

Original Research Article

Research on Hybrid Teaching Mode of Analog Electronic Technology Course under the Background of New Engineering

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Abstract: With the development of information technology, the role of analog electronic technology in education and teaching has become more and more prominent. As a more practical professional foundation course, it plays a vital role in the electronics, electrical and communications and other professional knowledge structure. However, the actual teaching process, can not achieve a good teaching effect due to the course content, complex knowledge points and practical and other characteristics. Therefore, this paper focuses on the mixed teaching mode based on MOOC, the optimization of the teaching of analog electronic technology courses to analyze, so as to effectively promote the efficiency of teaching analog electronics technology.

Keywords: Analog Electronic; MOOC; Online and Offline Mixed Teaching; New Engineering

1. Introduction

As a basic course for electronics, electrical and communication majors, "Foundation of analog electronic technology" is an important part of their professional knowledge structure. But the actual teaching of students' mastery is not high because of the influence of factors such as the complexity and diversity of the content of the analog electronics course and the practicalness. So that it affects the students' subsequent application of the practical effect. The mixed teaching mode based on MOOC has many advantages for instance open, low cost, personalised learning and collaborative assessment and so on. It is an important idea to solve the teaching dilemma of analog electronics technology. Therefore, the paper will use online and offline mixed teaching mode of based on MOOC into the teaching of analog electronics technology courses. It can optimize analog electronics technology course.

2. A brief analysis of the online and offline mixed teaching model based on MOOC

2.1. MOOC mixed teaching model concept

MOOC is actually a large open network course, a large-scale teaching mode carried out with the help of internet resources. Compared with the traditional classroom, its advantage lies in the use of internet advantageous resources, which can not only effectively mobilise students' interest in learning, but also strengthen students' participation in classroom teaching, thereby promoting students' understanding and memory of classroom learning, and realising the improvement of teaching efficiency and effectiveness.

2.2. Course features of the MOOC mixed teaching model

MOOC course features include four main aspects, including diversification of tools and resources, ease of use, wide audience and strong autonomy of course participation. The diversity of tools and resources mainly

refers to the integration of various social networking tools and digital resources in a variety of forms, thus forming diversified learning tools and rich course resources. The easy-to-use feature of the course is that MOOC courses can effectively break through the time and space limitations of traditional courses by using the advantageous resources of the Internet. The wide audience of the course is because that MOOC courses break out the limitation on the number of people. It is the initiative of course participation, mainly because MOOC courses have a high enrolment rate, so the teaching requires learners to have strong independent learning ability and self-control, so as to ensure good teaching efficiency and effectiveness.

2.3 Features of the MOOC mixed teaching mode

The most distinctive feature of the MOOC mixed teaching mode is the use of internet resources, which makes it remarkable for its openness, low cost, personalised learning and collaborative evaluation. Unlike the traditional classroom teaching mode, the MOOC mixed teaching mode has different teaching methods and teaching means, with its knowledge transfer process taking place before class and the internalisation process of knowledge being placed on the course, through the advantage of flipped classroom teaching in order to enhance the efficiency and effectiveness of teaching and learning activities. At the same time, by posting teaching videos, courseware and exercises on the teaching course platform, students can achieve independent fragmented learning, which not only enhances communication between teachers and students, but also strengthens students' understanding and memory of the knowledge content, thus effectively enhancing teaching efficiency and effectiveness.

3. Problems with the current teaching of analog electronics courses

3.1. Conflict between course content and teaching hours

From the analog electronics course teaching materials, the "Fundamentals of Analog Electronics" contains a lot of teaching content, mainly including operational amplifiers, diodes and their basic circuits, frequency response, analog integrated circuits, power amplification circuits, signal processing and signal generation circuits and many other contents. However these teaching content is not only many, but the knowledge point is abstract, the principle is difficult to understand. The course has only 64 hours of theoretical teaching time. In the actual teaching, many teaching contents cannot be explained in depth in time, resulting in poor teaching efficiency and effect.

3.2. Single mode of teaching

Because of the complex content of the analog electronics course and limited time and other factors, teachers in the teaching process, mainly to fill in the duck teaching, students in a passive state of knowledge, coupled with limited teaching time, the teacher's explanation is relatively simple, the actual degree of mastery received by students is not high, not only will affect the progress and effectiveness of subsequent teaching, but also frustrate students' interest in learning. It is very unfavourable for the efficiency and effectiveness of the analog electronics technology's course teaching.

3.3. Insufficient emphasis on student

With the deepening of the concept of quality teaching, students' subjective initiative has become an important goal of teaching, but from the current situation of the teaching of analog electronics technology courses,

by the course characteristics and teachers' concepts, teachers are just an instillation just mainly, the classroom atmosphere is boring and tedious, students in addition to passively accept the knowledge imparted by teachers, but also need to deal with a large number of after-school homework, student interest and enthusiasm for learning is not high, which makes analog electronics This makes the teaching of analogue electronics technology inefficient and ineffective.

