

Exploration and Practice of Online Blended Teaching on Outcomes-Based Education under the Time of COVID-19

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ABSTRACT. Outcome-based education (abbreviated as OBE) is an effective teaching concept that guarantees online blended teaching under the time of COVID-19, but it faces huge challenges in teaching objects, teaching resources, teaching methods, teaching organization, and teaching evaluation. The connotation of OBE was analyzed, a remote blended teaching process based on the OBE concept was designed, and then the BIM deepening of the continuous beam bridge was taken as an example to carry out the teaching practice. The results have show that under the blended teaching mode, with the support of information technology, the carrier of continuous beam bridge BIM application case, the guidance of the professionalism and craftsmanship, the students' academic conditions were accurately analyzed, the teaching content was carefully designed, and the diversified teaching strategy was used, it could also achieve good teaching results, the teaching goal of excellent technical skills and rigorous engineering thinking.

KEYWORDS: COVID-19, Outcomes-based education, Online blended teaching, Teaching design

1. Introduction

The sudden outbreak of COVID-19 in December 2019 has had a great impact on the normal opening of colleges and classroom teaching. On February 4, 2020, the Ministry of Education issued the Guiding Opinions on Doing a Good Job in the Organization and Management of Online Teaching in Regular Colleges and Universities during the Period of COVID-19 Prevention and Control ^[1,2]. Universities across the country were required to make full use of online MOOCs and high-quality online open courses at provinces and universities and other teaching resources, relying on online course platforms and spaces, online teaching activities such as online teaching and learning were carried out to ensure the teaching progress and teaching quality, and then it would realize stopping classes without stopping teaching, and closing classes without stopping school.

Online teaching was an emergency measure in a very period of COVID-19. It was different from traditional classroom teaching and blended teaching. The teacher could not see the students. Teachers must think about how to motivate students, make students learn effectively, know how well the students are learning, check whether students have learned important and difficult knowledge ^[3,4]. These problems made teachers consider how to change the traditional classroom teaching which was centred on teaching and shift to learning, that is, focusing on students' what to learn? How to learn? What is learned? There were many challenges for students and teachers. Therefore, in the time of COVID-19, this article relied on the concept of OBE and used the smart teaching platform to carry out online blended teaching to achieve the teaching goals.

2. Application of OBE under COVID-19

2.1 Connotation of OBE

The concept of OBE is proposed by Spady in the United States in the early 1980s[2], and then it has been widely used in the USA, Germany, Canada and other countries. The main educational idea is to break the traditional classroom teaching, student-centered, the purpose of a series of teaching design and teaching activities adopted by teachers, it allows students to obtain curriculum-related learning results, focusing on the cultivation of students' various abilities and thinking. In OBE teaching, five aspects of learning needs, learning goals, learning process, learning evaluation, and

learning improvement need to be addressed. At the same time, five aspects are a spiraling process that requires continuous improvement and optimization.

2.2 Application of OBE under COVID-19

Online teaching of courses is different from traditional classroom teaching because teachers and students rely on network connections. For teachers, online teaching is by no means a simple one-to-one live teaching. To grasp the content of learning, it is also necessary to organize the learning during the live broadcast process. In this state, teachers are more like lighthouses and students are ships. In the process of online teaching and learning, it is necessary to reshape students' learning habits and ensure the learning effect. An effective way to test the learning effect is to see whether the students' learning results are completed or not, and the quality of completion. Therefore, the result of OBE is an effective teaching concept to ensure the effect of online teaching under COVID-19. Teachers set the expression form of learning results in advance, and finally complete the learning results through the implementation of teaching design and teaching activities.

3. Design of Online Blended Learning Based on OBE

3.1 Construction Route

The blended teaching model based on the smart teaching platform divides the online classroom into three stages before live teaching, during live teaching and after live teaching[4], so that teaching and learning are mutually infiltrated and integrated. The construction route of blended teaching is shown in Figure 1. Before the live teaching, teachers make preview resources composed of videos, audios, pictures, texts, and test resource resources based on the analysis of their academic conditions and upload them to the smart teaching platform. Students preview the course content, and teachers and students communicate and give feedback in time. During the live teaching, teachers explain key and difficult knowledge in the live classroom. With the help of a smart platform, interaction between teachers and students, student-student interaction, and the whole class actively participate in real-time tests. After the live teaching, students complete the learning results and submit them to the teacher in time, and the teacher provides personalized guidance to the students. In addition, the teacher summarizes and analyzes the teaching data of the whole process, and launches teaching reflection.

