Practice and Exploration of Mixed Teaching of Microelectronics

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Abstract: The mixed teaching mode plays an increasingly important role in stimulating students' interest and autonomy in learning, and strengthening students' learning ability. The full integration of mixed teaching mode and microelectronics teaching can not only achieve the teaching objectives smoothly, but also enable students to deepen their understanding and memory of relevant knowledge with the help of diversified and interesting teaching methods. Therefore, this paper takes the microelectronics course as an example to practice and explore the effective ways to carry out the mixed teaching mode. Teachers should not make full use of online and offline teaching resources, but also actively improve the traditional assessment systems. Through the continuous improvement of the practicality of online and offline teaching content, an easy-to-complex teaching method with a coherent content structure can be adopted to stimulate students' learning motivation, improve their enthusiasm for participation, and lay a solid foundation for further improvements in the teaching of microelectronics technology.

Keywords: Microelectronic technology; Mixed teaching; Learning needs; Learning enthusiasm; Learning motivation

1. Introduction

The mixed teaching mode takes online teaching and offline teaching as the channel, fully integrates the advantages of traditional online teaching and classroom teaching, and is an effective teaching mode that meets the cognitive needs of students. The full integration of online teaching and offline teaching mode can completely eliminate the constraints on time and space that traditional students are subjected to when learning in classrooms, and ensure that students can master specific knowledge from simple to in-depth based on the teaching content designed by teachers. Microelectronics is a complex course as it involves theoretical, practical, technical, engineering, and other diversified characteristics, and plays an important role in promoting students' ability to apply microelectronics knowledge. Therefore, teachers should first thoroughly change their traditional spoon-feeding style teaching, actively develop online and offline teaching resources, take scientific measures to promote the full integration of the two, and ensure that students can fully absorb the content of online and offline teaching resources under their guidance. In order to optimize time management, preview and review can be done before class and after class and use class time to solve problems and answer questions.

2. Enrich the online and offline teaching resources to fully meet students' learning needs

To ensure the smooth development of microelectronics teaching, teachers should attach great importance to the richness of teaching resources and create a good environment to fully utilize various teaching

materials. In the process of preparing teaching resources for students, the relevant content should not only involve textbooks, cases, films and television programs, pictures, courseware, but also include infrastructure, education, teachers and other resources. In a broad sense, it also involves educational policies. In the process of integrating teaching resources, teachers should ensure that relevant elements are highly vivid, visually appealing and intuitive, so that students' learning needs can be fully met. In the process of microelectronics teaching, online resources mainly include quick lessons in point form, fishbone diagram, pre-class test questions, circuit making, interactive operation, simulations, video learning, original picture, Computer-Aided Design (CAD) operation, video production, demonstration videos, online work and tests, learning guidance map, and many other contents. It can be seen that the construction process of online resources has long-term characteristics [1].

In order to ensure rapid and effective completion of online teaching resource construction, teachers can use the quick lesson function of the teaching platform and video recording mode to make micro lessons for students in combination with classroom teaching. After teaching, teachers can also compile the excellent assignments handed in by students into one video, which will be played before the next class. This can not only help students to refresh their knowledge of the last lesson, but also effectively improve their self-confidence and sense of achievement, and concentrate better during the lessons. Teachers can also upload the prepared online teaching resources to the students' mobile devices through QQ, WeChat, Dingtalk and other platforms, use each module of the teaching platform to establish a microelectronic course with complete and coherent structure for the students. The contents of the course can then be uploaded in order according the designed course structure.

In the teaching platform, students can not only watch quick lessons, courseware, videos and other contents repeatedly according to their needs, but also carry out online test after learning, submit the completed homework to teachers, and discuss the problems with teachers. Teachers can use the teaching platform to upload materials for students, enable students to sign in online, issue notices, help students solve problems, mark the assignments handed in by students, keep up with the students' learning progress, and take targeted measures to encourage independent learning.

Offline teaching resources mainly include lesson outline, props, and printed textbooks [2].

