Research Article

Research on Teaching Method and Class Evaluation for International Online Teaching

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The COVID-19 epidemic in 2020 posed a sudden and serious challenge to education where online teachings were adopted, and problems that people had not noticed before were exposed. Based on the experience of international online course and the study of online teaching, the paper focuses on the associated problems and puts forward some solutions. First, based on the performance of current software and hardware used in online teaching, the characteristics of commonly used teaching software have been analysed and compared. Then, efficient combinations of teaching software for complementary advantages are recommended to ensure a high-quality online teaching. Second, problems inside of class existing in online lecturing and learning are studied, and corresponding teaching methods have been explored including the aspects of class interaction design and implementation, alternative method for delivering essential video information, and online class management. Finally, some objective class evaluation criteria are studied in terms of coverage of class content, learning effect of specialized knowledge, and online class interaction. In the end, some feasible solutions are provided, and it can be served as a reference to improve the online teaching.

1. Introduction

At the beginning of 2020, a worldwide COVID-19 epidemic disrupted the orders of various fields including education. Universities, colleges, and schools had to close and stopped traditional face-to-face classes. The adoption of online teaching, which had developed for some time and adopted relatively infrequently before COVID-19 epidemic, had a sudden explosion. More than 650,000 teachers in China had introduced nearly 1.7 million online courses. Chinese Education Department had organized 22 online teaching platforms to provide free courses. The online teaching faced serious challenges, while also met a great opportunity to develop.

Online teaching or network teaching is a type of teaching model which relies on network technology. It completes the teaching process through the way of live course or recorded course using software including special online teaching platforms and some APP software used for teaching. With the sudden arrival of the COVID-19 epidemic, the number of online teaching customers increased dramatically, and the use of various software for teaching also increased greatly [1–4]. Some problems that were not found in online teaching in the past are now exposed. Pedagogical researches have studied these issues from the aspects of teaching methods [5–7], online teaching evaluation [8, 9], examination mode [10–13], and so on. It has greatly promoted the development of online teaching. Based on the teaching practice of international online course for overseas students and some Chinese students, this paper studies and summarizes the problems encountered in online teaching and gives corresponding valuable solutions.

2. Problems Existing in Online Teaching

2.1. Problems in Performance of Software and Hardware.

The most important and basic challenge of online teaching is the strong dependence on software and network.
2.2. Problems in Teaching and Learning

Before the outbreak of the 2020 epidemic, although the online teaching had been developing for quite a long time in China, the number of teachers who were familiar with online teaching was actually small. The majority of teachers did not have online teaching experience and never used the platform software. Face-to-face teaching in classroom was still the dominant form. When schools started during the epidemic, they faced a sudden change to an unfamiliar teaching mode, and both teachers and students felt difficult to adapt. Some problems emerged.

2.2.1. In terms of Teaching

(i) Online class is a special "no-one classroom." Although the teacher and students are in the same class, they are separated in space unlike traditional classroom teaching. Generally, to reduce network traffic and get better condition for smooth teaching, all cameras are turned off. In this case, facing the cold computer screen or mobile phone, teachers cannot get feedback from students' facial expressions. They are not clear about how students understand and master the knowledge.

(ii) It is inconvenient for teachers to manage the class. When teachers speak passionately during the class, they do not know whether the students can follow their ideas in time. This is easy to lead to the deviation in the rhythm of the lecture.

(iii) At the end of a course, many of the previous exam methods are no longer applicable.

2.2.2. In terms of Learning

(i) Students are also just facing a device screen. Instructional guidance from teacher declines and learning effect decreases obviously.

(ii) With the time extension of online teaching, the freshness of students for online courses gradually fades away, the enthusiasm of online learning is not high, and learning motivation is lacked. The phenomenon of being late for class and leaving early is much more than the traditional teaching in classroom. It even appeared that the students left the computer after he signed in for the class. This is one of the reasons that the online teaching effect is hard to be guaranteed.

(iii) Online class at home has a comfortable environment. Correspondingly, it is difficult to create a good learning atmosphere like that at school and is easily disturbed by family members.

According to the survey [14], the major problems of the online learning during the epidemic period include excessive learning interference, easy distraction, difficulty in-depth learning, and low learning efficiency. One student is often troubled by multiple problems. In addition, learning interests, learning methods, learning objectives, depth and breadth of learning, and whether to make learning plans also have certain impacts on learning. The percentage of each problem is given in Table 1.

