New Teaching Form for the Course of Engineering Drawing based on OBE Mode and Chinese MOOC Platform- XuetangX

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Abstract. With the rapid development and popularization of MOOC Platform since 2012, Chinese traditional engineering education mode faces challenge and gain more opportunity to achieve the teaching reform based on the OBE education mode. Higher education reform based on the OBE mode and MOOC Platform in Chinese colleges was introduced firstly, and principles of MOOC were listed. Furthermore, the necessity to produce the online teaching video based on MOOC Platform was given, and the online teaching video based on Chinese MOOC platform XuetangX were introduced. In the end, the operating outline of new teaching form based on the OBE mode and MOOC Platform was shown as an outline figure and compared with the traditional teaching form of engineering drawing courses. So it is a perfect assistant to make up for the drawbacks of traditional teaching reform and accelerate the progress of higher education reform.

Introduction

Since 2012, MOOC has been a hot issue in the educational field, media, government, as a disruptive change agent of current Higher Educational System. A growing number of universities have offered MOOCs worldwide and the public and academic discourse around MOOCs has intensified. MOOCs have been endorsed as a major advancement of higher education\cite{1}.

There are two distinctive features of MOOCs that differentiate them from other forms of online learning: that they offer open access to Higher Education for learners irrespective of their previous qualifications or experience; and that they facilitate learning on a massive scale with thousands, or even tens of thousands, of learners signing up for each course. MOOCs, however, are qualitatively different from conventional, online courses, particularly in terms of their scale and openness. Gaining insight into self-regulated learning of individual participants in MOOCs is critical in understanding whether and how open, online courses are effective in supporting learning\cite{2,3}.

At present, the famous overseas MOOC Platforms are Coursera, Udacity and edX, and the influential Chinese MOOC Platforms are XuetangX and Chinese University MOOCs. The XuetangX is the online free and open MOOC (massive open online courses) Platform, and it is the online education research center and application Platform of the Chinese Education Ministry. It is committed to provide higher education system for the public by cooperating with Tsinghua University Online Education Research Center, and famous universities at home and abroad.

Outcomes-based Education mode originated from the reform of basic education in United States and Australia. Originally speaking, OBE model spread around the mail line as “define outcomes-realize outcomes-evaluate outcomes”, and the evaluation of outcomes from the students’ studying is the ultimate aim to realize the continuous improvement of teaching effect. Researcher Richard from United States presented a design model of courses based OBE mode, and the performance evaluation of students’ studying was one of three important factor of this model \cite{4}.
Online teaching videos play a key role of online open courses, and it records the complete teaching process as a reappearance of every lesson in a classroom. And it will provide constant and stable learning resources for students whenever or wherever students would like to learn by seeing teaching videos after logging in MOOC Platform. In addition, students can make full use of fragmented time to complete the online preview and review by replaying the teaching videos.

According to the OBE mode, the learning outcomes of students is very important basis to keep the OBE education mode running efficiently, and it is also a key factor for teacher to take right good action to intervene the learning activities of students to achieve continuous improvement of teaching and learning process. However, without effective means and tools in the past, it is difficult to obtain enough and effective data of learning process to evaluate learning status of every students. The online courses, produced according to the standards and specification of MOOC Platform, can provide abundant learning resources and enough status data of learning activities. So it is a perfect assistant to make up for the drawbacks of traditional teaching reform and accelerate the progress of higher education reform.

**Principles of MOOCs**

We assessed the instructional design quality of MOOCs using a set of key criteria based upon First Principles of Instruction interrelated prescriptive criteria for effective instruction abstracted from key instructional design theories and models. Proposed the five First Principles of Instruction are summarised by Merrill’s and Margaryan given additional five principles as below [5, 6].

