Student Learning Effects And Influencing Factors In Two Online Teaching Models: An Analysis

Yan Wang

School of Biomedical Engineering, Hubei University of Medicine

Na An

School of Biomedical Engineering, Hubei University of Medicine

Xu Chen

School of Biomedical Engineering, Hubei University of Medicine

Pei Hu (✉ skylinehp@163.com)

School of Biomedical Engineering, Hubei University of Medicine

Research Article

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Abstract

Background: Online teaching has become the main educational method in higher learning institutions during the Covid-19 pandemic. There is, however, no unified online teaching model in colleges and universities, and the pros and cons of different models and their teaching effects have not yet been reported.

Methods: An anonymous online survey of students and teachers of Medical Laboratory Science at the Hubei University of Medicine, who participated in online teaching during the pandemic was conducted by the website Questionnaire Star.

Results: The results found that 63.5 percent of students and 53.9 percent of teachers believed that the synchronous online teaching model in the form of live video streaming was more conducive to students' understanding of the course content than Massive Open Online Course (MOOC). Additionally, 64.1 percent of teachers believed that online teaching generally had a substantial impact on students' learning effects compared with face-to-face lectures, and that this was mainly because students were less able to focus their attention online. Although teachers and students agree that the methods of individual teachers are the most important factor in determining the effect of online teaching, their opinions on the influence of other factors vary. Interestingly, 41.4 percent of students interacted more online than they did in traditional offline classes, with only 25.5 percent recording fewer interactions.

Conclusions: Both teachers and students are inclined to live video streaming than MOOC in online teaching, and teachers should take various influencing factors into consideration to improve their teaching effects.

Background

The sudden outbreak of the Covid-19 pandemic at the end of 2019 forced countries around the world to suspend business, production, and educational activities. On 4 February 2020, in response to the pandemic, the Ministry of Education of China issued the "Guiding Opinions on the Organization and Management of Online Teaching in Institutions of Higher Learning during the Period of Pandemic Prevention and Control". These guidelines required that each college and university in the country actively carry out online teaching activities by making full use of various online resources, platforms, and spaces, to ensure that no teaching or learning is suspended even if there is no offline classroom. Schools at various levels across China accordingly began to teach online.

There are currently two major online teaching models in institutions of higher learning across the country: the first is to use live video streaming platforms to conduct synchronous online teaching; and the second is to use Massive Online Open Courses (MOOCs) to conduct asynchronous online teaching. So far, however, there is no literature on what the actual effects of the different online teaching models are; what problems have arisen from each of them; the advantages and disadvantages of each model, and of online teaching generally; and how such teaching should be refined and perfected. This study conducts

and analyzes surveys of teachers and students in our school's Medical Laboratory Science program, to help us understand the effects of different online teaching models, and identify the inherent problems in the online teaching process. Through doing this, we aim to provide a new reference for the improvement of online teaching methods and teaching quality, and establish a unified online teaching model and assessment method.

Research Participants And Methods

1. Research participants: Teachers and students in the Medical Laboratory Science program at the Hubei University of Medicine, who participated in online teaching during the 2020 pandemic.
2. Survey method: We conducted an anonymous online survey with 15 open-ended questions, designed by the website Questionnaire Star. The questions were mainly single and multiple choice, and participants were asked to grade their multiple-choice answers from 1-5 points. The online version of the survey was completed anonymously between April and November 2020. Altogether, 258 copies of the survey—52 from teachers and 206 from students—were collected, all of which were valid.
3. Data collection and analysis: Data was collected from the website Questionnaire Star using an e-learning readiness and expectancy survey. Data extracted from the single choice questions was presented by percentage, while multiple-choice data was presented as average scores. Descriptive statistics were used to analyze the survey data and content analysis for open-ended data.