3. Solutions to Problems of Online Teaching

Online teaching is an interactive activity between students and teachers, which depends heavily on online teaching conditions including hardware, software, and online teaching resources. It is a comprehensive process of interaction by students, teachers, online teaching conditions, online learning environment, and even other social factors as shown in Figure 3. Subjective and objective factors influence
each other and cannot be clearly separated. Therefore, in view of the problems existing in the development of online teaching, we make a comprehensive analysis of them considering the subjective and objective factors together. Some solutions to improve the quality of online teaching are proposed as follows.

3.1. Using Multiple Teaching Software Comprehensively for Complementary Advantages. Although there are several kinds of online teaching software which are used by a large number of users because of their relatively good performance, in the special emergency situation of COVID-19 epidemic, none of the online teaching software can fully meet the requirements of a high-quality teaching. A piece of software usually shows prominent performances in some respects and obvious deficiencies in the other. The common phenomenon is that some kinds of online teaching software run stably and smoothly, but lack interactive functions needed in teaching; some kinds of software have powerful functions for teaching, but they crash very easily.

To ensure the online teaching effects under present network performance, teachers have made various explorations and attempts [15]. Using different software at the same time and combining their advantages together to complete the teaching task is a common attempt. This is an effective way at present to solve the aforementioned problems. Adopting two pieces of software is the most common approach at present, and they can make up for each other’s shortcomings and sharing their strength. The following will summarize and analyse the main characteristics of several pieces of software commonly used in online teaching and then discuss some efficient combination modes.
3.1.1. Main Characteristics of Several Types of Software Commonly Used in Online Teaching. (1) QQ: In QQ, the “Share Screen” function is often used to show students PPT and other teaching materials, and the “Demo Whiteboard” function is used to show the content that the teacher writes impromptu in class. The transmission of picture, voice, and text information is very fast in QQ, and it can meet the needs of almost all the basic operation functions in teaching. At the same time, QQ has excellent fluency during the online class and rarely exhibits delay phenomenon. It is a very important advantage of QQ to meet both the common functional requirement and teaching fluency requirement.

(2) Tencent Conference: The APP system has high stability. When there are several opened files and windows on the desktop of the computer screen, it can choose any one to share online. Also, it has the whiteboard function for the teacher’s writing in class. While, Tencent Conference has no function of group management and file transmission, this is very inconvenient for teaching.

(3) Tencent Classroom: Compared with QQ, Tencent Classroom is more stable when the number of students in class exceeds 100, and functions for teaching are powerful. However, both sound and graphics have a relatively large delay. Some details were not very good, such as the experience of mouse and display.

(4) DingTalk: The stability is basically the same as that of Tencent conference. It also has the problem of delay, and the interactive function of teaching is in the middle level.

(5) Rain Classroom: Rain Classroom has many good functions for teaching, such as various types of teaching interaction and class information statistics, which are incomparable to other software. However, when the number of users increases, the platform often crashes badly and the class cannot continue. This problem was very serious in the early days of online class when the COVID-19 broke out and the number of users increased dramatically, and it already resulted in the loss of a large number of users.

(6) WeChat: For the teaching requirement, the function of WeChat is too simple. It is not convenient for teaching and is relatively less used in class.

3.1.2. Efficient Combinations of Online Teaching Software. In order to ensure the class effect, it is an effective way to use different kinds of teaching software together. The following are several combination modes:

(1) Mode A: QQ and Rain Classroom are Used at the Same Time. In this case, Rain Classroom runs just on the teacher’s computer. Students do not need to log in in Rain Classroom. This helps to reduce network congestion. “Share Screen” function in QQ is used to show students the information displayed on the teacher’s computer screen. In this mode, the rich and powerful interactive functions developed specifically for teaching in the Rain Classroom is maximized. All interactions can be displayed to students through QQ’s “Share Screen”. This approach reduces the crash probability of Rain Classroom and makes the best use of its excellent interactive function.

(2) Mode B: Tencent Conference and Rain Classroom are used at the Same Time. This is similar to Mode A. Tencent Conference also has excellent fluency. Under the important support, screen sharing function of Tencent Conference combining with the excellent interactive function of Rain Classroom can also achieve a satisfactory teaching effect.