1. **Problem-centred**: Learning is promoted when learners acquire skill in the context of real-world problems.
2. **Activation**: Learning is promoted when learners activate existing knowledge and skill as a foundation for new skill. This principle is rooted in a key tenet of instruction to start where the learner is.
3. **Demonstration**: Learning is promoted when learners observe a demonstration of the skill to be learned. This principle highlights the importance of showing learners what they could do to apply the new information or skill in new situations rather than merely presenting them information about what to do.
4. **Application**: Learning is promoted when learners apply their newly acquired skill to solve problems. Merrill’s review highlighted the almost universal agreement among contemporary learning theories that applying new knowledge or skill to real-world tasks is a necessary condition for effective learning.
5. **Integration**: Learning is promoted when learners reflect on, discuss, and defend their newly acquired skill. Learners have integrated new knowledge and skill into their everyday life when they are able to demonstrate change in behaviour or modification of their existing mental models and, when challenged, are able to defend their new knowledge or skill.
6. Collective knowledge: Learning is promoted when learners contribute to the collective knowledge.
7. Collaboration: Learning is promoted when learners collaborate with others.
8. Differentiation: Learning is promoted when different learners are provided with different avenues of learning, according to their need.
9. Authentic resources: Learning is promoted when learning resources are drawn from real-world settings.
10. Feedback: Learning is promoted when learners are given expert feedback on their performance.

Teaching Reform of Engineering Drawing Courses in Yanshan University

At present there are more than 1200 students required to learn the course “Fundamentals of Engineering Drawing”, who are from 42 classes belonged to four different schools like Electrical School and Information Engineering School, Environmental Engineering School and Chemical Engineering School in Yanshan University.

In order to explore a new teaching mode for higher engineering education and promote the reform of higher education, Yanshan University Dean funded 4 main courses more than 300,000 yuan to construct online courses based on the Chinese MOOC Platform--XuetangX in June 2016. Until now, the teaching videos and advertising video for engineering drawing courses have successfully been completed. Some samples of online reaching videos were shown as Fig.2(a) and Fig.2(b).

Traditional Teaching Mode

In traditional teaching mode, the activity of teaching and learning is mainly restricted to lessons in a classroom. Learning resource for students is limited and there are no more choices for students to present the class and lesson carefully. Once they are absent-minded in a lesson, they will miss the important contents [7,8].

(a) Leader of online open course                     (b) Key member of online open course

Figure 2. Online teaching videos samples of Engineering Drawing Course.

(a) Working sketch                                               (b) Structure figure

Figure 3. Traditional teaching mode.

As shown in Fig.3, the most obvious difference between the traditional teaching mode and MOOC teaching mode is the contact between teachers and students and the contact between different students. There is more contact between teachers and students and between different students in MOOC teaching mode than that in traditional teaching mode. The Engineering Graphics is an important
technical foundation course for students studying in colleges of science and engineering, especially for the students whose major is mechanical engineering or similar major. In traditional teaching mode, the process of teaching and studying always revolve around the teaching program, and the teaching contents are restricted by the teaching program and corresponding knowledge points. During the whole activity of teaching and studying, the participation degree of students and the flexibility of teaching schedule are all low.

**New Teaching Form Based on the OBE Mode and MOOC Platform**

Online teaching video will provide sufficient learning resources for students outside of the classroom by recording the teaching process, and students can make full use of fragmented time to complete the online preview and review, and they can post the problems and ask for help in BBS communication area with other learners. In addition, teachers can monitor students’ online learning status and learning gains by the online learning evaluation system, and then provide quick aid and guidance for students to solve the problems according to the results of online learning evaluation system and BBS system.

As shown in Fig.4, it is obvious that there are more learning resources for students in MOOC teaching mode than that in traditional teaching mode, and the teacher can get such sufficient status information of learning process to evaluate the learning effect that he can take an active action to intervene the learning process and improve the learning effect.

To explore the teaching methods of engineering drawing course based on the MOOC Platform and OBE mode, the online teaching videos composed of different knowledge point was produced by
professional shooting team from Chinese MOOC Platform XuetangX, and the specialized evaluating system of online learning has been developed to evaluate the learning outcomes of students for achieving the goal of OBE education mode as expected. Moreover, according to the feedbacks from online evaluating system, teachers can take action to monitor and urge students’ learning activities. In addition, teachers can focus on the disadvantages and drawbacks shown as results of online evaluating system and strengthen it by guiding and aiding students during a lesson or drawing practice.

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References