the novel coronavirus pneumonia in 2020 disrupted the normal teaching activities of colleges and universities. All colleges and universities actively responded to the call of the Ministry of Education to "stop classes without stopping teaching, and stop classes without stopping learning", and began to explore the relationship between online and offline course teaching. Online and offline blended teaching is a teaching method that organically combines information technology and other means with traditional teaching methods, and it is also a new teaching mode under the rapid development of information technology. Teachers can make full use of Internet technology to build a network teaching platform to improve teaching efficiency, while students can improve learning efficiency through independent learning through rich online resources, break the limitations of teaching time and space, and effectively overcome the shortcomings of the original teaching model[1].This paper takes the course of digital logic and digital circuits as an example to further enhance and improve the online and offline blended teaching of the course.

2. Design of online and offline Hybrid Teaching Mode Based on "Internet +"

2.1 Analysis of learning situation

At present, college students' ideological understanding has distinctive characteristics of the times, and they have a natural interest in the Internet and information technology. Their acquisition of knowledge is not only satisfied with the traditional offline passively receiving teachers' lectures, but also prefers to actively seek resources of their own interest on the Internet. They are good at collecting resources and integrating resources on the Internet. Under the background of this "Internet plus" era, conventional traditional teaching models and methods can no longer meet the needs of students at this stage.

2.2 Analysis of the implementation Conditions of Blended Teaching

The course of digital logic and digital circuit is the main course of computer majors. Through the study of this course, students will be familiar with the basic principles and characteristics of digital circuits, and master the basic structure, analysis methods and characteristics of digital logic and digital circuits. The use method can be connected with practice, so that students can realize what they have learned, and lay the foundation for subsequent courses and computer work. Therefore, this course adopts the online and offline mixed teaching mode, applies the "three-stage teaching" method before class, during class and after class, and implements the output-oriented teaching mode by exploring student-centered adaptability. The mixed teaching mode can realize all-round and multi-dimensional interaction between teachers and students, and cultivate students' thinking ability and ability to solve practical problems. At the same time, by paying attention to the formative evaluation of the whole process of teaching and its effects, it explores the operability of promoting the continuous improvement of teaching[2].

2.3 Teaching Mode Design

According to the characteristics of OBE theory, blended learning theory and Superstar Learning Pass, combined with the nature of digital logic and digital circuit courses and the actual situation of students, the mixed classroom teaching mode is designed as online preview before class, face-to-face teaching during class and online after class, and two ways of online and offline[3].

In the pre-class online preview stage, according to the teaching plan, the lecturer uploads teaching materials on the Chaoxing Learning Platform, such as PPT courseware, micro-class videos, and online classroom exercises and so on. The main lecturer guides students to learn online independently by publishing tasks, preview the content to be taught and submit online quizzes, and teachers check and find problems in time. Taking the teaching of “Decoder” as an example, in the pre-class section, the teacher should collect and organize the learning materials or record the micro-lesson video according to the requirements of the teaching syllabus and the actual learning situation of the students, upload the learning resources to the super star learning platform, so that students can log on to the online teaching platform before class, view the task book, combined with the teacher's uploaded materials to complete the preview task. Then, according to the request of the task book, after the effective preparation, students complete the practical application of the decoder survey report with the team members, and upload the final survey report to the Super Star Learning Platform. Teachers use the platform to understand the completion of the task of each group preview, adjust the teaching content and methods.

The mid-class stage is mainly based on offline teaching, supplemented by Learning Pass and Rain Classroom, where key and difficult points are explained, group discussions, and Q&A[4]. In

classroom teaching, teachers can create teaching situations with multimedia technology to naturally lead to the learning task of this lesson - decoder. In order to strengthen the students' theoretical knowledge base and improve their understanding of the decoder, teachers can use software simulation to display relevant theoretical knowledge and cooperate with teachers' vivid explanations to mobilize students' enthusiasm for learning. Then, the teacher organizes each group to present the pre class investigation report, which is evaluated one by one by the teacher. Then, the teacher can guide the students to design the actual application circuit of the decoder in groups, guide the students to use simulation software for actual design, and clarify the design scheme. Finally, in the evaluation and summary link, the teacher organized each group to upload the classroom works to the Superstar Learning Link teaching platform for inter group display. At the same time, the teacher released evaluation indicators, encouraged each group to conduct mutual evaluation and self-evaluation, and voted for their favorite works on the teaching platform. Then, the teacher draws a mind map containing the key knowledge of this lesson, and guides students to summarize and summarize the new knowledge according to the mind map, internalizing it into their own cognitive structure.

Table 1: Teaching process design

Teaching Process	Teaching Method	Teacher Task	Student Task
Pre-class	Online	Publish learning tasks and design teaching activities according to the completion of students' tasks	Watch videos and courseware, complete pre-class tasks
In class	Online+ offline	Explain key and difficult points, summarize knowledge points, and release activities	Interaction between teachers and students, group discussion and classroom practice
After class	Online	Publish jobs and tests Correct homework and test Summary and improvement	Complete work and test View Feedback Learning extension materials