(3) Mode C: QQ Runs on Computers and Mobile Phones to Meet Common Needs in Software Function for Teaching. In this mode, teachers need to use two devices: one computer and one mobile phone. On the computer, teachers can use QQ’s “Share Screen” to show students PPT, and use “Demo Whiteboard” to write improvised ideas for students. At the same time, teachers can put forward questions to students and discuss them with students in QQ group by mobile phone. In this way, it is also easier for teachers to attract students’ attention, and the proportion of students participating in class discussions is also high in this mode.

3.2. Exploring Teaching and Management Ways of Online Class. Characteristics of online teaching are different from face-to-face teaching in classroom. Some teaching methods can no longer be used and need to be adjusted to adapt the new teaching model. Several methods have been researched, and they have been proved to be feasible through teaching practice.

3.2.1. Class Organization Ways of Online Teaching. (1) New Ways of Class Interaction: In online teaching, students’ microphones are usually off during the class to avoid noise from home or environment. Only the teacher can speak freely. In this case, face-to-face discussion way is no longer appropriate and needs to be adjusted. An alternative method is that the teacher asks questions and students type and send their answers to the discussion area of teaching software. This is obviously more difficult to communicate than face-to-face class when the issues are slightly complex. To improve the communication efficiency between teacher and students in the limited class time and realize a real-time discussion, we have explored and tried a way for online teaching. The key points are as follows:

(i) Decomposition of problems: When raising and discussing questions in class, divide the questions into several small questions of logical interlink. The level of decomposition is determined by the criterion that students can finish answers quickly.

(ii) Design of answers: There are two ways to answer questions: one is the choice mode, such as choosing the answer from “Yes/No”, “1/0”, or “A/B/C”. The other is words mode. That means the question can be answered clearly in several words.

In this solution, students can instantly respond to the teacher’s questions by typing. It can ensure the maximum degree of real-time interaction between the teacher and students in class. During the class, the teacher throws out each small question in turn, and students can respond rapidly without a break like that in face-to-face class.
According to students’ feedback, the teacher can adjust his lecture content in time. Through this kind of interlocking rapid response, a complex discussion can be completed in a fluent and clear manner. The efficiency of class interaction has been greatly improved.

(2) Alternative Method for Efficient Presentation of Video Information: According to the analysis in Section 2.1, video materials cannot be played to students in real time in most cases under current network conditions. To convey the essential information of videos to students, it is an effective solution to extract the key frame images and make them into PPT. In class, this PPT will be presented to students accompanied by the teacher’s supplementary explanations. Videos themselves can be sent to students and watched after class by downloading them locally. In this way, the main content of the course is almost unaffected, and it is also adapted to different situations of students.

3.2.2. Class Management Methods of Online Teaching. Both teaching at home and learning at home are subject to many restrictions, the management methods of online class need to change. According to the characteristics of online teaching, teachers can dig deeply into the functions of teaching software and use them to explore and develop flexible and diverse class management methods, such as sign in with hand gestures before class, random award-winning questions and answers in class, online brainstorming discussion, and after-class team video conference. These measures are conducive to effectively improve students’ learning attention and interest in class. In addition, to ensure the attendance rate and learning effect of online teaching, some of the previous methods used in face-to-face class can still be adopted, such as supervisors’ random attending class and randomly checking students’ learning status.

4. Class Evaluation Criteria for International Online Teaching

Some representative class evaluation models are as follows: traditional expert model, Tyler’s objective model, Sufflebeam’s CIPP model, Stake’s Countenance model, and ethnographic evaluation. These evaluation models have different features in the value orientation, method, and participant. Modern education theory considers that knowledge is a process and knowledge system is always in a state of flux. People must pay attention to the specific performance of students during the learning process and then implement a process evaluation.

There are three evaluation models in Chinese universities: expert evaluation, peer evaluation, and student secret ballot. Expert evaluation has limited ability to accurately reflect teacher’s teaching situation because of the limited amount of attending class of the expert. In addition, experts’ personal teaching style, teaching habits, and thinking patterns also have an influence on the evaluation results. Peer evaluation is conducted in the form of faculty members from the department and the faculty listening to each other’s lectures. This evaluation model may be influenced by the relationship between colleagues. For the secret ballot, students’ cognitive ability is more in the perceptual stage, so the evaluation tends to be mixed with some random ego factors [16].