Research Results

1. General information of the participants

Of the 206 students surveyed, 38.8 percent were male and 61.2 percent were female. Of the 52 teachers surveyed, 38.5 percent were male and 62.5 percent were female. Teachers with intermediate, sub-senior and senior professional titles accounted for 51.3, 25.6, and 20.5 percent of teaching respondents respectively. Their level of experience was divided into categories: 2-5 years, 5-10 years, and over 10 years. Of the teachers surveyed, 23.1, 33.3, and 43.6 percent belonged to each of these categories respectively.

2. Opinions and Selection of Online Teaching Models

During the pandemic, most teachers in our school chose either the synchronous model (live video streaming), or the asynchronous model (MOOCs). The latter was then divided into two forms: one from the "Chinese University MOOC" website, taught by famous Chinese professors; and the other comprising video courses recorded locally, by teachers at the university. The results of our study showed that 53.9 percent of teachers and 63.5 percent of students were more inclined to choose the synchronous online teaching model, in the form of live video streaming, while 33.3 percent of teachers and 26.2 percent of students preferred the asynchronous online teaching model in the form of a MOOC (Figure 1). There was no significant difference in the preferences of teachers and students in each model. Those in the

synchronous online teaching model believed that live video streaming provided more of a classroom atmosphere, and was more conducive to students' understanding of the course content. The students and teachers who preferred the asynchronous online teaching model thought that this kind of teaching/learning provided students with more flexible viewing options, and enabled them to access the video repeatedly, at times of their own choosing.

3. Opinions and Assessment of Online Teaching Effects

To better understand the teaching effects of the different online models, this study conducted a survey of teachers and students. The results showed that 28.2 percent of teachers believed that online teaching had a great impact on students' learning effects, while 64.1 percent thought that it had little effect. Only 7.7 percent of teachers believed that it had no effect at all. The study demonstrated that although both teachers and students thought that teachers' methods were the main influencing factor, their opinions on other factors varied widely. Most students believed that the models in the survey had a greater impact on their learning than online teaching platforms or teachers' PPT/video production, while most teachers believed the opposite: that PPT/video production had the most significant effect, followed by online teaching platforms and teaching models (Figure 2). Additionally, it was found that the impact of online teaching on student learning was mainly observed in the attention span of students in the classroom, followed by classroom atmosphere and activity, the professionalism of the teacher's lesson preparation, classroom interaction between teachers and students, and student attendance (Figure 3). In the evaluation of students' learning effects, most teachers believed that the students' pre- and post-class completion of questions relating to the course content was most important, followed by examination results, classroom interactions, and student attendance (Figure 4).

4. Comparison with Traditional Teaching Modes and Corresponding Analysis

Compared with offline teaching, 38.8 percent of students experienced an increased frequency of interaction with the teacher in live-streamed online teaching activities, while 32.5 percent had a decreased interaction frequency and 28.6 percent found no significant change. When learning through a MOOC, 94.7 percent of students chose to re-view lessons before they took an exam. When there was no exam, 48.5 percent would re-view the MOOC at the teacher's request, 23.3 percent would re-view repeatedly according to their own needs, while the other 38.2 percent did not re-view at all. When asked about the role of online teaching in the future, 15.4 percent of teachers thought that online models could be used as the main teaching method, 10.3 percent thought they could gradually replace the traditional teaching model, and 74.4 percent thought that online teaching should only be used to supplement traditional methods.

5. Problems with Online Teaching

Although online teaching has already been employed for a long time, the ongoing pandemic has made it the main teaching model for the first time, problems will inevitably arise. Our survey found that both teachers and students thought that the susceptibility of online teaching to students' learning autonomy was its main obstacle, followed by a general concern over the lack of an online teaching management

system. Additionally, both groups worried that online teaching could not emulate the classroom atmosphere of offline teaching, and that it was too dependent on the stability of the app or network, which may not be reliable. Another major problem, specific to the asynchronous MOOC online teaching model, is that the lack of communication with teachers can have a negative impact on the learning effect (Figure 5).

