# The Diversity of Online Teaching in Chinese Universities During the Pandemic

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**Abstract:** Online Education is one of the important directions of future education reforms. The pandemic happened at the beginning of this year worldwide has promoted the pace of online education namely online teaching. What are the characteristics of online learning in an emergency? The article presents the results of a survey on the status and experience of online teaching during the pandemic in Chinese universities. Teaching platform, teaching form, teaching process, teaching content, teaching effect, learning environment and obstacles of online teaching are analysed. Chinese studies also showed that especially students with disabilities are affected by the Corona situation. Some benefit from the flexibility of online learning, but many suffer from missing competencies or missing aids. The overview of effects and empirical data presented here may help to promote and enhance the accessibility of educational media technology.

**Keywords**: pandemic; online teaching; diversity; inclusion

## 1   Introduction

With the change and advancement of modern technology, students may not be able to meet teachers in person. This distant "impossibility" was brought forward during the pandemic. Since January 2020, the Covid-19 pandemic has swept the world. Regular school teaching was forced to stop. In response to the impact of the pandemic on higher education, China's Ministry of Education issued a guideline on online teaching in early February, to urge universities across the country to "suspend classes but not teaching or studying". Under this initiative, universities across the country have organized the largest online teaching program in a very short time, with the largest number of courses and students. As of May 2020, 1454 universities（54.09%）nationwide had launched online teaching, and 1.07 Mio courses had been taught online by 1.03 Mio teachers（59.20%）. 17.75 Mio undergraduate students (58.56%) took part in online learning (Statistic of the Chinese Ministry of Education 2019) [Nu20]. Online teaching during the pandemic contains opportunities for educational innovation and teaching reform, such as students' self-growth, teachers'

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professional development and universities teaching reform, but it also brings great challenges to students, teachers and universities.

## 2    Brief introduction to the investigation

In order to investigate the online teaching situation in Chinese universities, the teacher development centre of Xiamen University has carried out an online survey on the online teaching situation in universities during the pandemic, which was commissioned by the secretariat of the Chinese Network of Internal Quality Assurance Agencies in Higher Education (CIQA). Through the questionnaire data, the present situation of the online teaching during the pandemic in Chinese universities has been analysed and discussed, and the further thinking and some advices of development of online teaching in future has been given [Su20][4]. A total of 334 universities, 13,997 teachers and 256,504 students have participated in this survey. The participators cover teachers of all ages from under 35 to over 55 years old, including both new teachers and older teachers with rich teaching experience. Participators came from 12 disciplines including engineering, literature, philosophy, history, education, art, economy, management, law and medicine.

Before the pandemic, only small percentage 20.43%of teachers have conducted online teaching, compared with 79.57% did not have any experience about online teaching before the pandemic. This percentage changed dramatically during the pandemic. The proportion of teachers teaching online increased sharply to 97.19% during the pandemic. Only 2.81% of the teachers did not take online teaching in this special period. Nearly 85% of them adopted one or two courses online among the teachers who taking online teaching, 54.89% of them offered "compulsory professional courses" online, while the rest 45.11% offered "elective professional courses", "compulsory public courses" and "public elective courses". Teachers take four different types of online courses, covering "theory course (including in-class practice and experimental teaching)", "independent empirical setting", "skill course", and "other teaching link". 53.02% of the teachers teach theory courses online, which means theory course occupies a dominant position in online teaching. The survey results of the students also proved the important role of theory courses in online teaching. 50.39% of the students studied the theory courses online during the pandemic.

## 3    Online teaching status in Chinese colleges and universities

### 3.1    Diversification of teaching platforms

*Diversified usage of teaching platforms.*
The combination of modern Internet technology and teachers' teaching wisdom could improve teaching quality more effectively. In order to ensure educational quality, teachers

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[4] Without special instructions and notes, the data in this paper are all from the <Survey Report on Online Teaching of University Teachers during the Pandemic Period>.

strive to explore appropriate teaching methods and online platforms. The teaching platforms used by university teachers are very diverse and decentralized. Nearly half of them use off-campus platforms entirely, and nearly 40% use both campus and off-campus platforms. At the same time, many teachers use multiple teaching platforms in a single course. Less than one-fifth use only one teaching platform and half of the teachers choose to use 2-3 platforms in one course.