Problems of the three evaluation models are obvious. In addition, differences exist between online and offline class and also between lecturing in the native language and in foreign language. So, class evaluation of international online teaching is studied in this paper to achieve an objective result, in which evaluation criteria reflect the behaviour and learning effect of students in the learning process. The considerations are as follows:

1. Percentage of class content to the syllabus
2. Learning effect of specialized knowledge in online class taught in foreign language which is generally English
3. Interactive activities of online class between learning and teaching

4.1. Percentage of Class Content to the Syllabus. In the course of online teaching, the interaction between teachers and students is affected to some extent because of space separation. For example, a discussion about a topic tends to take longer, so class contents may not be sufficient to meet the requirements of the syllabus in a time-limited class. This paper studies evaluation criteria to evaluate the class effect considering three respects: important contents, required contents, and understanding contents. For important contents, students are required not only to understand the concepts and principles but also have the ability to apply, analyze, and design. In required contents, students have an obligation to have a thorough understanding of concepts and principles. For understanding contents, students are only needed to understand the basic concepts.

First, to quantify the class contents into an objective value, formula (1) is designed for calculation:

\[
S = \lambda_1 \sum_{i=1}^{N} I_i + \lambda_2 \sum_{i=1}^{N} M_i + \lambda_3 \sum_{i=1}^{N} E_i, \tag{1}
\]

where \(i\) is the chapter number; \(N\) is the total number of chapters; \(I_i, M_i, \) and \(E_i\) are the numbers of important contents, required contents, and understanding contents of chapter \(i\), respectively; \(\lambda_1, \lambda_2, \) and \(\lambda_3\) are the weights of each item respectively and can be assigned different values to distinguish the importance of each item, such as 10, 3, and 1. \(S\) is the score of the class contents. On the syllabus: \(I_i = I_{im}, M_i = M_{im}, \) and \(E_i = E_{im}\), that is, \(I_i, M_i, \) and \(E_i\) are all their maximums. In this case, \(S = S_m\), which is the highest score of the class contents.

Then, the percentage of class contents to syllabus contents can be calculated by formula:

\[
R_c = \frac{S}{S_m} \times 100\% = \frac{\lambda_1 \sum_{i=1}^{N} I_i + \lambda_2 \sum_{i=1}^{N} M_i + \lambda_3 \sum_{i=1}^{N} E_i}{S_m} \times 100\%, \tag{2}
\]
$R_k$ is called coverage of class contents. At this time, $I_i$, $M_i$, and $E_i$ in formula (2) are the numbers of important contents, required contents, and understanding contents of chapter $i$ that are actually taught in online class, respectively, so $S$ is the score of actual taught contents. $R_k = 100\%$ indicates that all the contents required by syllabus have been completed. Among them, the understanding contents are often assigned to students for self-study.

4.2. Learning Effect of Specialized Knowledge in Online Class Taught in English. Due to the use of original English textbooks and the use of non-native language as teaching language, students have certain obstacles in thinking and lag in understanding. Therefore, more explanations are needed in the teaching process. However, the class time is bounded. Sometimes, some topics cannot be fully discussed, and students may not be able to comprehend them clearly. So, it is necessary to evaluate the effect of students’ professional learning in time. Available methods include check students’ mastery of specialized knowledge through flexible forms such as class discussions and quiz. The results are quantified by score, and it can compare to that of students who are taught in the native language of the same course. We assume that the whole knowledge consists of different knowledge points, and design formula (3) first evaluates the learning effect of students on knowledge point $k$:

$$P_k = \frac{1}{N} \sum_{i=1}^{N} s_i,$$

(3)

where $N$ is the number of students, $s_i$ is the score of the $i$th student for the knowledge point $k$, and $P_k$ is the average score of all students on the knowledge point $k$. Assume that the average score of students taught in native language for the knowledge point $k$ is $P_{kn}$, then the learning efficiency of students taught in English on knowledge point $k$ can be obtained by

$$\eta_k = \frac{P_k}{P_{kn}} \times 100\%,$$

(4)

when $\eta_k < 1$, it indicates that students taught in English have lower learning effect on knowledge point $k$ than those taught in native language. When $\eta_k > 1$, it indicates that students taught in English have better learning effect on knowledge point $k$. If student’s score for all knowledge points is to be calculated, the overall learning efficiency $\eta$ can be calculated as

$$\eta = \frac{P}{P_n} \times 100\% = \frac{1}{C} \left( \frac{1}{N} \sum_{i=1}^{N} s_i \right) \times 100\%,$$

(5)

where $C$ is the total number of knowledge points and $P_n$ is the average score of the students taught in native language for total knowledge. Similarly, when $\eta < 1$, it indicates that the overall learning efficiency of students taught in English is lower than that of students taught in native language. When $\eta > 1$, the overall learning efficiency of students taught in English is better than that of students taught in native language. $\eta_k$ and $\eta$ can reflect different levels of learning efficiency from some knowledge points to the whole knowledge.