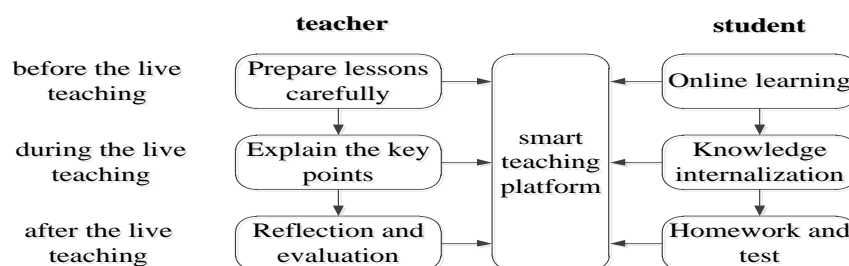


Fig.1 Construction Route of Online Blended Teaching Based on Smart Teaching Platform.

3.2 Design of Online Blended Learning Based on OBE

Curriculum is the core element of talent training, and the purpose of teachers' teaching activities is to ensure the realization of teaching goals. The online teaching design of courses based on OBE is how to integrate the curriculum knowledge system, design the teaching process, and conduct effective teaching evaluation under the premise of paying attention to the students' learning achievements. Therefore, the design of the online blended learning process based on OBE is shown in Figure 2.

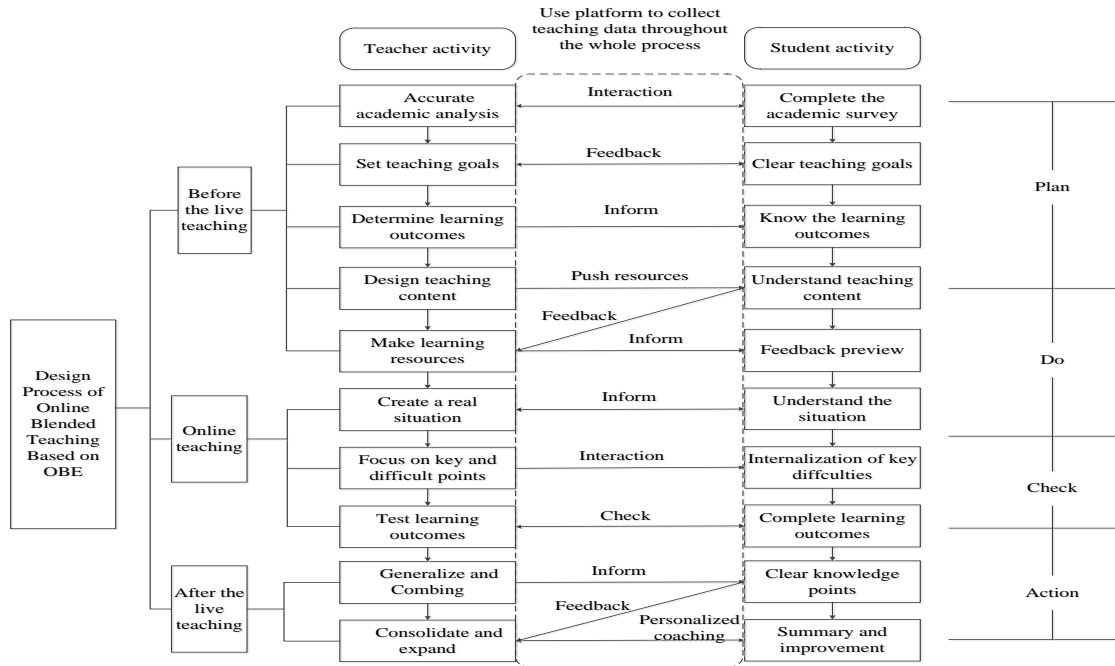


Fig.2 Design Process of Online Blended Teaching Based on OBE.

4. Implementation of Online Blended Learning under COVID-19

In response to the COVID-19, our school has successively launched online teaching resources using platforms such as Wisdom Vocational Education, School Online, Chinese University MOOC, etc. The deepening of continuous beam bridge BIM in the bridge engineering technology course was taken as an example, the smart vocational education and tencent conference was used to carry out online course. The live content was explained through the tencent conference, and the interaction and communication was carried out through the classroom.

4.1 Accurate Academic Analysis

Through the academic investigation and the previous lesson knowledge test, it was found that 78.5% of the students had difficulty in reading and understanding the continuous beam bridge drawings, and 45.68% of the students in the knowledge test had a score below 70.

