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Research and Practice of Online Teaching in Construction Training Courses Against the Background of COVID-19 Epidemic

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***Abstract*—At the beginning of 2020, COVID-19 epidemic begins to infect, and online teaching became the main measure to achieve "No classes but keep studying, No classes but keep teaching". This article aims at the problems that occur in online teaching of practical training courses. Taking construction training courses as an example, it puts forward some measures, such as the establishment of training management cloud system, the establishment of virtual simulation training platform and the integration of internet curriculum resources, and designs the corresponding teaching methods and teaching implementation scheme, which effectively improves the teaching effect of training courses.**

Keywords—COVID-19 epidemic; construction training courses; online teaching; training platform

I. INTRODUCTION

Affected by COVID-19 epidemic, primary and secondary schools and colleges have postponed the spring enrollment time. In early February, the Ministry of Education promulgated the "Guiding Opinions on Doing a Good Job in the Organization and Management of Online Teaching in Ordinary Colleges and Universities During the Epidemic Prevention and Control Period", requiring all colleges and universities to actively carry out online teaching activities such as online teaching and online learning. At the same time, the Ministry of Education has announced many online education platforms, and freely open more than 20,000 online education courses to ensure the teaching progress and teaching quality during epidemic prevention and control, and to achieve the goal of "No classes but keep studying, No classes but keep teaching". In accordance with the requirements of the "Guiding Opinions", colleges and universities have formulated relevant measures and adopted various methods to conduct online courses to meet the needs of students. However, in the teaching documents of many colleges and universities, it is proposed to give priority to the online teaching of theoretical courses, postponing the actual training courses or the content of practical training.

In the teaching activities of higher vocational colleges, practical training course is the main way to cultivate professional ability. Postponing practice or simply playing videos will seriously affect the teaching progress and learning rules of practical training courses, and it is difficult to guarantee the teaching quality of practical training courses. Therefore, how to build an educational resource and teaching platform for practical training courses and carry out effective online and remote education and teaching activities has become a research topic during and after the epidemic.

II. PROBLEMS IN ONLINE TEACHING OF PRACTICAL TRAINING COURSES

The implementation of the training courses requires corresponding training venues and training equipment, problems need to be found in the actual operation process, and

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teacher-student exchanges are required from time to time, which brings difficulties to the networked teaching of the training courses, and it is difficult to achieve the corresponding Teaching effect. Through the practice of online teaching during the epidemic situation, it is found that the following four problems exist in the online teaching of practical training courses.

A. The Limited Use of Technology Platform

Powerful and perfect network technology is the prerequisite and foundation for online teaching and learning. The technical condition of the product is not strong enough, which will directly lead to the reduction of teaching effect. During the epidemic, the online teaching platforms of various schools generally came from public platforms, such as Dingtalk, Tencent Classroom, Wisdom Tree, Superstar, China University MOOC, etc. When many universities use the platform at the same time, the instantaneous user volume soars, exceeding the maximum carrying capacity of the platform system design, which inevitably leads to the platform system being unbearable. Moreover, the problems that appear on the online platform are difficult for universities to control and repair, and are difficult to solve in the short term.

B. Lack of Network Teaching Platform for Practical Courses

In response to the teaching during the outbreak, the ministry of education announced an online education platform, offering more than 20,000 online education courses for free. There are two main reasons for this. First, training courses need special training places, training equipment or training platform, and online teaching is difficult to achieve these conditions. Second, the virtual training platform is built by universities with a large amount of money and time. In order to ensure the safety and fluency of its application, the application scope is only limited to the training room and is not disclosed to the public.

C. Difficulties in Supervision of Skills Training Process

In the process of online teaching, teachers mainly conduct live lectures, with a single teaching organization and low student participation. Students' participation in teaching is limited to discussion, test answering and other aspects, which are difficult to train skills for practical training courses. On the other hand, teachers and students are not in the physical space with the application platform as the medium, so teachers cannot effectively manage and supervise students' learning state and behavior, let alone guide them.

D. Lack of Systematic and Sequential Curriculum Resources

Practical courses not only train skills, but also need the support of theoretical knowledge, knowledge learning needs rich resources. However, at present, through the investigation of various colleges and universities, the resource construction of practical training courses is generally relatively backward, with insufficient resources and a single form of presentation. Moreover, there is no unified online resource platform, and the lack of systematic resource sequence makes it difficult to meet the needs of online teaching of practical training courses.

III. Construction of Teaching Platform for Practical Courses of Construction

Construction practical training course is the core course of civil engineering major, which has strong practicality and operability. Aiming at the problems in online teaching of practical training course during the epidemic, this paper puts forward the construction plan of online teaching of practical training course of construction

A. Establish the Cloud System of Practical Teaching Management

In view of the problems of congestion and jam on the public network platform, an independent practical teaching management cloud system can be built to effectively guarantee the development of teaching and achieve good teaching results. The core of the practical teaching management cloud system is to transfer the application software from the local machine to the background server, which has the advantages of centralized service, multi-point access, cloud storage and rapid response.

The established practical teaching management system can support multi-point multi-terminal access, support teachers to carry out lesson preparation, teaching and evaluation in residential and office, and support students to carry out online learning activities at home and dormitory through mobile phones, computers and other terminals. The resource platform and simulation platform connected to the system will establish a unified network entrance, and students can use their student number to log in, that is, they can enjoy various services in the system, which optimizes the learning program from a variety of ways and perspectives [3].