4.3. Interactive Activities of Online Class between Learning and Teaching. Online teaching uses computer, network, mobile phone, and other hardware as carriers and relies on teaching software to realize long-distance and real-time teaching and learning. Online teaching makes students study different courses in front of the computer or mobile phone from morning to night every day. Students tend to feel sleepy when they use devices for a long time. In addition, studying at home, students cannot feel the restriction and learning atmosphere as that in the classroom. The lack of “presence” and “reality” leads to easy distraction. Interactive activities in online class have a significant effect on improving students’ attention and learning interest.

In general, the more teaching interaction occurs in class, the better the class effect is. But too frequent interaction may slow down the teaching progress. Also, continuous intensive activities will make students unresponsive and easy to fatigue. At this time, interaction is easy to cause distraction instead. Considering the positive and negative effects, we study the teaching interaction incentive function to indicate the influence of teaching interaction on students’ learning effect. The definition of teaching interaction incentive function is shown in

$$\xi_q = 1 + \sin \left( \frac{A_q}{A_q'} \pi \right),$$

(6)

where $q$ represents the number of a teaching activity; $\xi_q$ represents the incentive function value of the $q$th teaching activity; $A_q$ is the total number of knowledge points in the $q$th teaching activity, and $A_q'$ is the total number of knowledge points implemented with interaction in the $q$th teaching activities. $0 \leq A_q' \leq A_q$, and $1 \leq q \leq 2$. Assuming that the total number of teaching activities is $N$, the definition of the average teaching interaction incentive function $\xi$ is as shown in

$$\xi = \frac{1}{N} \sum_{q=1}^{N} \xi_q = \frac{1}{N} \sum_{q=1}^{N} \left[ 1 + \sin \left( \frac{A_q}{A_q'} \pi \right) \right],$$

(7)

where the greater value of $\xi$ means the greater incentive effect of interaction in the teaching activities. In typical cases, when there is no interaction in class, $A_q'/A_q = 0$ and $\xi$ has a minimum value of 1, then $\xi$ may have a minimum value of 1; when $A_q'$ reaches half of $A_q$, $\xi$ has a maximum of 2, also $\xi$ may have a maximum of 2. At this time, $\xi_q$ represents that the class atmosphere is most active and the teaching effect is the best in the $q$th teaching activity, and $\xi$ represents the same meaning for overall situation. When all the knowledge points are carried out with interaction, $A_q'/A_q = 1$ and $\xi_q$ return to the minimum value of 1, also $\xi$ may have the minimum value of 1. This implies that too much interaction will make negative effect counteract the positive effect. When $\xi > 1.9$, it indicates that the interaction effect in class reaches an ideal state.
4.4. Results and Discussion. The above three criteria provide the class evaluation ways for international online teaching from different aspects. In use, we can flexibly set a time period $T$ to evaluate and examine the class effect for the desired time period. $T$ can be set as the total time of a course or some credit hours of a course. The results can be used as the basis for improving the teaching method.

For coverage of class contents $R_c$ when $T$ is set as some credit hours of a course, teachers just need to take the parameter values corresponding to the period $T$ in formula (2). According to $R_c$, it will be convenient to check how much of the teaching plan has been completed in the period $T$. If there are problems, teachers will think about the reasons and solve them, then adjust their teaching progress in time. Another way to use criteria $R_c$ is after a course is over. At that time, teachers can set $T$ as the total time of the course to evaluate the class effect and obtain valuable information for the improvement of online teaching in the future.

Through the observation of overall learning efficiency $\eta$, teachers can see how well students are learning a course. It provides a useful hint for improving teaching in time to avoid the decline of students’ learning effect. $\eta < 1$ is the most case, mainly because of the influence on understanding in non-native language teaching. For more detailed studies, one can further examine the learning efficiency $\eta$, and analyse and identify problems existing in certain knowledge points.

For the effect evaluation of class interaction, the mean teaching interaction incentive function $\xi$ reflects the law that the incentive effect of class interaction increases from small to large and then decreases with the change of interaction from less to more. The range of $\xi$ is $[1, 2]$, and the larger the value, the better the incentive effect on class.