3. Reasonably design online and offline teaching activities to ensure that students' learning enthusiasm is fully mobilized

The first stage is the information release stage. Before the lessons, teachers can upload carefully prepared teaching resources and establish new teaching modules on the teaching platforms. In this module, students will only be exposed to a large number of learning resources, teachers can also release supplementary teaching resources for students in a timely manner based on the actual situation of students, supervise students in completing online previews, guide students in understanding the lessons, and the understand the offline resources prepared by the students in advance. After reading and analyzing the resources and information uploaded by teachers, students can fully understand their own learning tasks and objectives, and actively complete the online preview test task designed by teachers [3].

The second stage is the autonomous learning stage. Students click the learning guidance map in the teaching platform to independently complete their learning tasks. In this process, students can watch CAD videos, simulation videos, knowledge points, quick lessons, and take notes. They can also operate the computer or assemble circuits according to the demonstration videos, timely point out the existing problems, and actively communicate with teachers or other students to successfully complete the online autonomous learning tests assigned by teachers. Teachers should provide timely feedback online, provide professional guidance, summarize the common problems existing in the process of students' independent learning by randomly checking their work and strictly evaluating their test assignments, and explain relevant content

using online videos [4].

The third stage is the offline teaching stage. After fully mastering the situation of students' autonomous learning, teachers provide a centralized explanation regarding problems that could not be addressed during online lessons to the classroom. In class explanations, teachers should not only teach students how to analyze the principles and characteristics of key and difficult problems, but also demonstrate the specific operation process. The students' enthusiasm for learning can be fully stimulated through classroom interactions with the teachers. On this basis, classroom tests can be carried out to evaluate their understanding of key and difficult problems. Finally, students can be assigned with highly targeted homework [5].

The final stage is the summary and reflection stage. After teaching, both students and teachers should reflect on the development of the mixed teaching mode. In the process of reflection, students need to modify the circuit designed by themselves, fill in the feedback form in the teaching platform, complete the homework assigned by their teachers, and summarize the problems they have encountered in the learning process and their learning outcomes. Teachers need to summarize and analyze students' feedback forms, carefully correct the content of homework handed in by students, summarize the problems and gains in the teaching process, and make excellent design works and homework into teaching courseware to improve online resources [6].

4. Strengthen the reconstruction of teaching assessment and evaluation system and pay close attention to students' learning motivation

In the teaching of microelectronics technology, the quality of the student's design based on the requirements of the evaluation system directly reflects their attitude towards learning and whether the learning goals are achieved. Teachers should analyze the characteristics of the mixed teaching mode in detail, take diversified measures, promote the effective integration of process evaluation and summary evaluation, and make teaching tests and teaching activities as the basis for progress evaluation, discover the students' strengths and give them active encouragement [7].

In the process of designing the evaluation system, teachers should attach great importance to the students' learning process, objectively evaluate the students' video learning completion level, online homework scores, test results, participation in classroom discussions, level of interaction based on questions and answers, and completion of hands-on operations, and include online and offline scores to form the overall curriculum evaluation score.

For example, tests before, during, and after class account for 15% of the total score; online homework score accounts for 10% of the total score; online teaching and video learning account for 15% of the total score; online interaction account for 5% of the total score; attendance accounts for 10% of the total score; the completion of the simulation circuit accounts for 15% of the total score; CAD design and circuit completion account for 15% of the total score; and the completion of circuit production accounts for 15% of the total score. In this process, the teaching platform can be used to effectively summarize students' academic achievements to ensure that additional calculations and statistics are not needed. The teaching platform can automatically score students' test results, video learning and attendance. Teachers only need to mark students' online homework and offline assessment results [8].

5. Conclusion

In order to maximize the role of mixed teaching mode in the teaching of microelectronics, teachers should not only make online and offline teaching resources more abundant, which can fully meet students' learning needs, but also reasonably design online and offline teaching activities according to students' cognitive needs and interests, so as to stimulate the students' learning enthusiasm. They can also modify the

assessment and evaluation system according to the characteristics the online and offline teaching mode, and always pay attention to the students learning motivation. For simple knowledge points, teachers can provide students with learning resources and learning methods, encourage students to learn independently, and improve students' initiative in learning. For complex contents, teachers can use modern information technology to demonstrate and explain, so as to further improve the effectiveness of the lessons.

Disclosure statement

The authors declare no conflict of interest.

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