Overall, online teaching in colleges and universities mainly use four types of platforms:

(1)  course resource platforms, such as MOOC platforms of Chinese universities, Wisdom Tree, Xuetang Online, etc.;

(2)  experimental platforms, such as the national virtual simulation experiment teaching comprehensive platform;

(3)  live streaming platforms, such as Dingding, Rain Classroom, Tencent Classroom, ZOOM, enterprise WeChat, QQ video, etc. and

(4)  On-campus platforms, such as course center platform and SPOC platform.

The main teaching forms are "live broadcast" and "online interactive discussion". The forms that we are familiar with, such as "recorded broadcast" and "MOOC" are far less frequently used than these two new teaching forms [CC20].

*The nature of courses and the characteristics of teaching content affect the using frequency of online courses.*

Whether the nature and characteristics of the course and the function of the teaching platform can meet the teaching needs or not are the important standards for teachers to choose the teaching platform. Whether the content is suitable for online teaching affects the utilization rate of online courses. Experimental and practical courses pay more attention to on-site and practical practice in teaching, so these kinds of courses are been greatly affected during online teaching due to limitations of laboratory, playground, piano room and other practice places. Less than 30% of the participators thought that the online platform could finish the teaching task of experimental demonstration. As for other links of classroom teaching and teaching activities, such as submitting and transmitting course materials, answering questions after class, assigning and correcting homework, teaching in class, attendance management, etc., 60% of the participators believe that online teaching platform can meet the needs of such teaching activities. The mean value analysis also verified the results. Except the mean value of "online experiment demonstration" was significantly lower than three, the value of satisfaction of other teaching activities was all above 3.5, which indicated that teachers showed a good recognition of the functions of online teaching platform. For experimental demonstration courses, some universities have independently formulated some teaching plans, such as using online virtual simulation

platform for teaching, or conducting theoretical teaching according to teaching needs. For example, Physical courses could focus on the exercises and MOOCs that do not depend on venues and equipment. By recording videos, students could be supervised and guided to exercise every day.

*Students prefer platforms that are stable and easy to operate.*
Although the use of online learning platforms is characterized by diversification and mixing, it can still be seen from the data that platforms with good evaluation and high frequency of use are characterized by easy operation and strong stability by students. In terms of students' evaluation, more than 60% of them rated the "fluency of network speed" as "good" or "very good", while 36.5% of students rated it as "average". As for the "stability of platform operation", 57.6% of students consider it as "good" or "very good", while 38.6% as "average". Overall, students' evaluation of online teaching platforms was medium level, which may be related to network problems or expensive mobile phone traffic. The evaluation of teachers was better; nearly 70% of the participating teachers rated various platforms as "good" or "very good".

Technology is the foundation, any online teaching without the support of the hardware and technology is "a clever housewife without rice", which is not feasible. The information technology status and environment of the universities provide strong external support for online teaching. In addition to live streaming, MOOC, SPOC and communication platform tools, some universities also suggest teachers to use correction network, online testing system, collective editing software and other auxiliary tools. Universities have launched an online study survey to students before the start of the semester and provided a variety of solutions for students who have difficulties in online teaching, including mailing study materials and one-to-one tutoring, so that no student is left behind in online teaching during the pandemic. Compared with the situation of students, not so many universities pay enough attention to the personal network equipment of teachers, such as their own network equipment at home.

*Effective services provide guarantee for smooth development of online teaching.*
Effective online teaching services were provided during the pandemic, such as teaching and community support for teachers. In view of the technical problems in teaching, specialized technicians would be arranged. To investigate how teachers evaluate the online teaching service of their universities, 8 dimensions were divided including "Network conditions", "teaching platforms", "e-book resources", "technical team", "technical skills training", "online teaching methods training", "policy", "and leadership". According to the survey, the mean value of teachers' overall evaluation on online teaching service guarantee is 3.87 (the mean value of students' overall evaluation is 3.60), which is close to the level of "better 4.00". Dimensions "support from the leadership", "Training of the technical skills", "training of the online teaching methods" got the mean value over 3.87; while the other five dimensions were, lower than 3.87. This indicates that teachers and students are quite satisfied with the various support provided by the universities. However, the assessment of both teachers and students still show that current software and hardware resources of the universities do not yet fully meet the needs of online teaching, such as the

evaluation of existing network condition, the school policy, and the electronic library resources are below the "overall evaluation".