By comprehensively considering the aforementioned criteria about class contents, learning effect of specialized knowledge, and interactive activities of online class, an objective class evaluation of international online teaching can be achieved. Table 2 shows the evaluation results of applying three criteria to a course of "Introduction to Avionics systems" in its different stages. This is a 32-credit hour elective course which is taught in native language and English for different types of students. The course is taught for the first time in an online format after the outbreak of the new crown epidemic. We did an evaluation for the online English-taught course. Three criteria were used to evaluate the class when the first 16 credit hours of lecturing were completed, to check whether the teaching was going well, and to analyse and solve problems timely if there are. At the completion of the last 16 credit hours of lecturing, that was 17 to 32 credit hours of instruction, the class evaluation was done again to check whether the teaching had been improved and what problems still existed.

From the data in Table 2, it can be seen that the coverage of class contents $R_c$ in the first 16 credit hours of the course was only 81%, which meant that the teaching progress was slow, and some teaching contents were not completed as planned. The overall learning efficiency $\eta$ was 89.4% which is relatively low. Then observe the mean teaching interaction incentive function $\xi$ whose value was 1.81, and its related parameter $A_{opt}/A_{opt} = 0.70$ indicating that the number of class interaction was relatively high. The criteria indicated the problems existing in teaching. Through a review of the teaching process and a comprehensive analysis of these data, problems were found: since the online teaching was conducted for the first time, teachers could not adapt to the new teaching method immediately because they could not meet with students face to face, especially in terms of class interaction, some intuitive interactive information in the previous face-to-face teaching was no longer available, so teachers tried to adopt new interactive methods in online teaching to ensure the teaching effect. However, due to the lack of experience, the initial attempts were not efficient enough, the number of attempts was on the high side, and time control was not given enough attention, so that the teaching plan was not fully completed and the students’ learning results were not good enough.

Table 2: Evaluation results of "Introduction to Avionics systems" in its different stages.

<table>
<thead>
<tr>
<th>$T$</th>
<th>$\xi$ calculation</th>
<th>$\eta$ calculation</th>
<th>$R_c$ calculation</th>
<th>$\lambda_1, \lambda_2, \lambda_3, \lambda_4$</th>
<th>$A_{opt}/A_{opt}$</th>
<th>$\xi$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–16 credit hours</td>
<td>10, 3, 1, 4</td>
<td>81%</td>
<td>96, 85</td>
<td>$A_{opt}/A_{opt} = 0.70$</td>
<td>1.99</td>
<td></td>
</tr>
<tr>
<td>17–32 credit hours</td>
<td>10, 3, 1, 4</td>
<td>100%</td>
<td>83, 87</td>
<td>$A_{opt}/A_{opt} = 0.70$</td>
<td>1.99</td>
<td></td>
</tr>
</tbody>
</table>

Based on the results of the above analysis, teachers used the solutions discussed in Section 3 to improve the online teaching method, focusing on optimizing the interaction ways to increase the efficiency of interaction while reducing the number of interactions so that the $A_{opt}/A_{opt}$ value was close to 0.5. Applying the improved teaching method to the last 16 credit hours of the course, the class effect was evaluated again at the end of the course, and it could be seen that $R_c$ had been improved to 100%. That is, all teaching contents were completed. $\xi$ was improved to 1.99, and the overall learning efficiency $\eta$ was also improved to 95.5%. It could be seen that class evaluation method was effective. It was beneficial to understand the teaching effect and improve teaching method in time.

Class evaluation is one of important aspects that promote the improvement of international online teaching. The contribution lays a foundation for further exploring the class evaluation system of online teaching.

5. Conclusion

In view of the problems existing in current online teaching, we study the issue from several respects: (1) analyse and discuss the performance problems of software and hardware in present online teaching; (2) discuss the class problems in online teaching and learning; (3) recommend corresponding feasible solutions to discussed problems, including comprehensive use of multiple software for complementary advantages, class interaction design and implementation, alternative method for delivering video information and
class management method; and (4) develop several class evaluation criteria for an objective class evaluation of international online teaching. A relatively complete online teaching operation system is formed. In the future, with the development of new technologies such as 5G, Big Data, Artificial Intelligence, and Internet of Things, online teaching might be gradually adapted more and more. The mode of online teaching might also become diverse, for example 5G live class, ultra HD video interaction, holographic live, VR live, and AI teacher. The study provides some valuable information for present online teaching research and practice and is also beneficial to its continuous development.

Data Availability

Data sharing is not applicable to this article as no data sets were generated or analysed during the current study.

Conflicts of Interest

The author(s) declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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