4. Research on the online and offline mixed teaching mode of Foundation of analog electronic technology'' course based on MOOC

4.1. Construction of mixed teaching resources for the Foundation of Analog Electronic Technology'' course based on MOOC

In the MOOC mixed teaching mode, the integration of teaching resources around the internet resources is its main advantage, and it is also the basic resource for carrying out mixed teaching. And the traditional analog electronics teaching process has some problems, such as the contradiction between its teaching content and teaching hours. In the actual teaching process, analog electronics teaching efficiency and effectiveness is not good, and even affect the subsequent students on the practice and application of analog electronics technology. In fact, when we analyse the application idea of MOOC online and offline mixed teaching in analog electronic technology, we can start from the actual defect of traditional analog electronic technology teaching, while we can also use MOOC mixed teaching mode teaching resources integration advantage, relying on conventional analog electronic technology teaching content, giving full play to the MOOC mixed teaching advantages, and forming of electronic technology teaching resources innovation structure, thus we solve the analog electronic technology course teaching traditional defects, effectively strengthen the simulation of electronic technology course teaching quality and effect.

In the actual construction of teaching resources, the paper mainly is on the basis of the content of the conventional analog electronics course materials, using the advantages of MOOC online and offline mixed teaching mode, through the way that obtain knowledge points, video resources and interactive exercise question design etc., to complete the construction of MOOC-based analog electronics course hybrid teaching mode teaching resources, finally it solve the traditional analog electronics course defects. This is to solve the shortcomings of the traditional analogue electronics course and to enhance the teaching efficiency and effectiveness of the analogue electronics course. First of all, the knowledge acquisition link, knowledge acquisition is the basis of the teaching video production of MOOC mixed teaching mode. But because of the strong theoretical nature of the analog electronics course, abstract teaching principles and formulas and other practical characteristics, not all the content in the textbook is suitable for MOOC mixed teaching teaching video production, some of the content will even affect the progress and effect of teaching, such as differential amplification circuit analysis, power amplification circuit analysis and other teaching resources.

For example, the analysis of differential amplification circuits and power amplification circuits is not only professional, but also relatively abstract and complex, so if it is made into a teaching video, students will not be able to actually accept and understand it. Therefore, in the actual acquisition of knowledge points, we need to adhere to the principle of comprehensive sorting, grasp the key points and analyse the difficult points for knowledge acquisition planning, and choose the teaching content in the textbook with relatively simple principles and strong practical application as the teaching video knowledge points, so as to ensure the quality and effect of

knowledge acquisition, such as the amplification circuit of op amps and diode application circuit content as an example. In the actual teaching, it can be divided according to the teaching content to create MOOC mixed teaching videos.

Secondly, it is the video resource production link. After the knowledge acquisition, it will select knowledge points to produce about 7-10 minutes teaching video that is based on the content of the analog electronic technology textbook. During the production of the teaching video, we must ensure that students can understand the teaching video timely. To achieve this purpose, we have done something. First of all, the transmission of teaching knowledge cannot be destroyed. It try to innovate the way of video, that try to adopt diversified communication channels to present, by the text, sound, video and other forms of the content of the textbook for concrete and vivid expression. Teachers should pay attention to the linkage between knowledge points and knowledge points to avoid the lack of linkage between knowledge points, which affects the progress and effect of teaching in the production of teaching videos. In addition, teachers can also adopt excellent teaching video resources at home and abroad, through the way of cutting and adjustment, planning and perfection to the MOOC online teaching platform. It can help students to wild students' knowledge, and to explain knowledge points.

Finally, it is the production of the course exercises. Course exercises serve as a teaching aid. It is not only an important idea for students to understand and contact the knowledge points, but also a key point to consolidate the teaching effect. Therefore, when building MOOC mixed teaching resources, it is also necessary to start with the design of practice questions, through the design of interactive practice questions, so as to help students to better understand and remember the knowledge points.

In practice, interactive practice questions of different levels of difficulty are mainly configured at the end of the textbook video. The practice questions are divided into three levels: high, medium and low, and are presented in the form of judgement, multiple choice, fill-in-the-blank, analysis or calculation questions. The simple questions such as judgement and multiple choice are mainly used to test students' basic concepts and principles, while medium difficulty questions such as fill-in-the-blank are mainly used to link and master core knowledge points. Then, there are more difficult questions of analysis and calculation, which are mainly used to test students' basic theories and applications, or can be used as extended questions, such as the calculation and analysis of operational amplifier application circuits, so as to strengthen the quality and effectiveness of teaching in the MOOC mixed teaching mode of analogue electronics.

4.2. Online teaching and learning model planning and design

Online teaching as the foundation and premise of teaching activities, plays an important role in the application of mixed teaching mode, and improve the analog electronic technology course teaching effect, mainly through the teacher teaching courseware, teaching video and interactive exercises teaching resources released to the MOOC online teaching platform, to help students to plan their own learning. And online teaching is the key to the advantages of the MOOC mixed teaching flipped classroom model. So the actual analysis of online and offline mixed teaching mode of analog electronics" course based on MOOC need to start with the planning and design of online teaching and learning mode , in order to ensure the implementation effect of analog electronics MOOC mixed teaching.

