

Research and Practice of Online Teaching Methods in Universities in the Context of COVID-19

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ABSTRACT

In order to effectively prevent the spread of novel coronavirus pneumonia and ensure the orderly development of teaching tasks, colleges and universities have launched online teaching activities. As a new teaching method, how to reasonably carry out teaching design, teaching organization and ensure teaching quality has become a new problem in front of educators. Taking the “Subway” course as an example, this paper summarizes and introduces the online teaching methods and personal experience under the epidemic situation from the aspects of the overall framework design, specific implementation scheme, effect investigation and reflection of the online teaching mode based on MOOC platform, so as to enrich the experience of online teaching activities in colleges and universities during the epidemic period.

1. Introduction

Since the end of 2019, COVID-19 has wreaked havoc around the world, posing a serious threat to human life, health and safety. By March 2022, nearly 500 million people had been infected with the novel coronavirus and more than 6 million deaths had been reported globally, putting people’s daily life and economic and social development under great pressure. University education, as the front line of human civilization inheritance and social talent training, also faces unprecedented challenges. In order to effectively prevent the spread of the epidemic and ensure the orderly development of teaching tasks, universities have carried out online teaching activities^[1].

Online teaching, also known as “online education, E-Learning”, was put forward about 20 years ago. It refers

to the method of content dissemination and rapid Learning through the application of information technology and Internet technology, or the teaching method with the network as the medium^[2]. As a brand - new teaching method, how to carry on teaching design, teaching organization and guarantee teaching quality rationally has become a new difficult problem in front of educators. As early as October 2019, China’s Ministry of Education and other 11 departments jointly issued guidance: to promote the healthy development of online education. It is proposed that by 2020, the infrastructure construction level of online education should be greatly improved, modern information technologies such as Internet, big data and artificial intelligence should be applied more widely in the field of education, online education model should be im-

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proved, and resources and services should be enriched.

Therefore, the majority of educators have also been involved in the exploration and research of online teaching mode. Yue^[1] analyzed the advantages and existing problems of online teaching and proposed methods to improve the quality of online teaching in colleges and universities. Li et al.^[3] investigated the status quo of offline and online practical teaching of engineering majors in colleges and universities, expounded the new characteristics of practical teaching under the influence of the epidemic situation, analyzed the advantages and disadvantages of different practical teaching methods, proposed practical teaching implementation measures under the background of the epidemic situation, and proposed the evaluation method of practical teaching effect under the background of the epidemic situation. Liu et al.^[4] conducted an empirical survey on 11443 students from different majors participating in online learning in the university, research points out that the nine external variables of teachers' teaching behavior and activities have a significant positive impact on students' online learning satisfaction, among which the three variables of curriculum assessment, curriculum content and learning resources have the most obvious impact on online teaching satisfaction. In this context, taking the "Subway" course as an example, this paper summarizes and introduces the online teaching methods and personal experience under the epidemic situation, so as to enrich the experience of online teaching activities in universities during the epidemic period.

2. Overall Framework of Online Teaching Mode Based on MOOC Platform

2.1 Overall Teaching Objectives

In view of the new champions league during the outbreak of the actual teaching demand, teaching team conducted a special seminar, in line with the "closed is not suspended, closed constantly teach" principle, through the change of teaching method and examination way, in order to "geared to the needs of engineering practice, to improve the effect of classroom teaching, cultivate students' innovative quality and ability of solving practical problems" as the goal, guide students to transform from rote memorization to innovation and application, cultivate and improve students' ability of self-study, innovation, expression and communication, and the ability to comprehensively use knowledge to solve practical engineering problems, so as to lay a solid foundation for future jobs.

2.2 Using Plan of Information Platform

In the process of online teaching, we follow the idea of "student-centered", grasp the unity of students' dominant position and teachers' leading role, scientifically design each teaching link, innovated online teaching mode, cross use a variety of information platforms, and provide high-quality online teaching. The specific platform usage scheme is shown in Figure 1.

(1) Chinese University MOOC online platform: provide students with online self-study, after-class test, Q & A interaction and online discussion platform, release study announcements, etc.

(2) Enterprise WeChat: release learning schedule, online video teaching, discussion and exchange, etc.