Discussions

As the pandemic and other uncertain factors may continue to impact offline education, online teaching is increasingly valued by teachers and students. In 2015 alone, more than 6 million people participated in online distance learning [1]. MOOC has gradually become an important method of online learning for most students, and as a consequence much more attention has been paid to its development in higher learning institutions. The number of courses on the MOOC platform now exceeds 500, and more than 3 million students have used it for online learning [2]. In addition, live video streaming has become a popular approach for learning online. Although there have been many studies on online teaching over the years, most regarded it as a supplementary form of traditional teaching, and did not conduct an in-depth exploration of it as the main teaching form.

The sudden outbreak of the Covid-19 pandemic at the end of 2019 made online teaching the only option for many universities for the first time. This presented both teachers and students familiar with traditional classrooms with the challenges of online learning [3], including the added discipline required to avoid distractions, the lack of an online teaching management system, the diversity of models available, and the fact that teachers and students had not yet fully adapted to online teaching. It was found that teachers must assume five roles—Facilitator, Course Designer, Content Manager, Subject Matter Expert, and Mentor—and their tasks fell into two areas: Course Design and Teaching [4]. In the online teaching model, due to differences in students' knowledge bases, learning strategies, and personal characteristics, the adaptation and adjustment of teaching methods is inevitable. One finding suggests that age, academic background, the dedication of teaching staff, and, particularly, teachers' adaptation to their new roles, are important predictors of the adoption of a particular approach to online teaching [5].

The learning effects and evaluations of online teaching also varies with factors such as the curriculum requirements for students of different majors. To avoid inconsistencies, this study only surveyed teachers and students from the Medical Laboratory Science program of Hubei University of Medicine. A survey was conducted on the identification and selection of online teaching models, the identification and evaluation of online teaching effects, and the factors that affect online teaching. Of the two models in the survey, results found that 63.5 percent of students and 53.9 percent of teachers believed that the synchronous online teaching model in the form of live video streaming was the most conducive to students' understanding of the course content.

It has been reported [6] that 86.9 percent of students believe that face-to-face teaching is more helpful to their understanding of the curriculum than online teaching, but it has also been found that there is no

difference in the test scores of students in each form of learning [7]. In the present study, 64.1 percent of teachers believed that online teaching had a greater impact on students than offline teaching, and that its impact was mainly observed in the attention spans of students, followed by the classroom atmosphere and the degree of students' activity. Through comparison with, and analysis of, the traditional offline teaching model, we found that the number of student interactions in online teaching differed significantly, as did their attitudes towards MOOCs, depending on whether or not an exam was required. Although teachers and students agreed that the methods of individual teachers were the most important factor in determining the effect of online teaching, their views on the influence of other factors varied considerably. In a survey of online teaching situations [8], Professor Bao Wei of Peking University put forward five major principles, including plans for handling emergencies that may occur on online teaching platforms. Other researchers have also studied the problems of online teaching and their potential solutions [9, 10].

This study has given us a preliminary understanding of the online learning situation of students in the Medical Laboratory Science program at Hubei University of Medicine. It has provided the data and theoretical underpinnings to formulate a reasonable and effective online teaching management system, refine teachers' online teaching methods, and improve the quality of online teaching. Finally, this study can help us make full theoretical and ideological preparations for the possible recurrence of this or other pandemics in the future.

Declarations

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Disclosure

We declare no conflicts of interest.

Author Contribution

Pei Hu and Yan Wang designed the subject and analyzed the data, the survey was carried out by Na An and Xu Chen, and the manuscript was wrote by Pei Hu.

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Data Availability Statement

The datasets used and/or analysed during the current study available from the corresponding author on reasonable request.

Ethical approval and informed consent to participate

The present study was conducted with permission from Hubei University of Medicine, Ethical approval was granted by the Ethics Committee at the Hubei University of Medicine. Informed consent was obtained from all participants, and no participant is under 18.

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Figures

Figure 1
 Teacher and student preferences for online teaching models

Figure 2
 Influencing factors that determine the effects of online teaching

Figure 3

Specific influencing factors of online teaching on student learning

Figure 4

Degrees of importance of different forms of assessment on the effects of students' online learning

Figure 5

Influencing factors of online teaching effects