In the actual planning and design, teachers must first set clear teaching and learning tasks based on the

teaching content and teaching objectives. In the planning and design, the main focus is on the key points and difficulties of the teaching of analog electronics courses, with reference to the teaching objectives for comprehensive consideration, so as to ensure effective teaching and learning tasks and provide a basis for online teaching and learning. After planning the learning tasks, teachers also need to divide the teaching content around the learning tasks. After dividing the learning content, teachers refer to the core knowledge points in each part of the teaching content for the production of teaching materials and resources, including teaching courseware, teaching videos and course practice questions, etc. The knowledge points highlight the key points and difficulties of teaching, and at the same time, they also fully carry out the internal linkage, so as to ensure the effect of online teaching activities. This ensures the effectiveness of online teaching activities.

Secondly, on the basis of planning teaching content and teaching resources, teachers should release the planned knowledge content to the MOOC online teaching platform, so as to complete the planning and design of online teaching links. The students' learning process is carried out through the students' personal accounts logging into the MOOC online teaching platform. The teachers can use the MOOC online platform to observe the students' learning situation in real time, and judge the students' learning mastery through the students' teaching video viewing time, exercise completion, post-class discussion and other contents, so as to ensure the supervision and management of the students' online learning. Moreover, the social function of the MOOC online course platform, that is the after-class discussion area, not only understands and comments on students' learning mastery, but also allows teachers to answer students' difficult questions, thus forming a good teacher-student interaction environment and ensuring the quality and effect of MOOC online teaching in the analogue electronics course.

Finally, the teaching resources released in the MOOC online teaching platform can be repeatedly watched and learned by students, which means that in addition to the completion of basic learning tasks, students can also repeatedly carry out independent learning, this self-learning process, not only can deepen students' understanding and memory of analog electronics knowledge, but also cultivate students' independent learning ability and self-control ability, so as to achieve the overall quality of students. This self-learning process not only deepens students' understanding and memory of the knowledge points of analogue electronics, but also cultivates students' independent learning ability and self-control, and realises their comprehensive quality. Moreover, the online platform provides interactive functions that facilitate communication between teachers and students, and between students and students, which has a key effect on motivating students and cultivating their interest in learning.

To sum up, online teaching and learning in MOOC-based mixed teaching mode is mainly divided into two parts, on the one hand, it is the teacher's teaching link, which mainly includes clarifying teaching objectives and setting learning tasks, dividing knowledge points and making teaching resources, releasing teaching resources, monitoring and understanding students' learning, answering questions and exchanging discussions online, etc.; on the other hand, it is the student's learning link, which mainly includes accessing materials, watching teaching videos, completing practice problems, sharing learning experiences and releasing difficult problems in learning according to the learning. On the other hand, it is the students' learning session, which mainly includes consulting materials according to the learning tasks, watching teaching videos, completing practice questions, sharing learning experience, posting difficult questions in learning, etc.

4.3. Off-line teaching and learning planning design

In the MOOC mixed teaching mode application, offline teaching and learning is the key to teachers guiding students' understanding of teaching knowledge points, and is also an important factor in ensuring the effect of the MOOC mixed teaching mode application. Therefore, the actual analysis can also start from the planning and design of offline teaching and learning, so as to ensure the overall teaching effect of analogue electronics technology.

Firstly, when teaching, teachers should explain the teaching content and knowledge points, when explaining make full use of teaching videos and textbook resources, around the teaching focus and key points to solve, or from the students online learning in the existence of difficult problems, to teach and explain in detail, so that students on the analog electronics course knowledge points for comprehensive understanding and memory, strengthen the quality and effect of analog electronics teaching. Secondly, the teacher can set up associative classroom practice questions around the online teaching interactive practice questions to test students' online learning effect and strengthen students' mastery of knowledge points and repeated practice, so as to promote the teaching process and effect of the analogue electronics course. At the same time, teachers also need to set up discussion topics around the teaching content with reference to the teaching knowledge points, so that students can use the group inquiry mode to learn, so as to cultivate students' teamwork, analysis and solution of implementation problems and communication and coordination skills, so as to achieve the improvement of students' comprehensive quality training. In addition, in the process of group inquiry, teachers should pay attention to guidance and observation, and guide students to carry out independent inquiry with the goal of explaining knowledge points, and form a comprehensive student assessment of students' group inquiry performance, so as to ensure the actual efficiency and effectiveness of teaching. To sum up, the offline teaching mode based on MOOC mixed teaching mode is mainly set up around online teaching and learning, through the teacher briefly explaining the knowledge points, answering students' online learning problems, arranging classroom practice problems, arranging classroom discussion topics, summarising comments, combining students' practice problem answers, topic group discussions, group exchange and mutual evaluation, etc., so as to form a MOOC mixed mode and analogue electronic The course is designed to enhance the quality and effectiveness of the teaching of analogue electronic technology.

5. Summary

The research of analog electronics' course online and offline mixed teaching mode based on MOOC, mainly for the actual problems of analog electronics course, give full play to the advantages of MOOC online and offline mixed teaching mode to solve and make up, so as to effectively promote the optimization of analog electronics course teaching development.

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