4.2 Set Teaching Goals

According to academic conditions, the teaching objectives of this course were determined, it was able to design the continuous beam bridge section according to the project overview and design principles, draw CAD drawings and establish the BIM model of a continuous beam bridge section.

4.3 Determine Learning Outcomes

Teachers determined the learning outcomes of this class based on their academic conditions and teaching goals for students to use BIM software to draw three-dimensional BIM solid models.

4.4 Design Teaching Content

According to academic conditions and teaching goals, the teaching content of this course was determined to be the principles of continuous beam bridge section design, continuous beam bridge section drawing and continuous beam bridge section BIM model.

4.5 Make Learning Resources

The micro-lectures, PPT, videos, animations, pictures, test questions, etc were selected, at the same time, the electronic teaching materials were pushed to the students.

4.6 Create a Real Situation

The teacher released an overview of a certain bridge project in Xi'an at the starting point of the Belt and Road and a task list in class, eliciting the important role of continuous beam bridges in the construction of the Belt and Road, and analyzing tasks and implementation requirements.

4.7 Focus on Key and Difficult Points

The teaching content included design principles of continuous beam bridge section, section drawing, BIM model, and 3D print. With the help of the vocational education cloud platform, set up brainstorming, cognitive assessment, group discussion, program comparison, VR experience, 3D print and other links to stimulate students' interest in learning.

4.8 Test Learning Outcomes

The knowledge test was released and student scores were counted. It was found that more than 92% of students scored above 95.

4.9 Generalize and Combing

The knowledge points were generalized and then mind maps were drawn.

4.10 Consolidate and Expand

Homework questions were pushed to students and ask them to complete on time, and complete the teaching reflection of this class.

5. Effects and Reflection of Online Blended Learning under COVID-19

During the online teaching under COVID-19, teachers experienced a period of technological adaptation, inspiring teaching, and promotion. At the same time, students experienced a period of fresh learning, learning semester-weary, and learning growth. In the first 4 weeks, students were curious about online blended teaching and they were very serious about listening to lectures. In 5~6 weeks, they gradually became accustomed to online learning. Teachers actively adjusted teaching methods, finally teachers and students basically reached the stage of integration and promotion.

5.1 Effects of Online Blended Learning

5.1.1 Increased Student Participation in the Classroom

During the epidemic, the blended teaching was used by vocational education cloud and tencent conference. After class was resumed, the online teaching was used for students who had not returned to school, technical means were used to solve the important problems in teaching, such as construction site videos, micro-classes, VR virtual simulation, barrier-breaking games, mind maps, and BIM technology applications. It not only stimulated students' interest in learning, but also enhanced their professional abilities.

5.1.2 Improve the Achievement of Teaching Goals

Taking the construction of continuous beam bridges along the Belt and Road as the carrier, creating a real situation that meets the requirements of bridge tunneling and 1+X vocational skill level standards, it not only enriched teaching cases, but also stimulated students' sense of professional honor and improved the achievement of teaching goals degree.

5.1.3 Realize the Same Direction of Knowledge Transfer and Value Shaping

The ideological elements and labor education elements of the course were fully excavated, and the value shaping into the knowledge transfer process was integrated in a quiet and silent way. At the same time, combined with the teaching content, the bridge design concept of safety, application, economy, and beauty run through the whole teaching process, and relying on bridge culture to cultivate students' safety and quality awareness.

5.2 Reflection of Online Blended Learning

After a semester of online blended teaching practice of bridge engineering technology under COVID-19, although homogeneous and equivalent teaching effects had been achieved, in order to better carry out online teaching, the following considerations should be done, such as carefully design online teaching activities and innovative teaching methods, enrich and expand online teaching resources to stimulate interest, develop a variety of interactive teaching modes and innovative learning methods and make full use of the data evaluation system to monitor teaching.

6. Conclusions

Based on the analysis of the connotation of OBE in the curriculum, an online blended teaching process based on OBE concept was designed. It had greatly improved the teacher's information quality, teaching and research capabilities.

With the help of information technology and vocational education platform, the BIM deepening of the continuous bridge was taken as an example to carry out teaching practice. At the same time, bridge culture, professionalism, craftsmanship, labor education, quality awareness, and safety awareness were integrated into the classroom. It improved students' participation and achievement of teaching goals, and also realized knowledge transfer and value shaping.

According to the characteristics of the curriculum, teachers carefully design the teaching process, select rich teaching resources, and develop a variety of interactive modes. And it allows students to learn at home while at the same time being able to understand, keep up, ask questions and learn well. It guarantees the healthy development of efficient education and teaching.

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