Another advantage is cloud storage and rapid response, using the cloud to store a large number of video, micro class and animation resources, to provide students with a variety of teaching services such as library access, remote call of simulation software, online examination, online course learning; Rapid response improves the speed of information acquisition and plays an important role in supporting the presentation of course content and the in-depth interaction in class.

B. Construction of Practice Teaching Resources of the Internet

In order to solve the problem of lack of practical training resources and insufficient network construction, we load professional teaching resources, relevant knowledge and cutting-edge professional information into the platform by using online courses such as large-scale online open courses platform and mosoteach platform, and realize remote and open teaching with the help of Internet teaching platform.

Further development and integration of curriculum resource, docking has built the fine course group, provincial excellent resources sharing at the provincial level and other relevant resources, the resource node graining and further, the display of "construction" node for clues, stored in the network cloud server, using large-scale online open courses platform for networked sharing, open teaching, students can everywhere on the mobile device screen into the curriculum to study [6].

C. Build a Virtual Simulation Training Platform

Aiming at the problem of the training site cannot be opened, the virtual simulation training platform is built. Based on the civil engineering case scenario, the platform takes a single node of the engineering construction process as the core guidance of the practical operation task to realize modular comprehensive practical training teaching [1]. The virtual simulation training platform supports three modes: teaching demonstration, practical training operation and project assessment. The teaching demonstration mode is controlled by the teacher to realize the demonstration of the whole process flow. Students can watch it in real time through cloud storage at any time. Under the practical training operation mode, students enter the simulation platform as construction personnel to conduct virtual operation, and the platform records and gives feedback on the practical training process. The assessment mode is divided into three types: machine assessment, test question assessment and comprehensive assessment. Teachers can organize assessment by stages and projects according to students' learning progress [5].

IV. Teaching Design of Practical Courses in Construction

Based on the "network platform" built in the early stage, the three-step teaching method of "pre-class cognitive learning, in-class imitation and after-class feedback improvement" is adopted to integrate knowledge and skills, and the teaching design scheme of network practical training is compiled and applied to online teaching.

A. Cognitive Learning

Before class, the teacher uses "mosoteach" and "the online open course platform" to push the pre-class independent learning task list to the students. First, students log on to the teaching platform to learn resources related to the practical training courses, including micro-lessons, pictures, PPT, teaching plans and 3D simulation, according to the prompts on the task list of autonomous learning before class to complete the cognitive learning. Secondly, based on independent learning and cognitive practice, students find problems in the process of knowledge learning and skill operation and send questions to teachers. The teacher records students' common questions and focuses on answering them in class.

B. Simulation Training

In class, the teacher conducts practical teaching demonstration through the simulation platform, and the students conduct practical operation through the online simulation platform.

Firstly, the teacher starts the teaching mode of construction simulation and interprets the information of the project by referring to the general description of the architectural design of the project. Understand the construction tools, according to the type of tools to display all the tools used in this project, select any one click, will appear about the tool information and 3D model. Explain and play the video of construction operation, give a comprehensive preview of the construction process of the project, and finally summarize the construction technology and specifications of the project. In this process, teachers try to shorten the demonstration time, to avoid the practice of curriculum theorization.

Secondly, start the practice mode. The teacher uses the administrator status to open the training platform, and the students log in the simulation system through the terminal. During the operation of the virtual network system, the form of virtual simulation establishes an effective connection between virtual simulation and entity structure, strengthens students' correct cognition of entity structure, achieves the consistency requirements of entity and virtual, and plays a good role in improving the operational level of practical training.

In the process of virtual training, students complete the construction process and the selection of construction machines and tools according to the operational requirements of the training platform, so as to realize the whole process of simulation training operation. The platform will record the practical training operation process by video. Students can review the video of the practical training process and find out the existing problems through the playback function. Teachers can monitor students' practical training operation process in the background, push information for prompts and solutions, and realize remote interaction and guidance [4].

C. Feedback Improvement

After class, the teacher in the training management system platform for the students to open the inspection and test module, the construction technology of the simulation training platform evaluation model including single machine, single exam and comprehensive assessment of three kinds of model machine and test, the operation of the students will be recorded in the background, generate examination scores, student according to the result feedback, to enter the system correction error nodes, eventually master speaking skills, and complete the test. On the other hand, through the network cloud information management platform, the images of teachers' operation demonstration and students' follow-up training operation are stored on the network, which can be presented on the mobile terminal anytime and anywhere to facilitate students' review and consolidation [2].

V. Conclusion

The outbreak of covid-19 has put forward higher requirements for the new form of "Internet + education" teaching, and promoted the deep integration of modern information technology and education teaching. In this paper, the construction craft course as an example, according to the construction of informatization, network as a starting point, puts forward the training course during the outbreak of the construction and implementation plan, establishing practical teaching management cloud system, virtual simulation and network integration and resource construction, information construction and design training courses teaching units and teaching implementation plan, for how to do during the outbreak of online training course provides advice. After a period of practice and application, this network teaching strategy of "platform + teaching method" can effectively

guarantee the teaching quality of practical courses and improve the online teaching effect.

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