(3) University visual teaching platform: PPT (including key knowledge series and case discussion and explanation), teaching materials and other teaching resources can be downloaded.

(4) Questionnaire star: teaching effect, learning efficiency, use of information platform and other investigation feedback.

2.3 Assessment Plan of Learning Effect

The evaluation of students' learning effect includes unit test (15%), class discussion, forum discussion and final examination. Students are assessed from three aspects: basic knowledge, application ability and comprehensive quality. The proportion of each part of learning effect evaluation is unit test 15%, classroom discussion 25%, online discussion 10%, final exam 50%.

3. The Concrete Implementation of Online Teaching Based on MOOC Platform

3.1 Overall Teaching Design

The overall design scheme and process of the teaching course are shown in Figure 2.

It can be divided into three teaching stages: 1) Pre-class preparation stage: providing teaching resources, releasing learning plans, and students' independent learning; 2) Organization stage in class: students show and communicate, teachers summarize and comb; 3) After-class improvement stage: after - class Q&A and unit test.

3.2 Teaching Process Organization

(1) Students' autonomous learning links (completed before class). In view of the needs of the rapid development of the subway industry in the new era for the knowledge structure and professional quality of employees, follow-

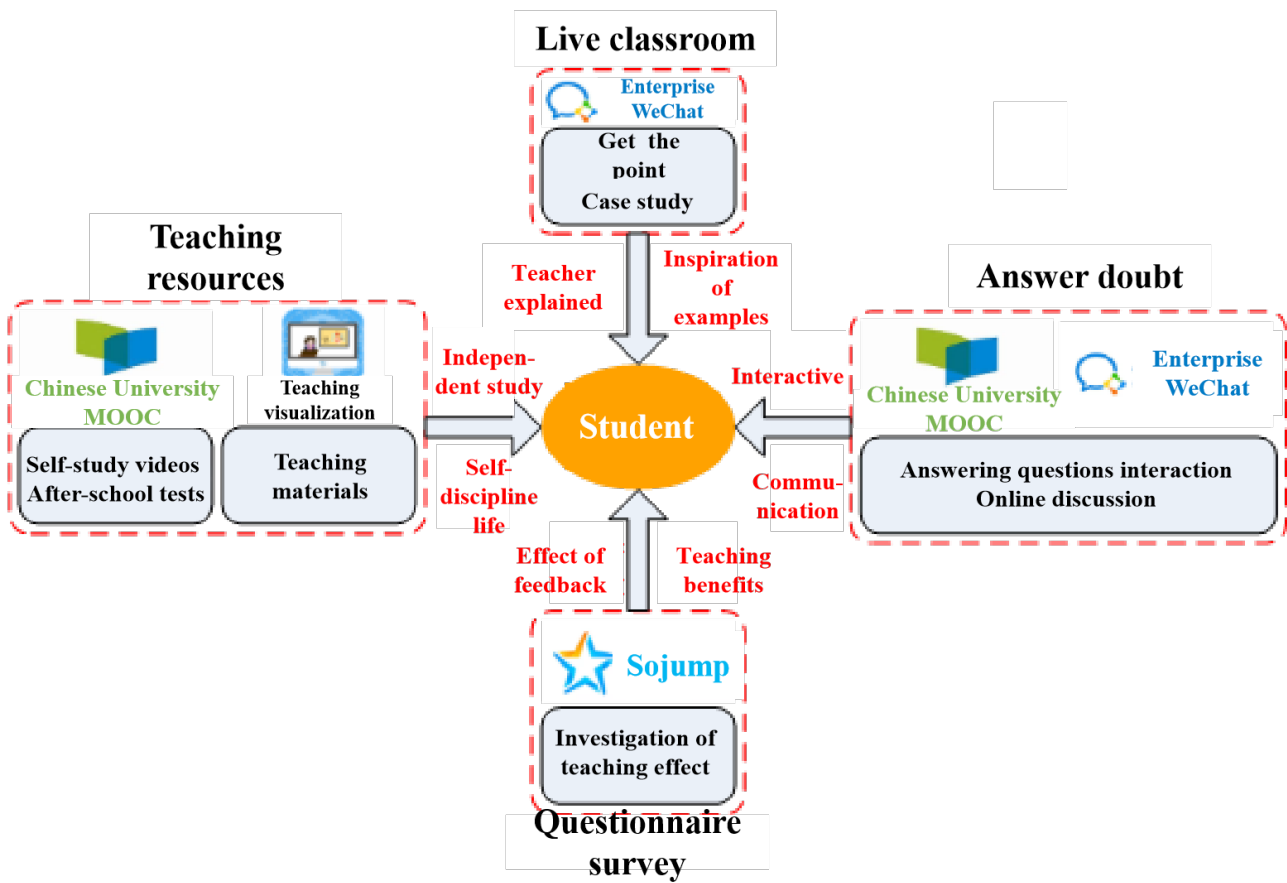


Figure 1. Application scheme of online teaching information platform

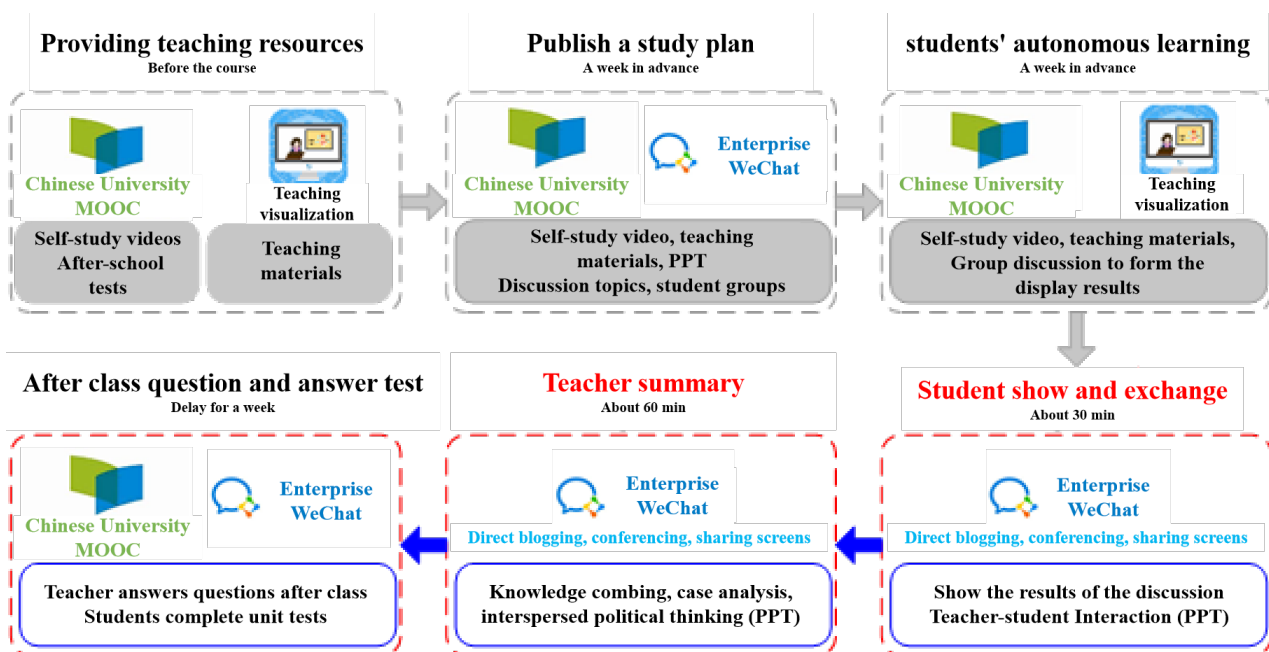


Figure 2. Overall teaching design

ing the principle of knowledge point decomposition and focus on key and difficult points, three core knowledge modules were determined according to the three stages of subway planning, design and construction, 57 knowledge points were selected, the online course content was optimized and reorganized, and short videos were recorded in advance and uploaded to the MOOC platform of China University. During online teaching, using this teaching resource, students can independently watch short videos of learning related knowledge points and provide learning notes before class.

(2) Student group survey (completed before class). According to the given two topics, students will carry out data collection and case investigation in groups, discuss in groups, form investigation results, and make PPT for discussion and communication. It aims to cultivate students' practical ability, data collection and processing ability, guide students to master the development trends of industries at home and abroad, understand China's industry development advantages, stimulate students' industry pride, and improve students' word processing ability such as material refining and PPT production.