In the post-class stage, homework and tests are distributed and handed in through Chaoxing Learning Pass, and online interactive discussions are conducted. , learning effect evaluation and expansion of learning, so as to realize the whole management of pre-class, in-class and after-class learning through pre-class knowledge transfer. The knowledge and skills acquired by students in the classroom must be transformed through repeated contact, verified and consolidated in practical application, and the organic unity of theory and practice can be achieved in the process of finding problems, solving problems, summarizing and revising. To this end, teachers should improve the online question bank, so that students can complete homework online. When students finish the exercises, the system will automatically give a score, so that students can learn relevant knowledge points again according to the wrong questions, try to solve the problems again, and complete the effective transformation of knowledge. Superstar Learning Link software system internally supports uploading different types of exercises. Teachers can upload multiple types of questions, such as selection, filling in the blank, judgment, and short answer. According to the teaching content in the classroom, appropriate exercises can be selected as homework, and task points and correct answers can be set synchronously. With the advancement of the course teaching, teachers can carry out staged online tests, select the exercise materials in the question bank as the test questions, and let all students participate in the test online. Teachers can use data analysis to understand the learning

situation of the same student at different stages, or the common learning weaknesses of the whole student, adjust the teaching focus and teaching form, and realize the mutual benefit of teaching and learning under the online online offline hybrid teaching mode.

The specific teaching process design is shown in Table 1.

2.4 Teaching Mode Practice

In 2021, an online and offline hybrid teaching model will be launched for 198 students in 6 classes of the 2020 computer science and technology major. Before class, students complete the online test of pre-class practice questions by studying online resources such as PPT courseware and video of important knowledge points, which effectively improves the efficiency and consciousness of students' learning [5]. At the same time, teachers can timely find problems in students' learning. In the class, the offline classroom teaching focuses on the key and difficult points and the problems existing in the pre-class preview, and carries out in-class tests according to the knowledge points, realizing the efficient supervision both online and offline. After class, students can complete homework and tests online to learn extracurricular materials. After teacher's correction, students can check the feedback results.

Data from the platform show that 92% of students complete all online learning tasks, effectively improving the completion rate of learning tasks. In the blended online and offline teaching model, the grade distribution of classes is more scientific and reasonable, the average grade of students has been improved, and the comprehensive quality has been significantly improved.

Compared with the students of Grade 2019 who adopt the original teaching method, under the same class period, the blended online and offline teaching can improve students' learning enthusiasm and initiative, and change the disadvantages and shortcomings of the original "solid" teaching. Blended teaching practice shows that online model is more in line with students' learning needs and can effectively improve students' learning motivation. The synchronous offline mode can assist the successful development of online teaching, consolidate knowledge and comprehensively improve teaching quality.

3. Advantages of online and offline hybrid teaching mode in teaching

3.1 Cultivate students' autonomous learning ability

In view of the problems existing in the original teaching, such as students' failure to preview before class and their inattention in class, teachers can use the network platform to provide students with preview materials before class, cultivate students' autonomous learning ability, summarize the completion of students' preview tasks before class, and take common problems such as difficulties and mistakes as the focus of teaching in class. The online and offline hybrid teaching mode effectively solves the problem that students do not preview, monitors the process and results of students' self-study through the network platform, promotes students to develop a good habit of independent learning, and also eliminates the shortcomings of insufficient time for students to discuss and communicate in the original classroom.

3.2 Improve teachers' teaching efficiency

The online and offline hybrid teaching mode allows teachers to make statistics on students' attendance and completion of pre class preview tasks through platforms such as Superstar Learning Link, MOOC of University of China, Rainclass, etc., which can not only save time for signing in and urge students to attend classes on time, but also grasp the difficulties existing in students'

learning of this course content, adjust the offline teaching content and method in time, and combine online learning with offline supplement, Improve students' learning efficiency and teachers' teaching efficiency.

3.3 Expand the teaching content of the course

The original course teaching focuses on the teaching of students' theoretical knowledge, but pays less attention to the cultivation of students' logical thinking ability, which cannot meet the diversified needs of students for knowledge. Based on the "Internet plus" online and offline hybrid teaching mode, teachers can provide students with rich and diverse learning resources through the network platform to further meet the diverse needs of students for knowledge, which is conducive to improving students' learning interest, enriching teaching content, and achieving hierarchical teaching and knowledge expansion. Teachers upload homework or unit tests and extracurricular materials on the network platform, so that students can comprehensively learn relevant professional knowledge through the network, and combine theoretical knowledge with practice in the classroom.

3.4 Ensure the fairness and justice of teaching evaluation

Teaching evaluation is an indispensable part of curriculum teaching. The evaluation of students' learning mainly includes process evaluation and result evaluation. In the original classroom teaching, the process evaluation of students is difficult to organize and takes a long time in class, while online evaluation is easier and simpler than the original classroom. Teachers can realize process evaluation through the statistical function of the network platform, and timely understand the learning status of students at different time nodes through background data. The combination of online process evaluation and offline outcome evaluation is adopted to make teachers' evaluation of students' learning more complete, objective and fair.

4. Conclusions

In the Internet era, the integration of "Internet plus education" is imperative. The online and offline hybrid teaching mode is also an inevitable trend of higher education teaching mode reform. The basic theory and practical methods of the course of digital logic and digital circuit are the necessary knowledge content for computer talents. This course has built a super star learning platform integrated with modern information technology, as well as a student-centered online and offline hybrid teaching mode based on OBE teaching philosophy, which can make the original classroom teaching and online teaching complement each other, make the teaching methods more flexible and diverse, and enrich the teaching content more comprehensively. The teaching efficiency is more efficient and more in line with the requirements of the current era for student training.

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