(3) Student discussion and exchange. Students in each group organized data collection, data sorting and other investigation work in advance, and prepared PPT and broken down the content of the talk, and showed the discussion results by sharing the screen in turn. After each group shows, other students and teachers can communicate and interact with each other. The discussion and exchange link aims to guide students to study independently, and apply new knowledge and new achievements to carry out online analysis and discussion from multi-dimensional and multi-angle, helping students build scientific and systematic critical thinking way, cultivating students' innovation consciousness and innovation ability, and improving students' ability to solve practical engineering problems. At the same time, through the investigation, analysis and experience of engineering cases, so as to stimulate students' sense of responsibility and mission for the rationality and safety of engineering construction.

(4) Teacher summary and sorting. On the one hand, according to the teaching focus, knowledge difficulties and video learning notes provided by students, the key knowledge points are sorted out and PPT is made. The key knowledge series is completed through the screen sharing function of WeChat. On the other hand, through the analysis of practical engineering cases, students can deepen their understanding of the important and difficult knowledge of the course and cultivate their practical application ability.

(5) Ideological and political education during recess.

Through examples of advanced figures, carry forward the values of "loving the country and casting a shield for the country" of engineering scientists, and cultivate students' craftsmanship spirit and family and country feelings.

(6) Homework after class. Homework after class, communication and Q & A are completed online through the MOOC platform of China University.

4. Investigation and Reflection on the Effect of Online Teaching

The teaching team designed an online learning questionnaire for online teaching during the epidemic period and used the Questionnaire Star to carry out specific investigation and statistics. The results show:

(1) 83.3% of the students approve of the online teaching method, but 8.3% of the students oppose it (8.3% choose "it doesn't matter").

(2) 89.6% of students can finish online homework and other independent learning links on time, but 23% of students think that compared with traditional teaching, the effect of similar online school will be greatly reduced. The main problems are as follows: 1) The teacher-student interaction and student interaction are relatively poor (56%); 2) Lack of necessary learning environment and atmosphere (35%); 3) It is difficult to grasp the key points and points of learning in autonomous learning, so it is suggested to reduce the discussion time and appropriately increase the teacher's explanation time.

According to the results of the questionnaire survey on the teaching effect, the greatest deficiency is the interaction. Compared with the traditional face-to-face teaching, the interaction effect between teachers and students is poor, which cannot meet the necessary emotional communication. In addition, under the influence of the learning environment and atmosphere, students are easy to be distracted, and their learning efficiency needs to be improved.

5. Conclusions

COVID-19 is still spreading at a high speed, all countries are still under high pressure from epidemic prevention. Online teaching is not limited by time and space, and it is beneficial for students to acquire knowledge. It is an inevitable educational means under the new normal of the epidemic. At the same time, with the development of modern information technology and the continuous deepening of teaching reform, online teaching will play a greater role in improving teachers' teaching level and students' learning quality. The author's teaching team conducted targeted discussions on the construction of MOOC

in the early stage and teaching quality assurance during the epidemic and summarized the following experiences through teaching practice:

(1) Optimize and restructure the course content. Follow the principle of knowledge decomposition, focus on the key and difficult points, optimize and reorganize the online course content.

(2) Elaborate design of thematic cases. Combined with the core teaching content of the course, the discussion topics and cases are carefully designed to strengthen the training of students' engineering application ability.

(3) Efficient use of online platforms. In view of the epidemic control environment, the online teaching platform combining multiple platforms is selected based on extensive research and experience.

(4) Timely feedback on teaching effect. Design the online Teaching Questionnaire, review the students' video learning notes, adjust the teaching focus according to the feedback of the survey, and ensure the teaching effect.

To sum up, in order to overcome the difficulties of online teaching, such as "lack of face-to-face communication between teachers and students, lack of effective management of learning activities, and difficulty in ensuring teaching quality", teachers can strengthen teaching opti-

mization behaviors such as procedural assessment, curriculum design, preparation before class and construction of learning resources. And adjust online teaching behavior and online teaching activities according to the differences of liberal arts, science and engineering majors in order to effectively improve the effectiveness of online teaching.

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