### 3.2    Online live broadcast as the main teaching form

*Online teaching in emergencies is an online version of offline teaching.*
During online teaching, most teachers use a mixture of online teaching resources, online live broadcast, group interaction and offline immediate guidance to maximize the completion of teaching tasks. Teachers, such as attendance check, on-site answer questions, free talk, and homework circulation, have adopted a variety of interactive online teaching methods and so on. While teachers provide materials for students to study on their own, Q&A sessions and live broadcasts are used frequently, compared that MOOCs and recorded broadcasts on the platforms and other existing online courses are less frequently used. However, whether live, recorded or existing online courses, the essence of them is still the "online version" of offline class. How do teachers think about their own online teaching? The survey divided teachers' online teaching activities into 13 dimensions. Out of these, teachers gave the highest self-assessment of dimension "submit/modify teaching materials (such as PPT)" with the mean 4.18, and next in turn is "assignments, marking and feedback of homework online" (4.10), "recommend electronic learning resources to students" (4.05), "organize online teaching effectively" (4.01), "interact with students through the various kinds of platform" (4.00). Dimensions "record and broadcast by using electrical tools" and "use data to analysis and track students learning behaviour" got the mean value below 3.7. Utilizing the online teaching platform for teaching (live or recorded) is still the main online teaching activity. While interacting with students is mainly related to homework, such as online assignments, collect, grade and feedback. It can be recognized that teachers still take the common methods they commonly used in traditional classroom teaching in online teaching.

*Interaction between teachers and students during online teaching is insufficient.*
The disadvantage of live broadcasting is that teachers cannot see students directly; they cannot recognize how the students grasp the knowledge by eyes like offline teaching. Therefore, it is significant to combine live broadcasting with interaction. Whether online or offline teaching, the interaction between teachers and students in class is an important link in the teaching process, which has to be verified along with the teaching effect. However, since online teaching is completely new for most teachers, they are still exploring the usage of online teaching platforms and teaching formats. During the live streaming, a teacher becomes the pure "network anchor". Without an effective interaction with the teacher, it is difficult for students to pay attention to the teacher continuously, therefore the teaching effect would not be guaranteed.

For example, slightly more than 50% of students consider the effect of each link of teachers' online teaching as good or very good, and another 40% as average. The difference of the mean value among each dimension ("class live broadcast", "class record and broadcast", "text audio", "communication and interaction with teachers in and out of

class", "e-leaning resources", "submit homework online", "feedback for homework", "mutual help and discussion among students" and "use various online learning tools") of students' evaluation is not particularly significant. 53.9% of the Students consider the effect of "communication and interaction with teachers in and out class" as good or very good. Even some students who are ashamed to communicate with teachers face-to-face prefer to communicate with teachers online. However, nearly 50% of the students think that their teachers cannot immediately "understand and realize the learning status of students" and they cannot "recognize how students grasp the new knowledge" as the shortcoming of online teaching. The interaction between teacher and students in online teaching is more active, and students speak more open than in traditional classes. However, this does not achieve the desired effect. The reason appears that frequent barrage and numerous group chats will lead to low interaction efficiency. It is difficult for teachers to pay attention to students' learning feedback and give effective evaluation in time when too much chatting information come out in short time, which also increases the difficulty for teachers to control students' learning dynamics and classroom participation [CC20].

## 3.3     Effective teaching process as the focus of students' teaching satisfaction

Data showed that the majority of students is overall satisfied with teaching. According to the regression analysis of some questions, the regression coefficient value of satisfaction of items "online course design", "teaching process" and "teaching assessment" is 0.271 (p = 0.000 < 0.01), as well as "teacher could focus on the key points, solve the difficult contents, lecture proficiently and clear" is 0.204 (p = 0.000 < 0.01). The regression coefficient of "teaching interaction and effect" (like "teacher guides the student to interactive with each other effectively, and the students respond positively, the teaching effect is good") is 0.07 (p=0.000<0.01). The regression coefficient of satisfaction of "teachers' teaching attitude" is 0.280 (p = 0.000 < 0.01) which shows that the students pay more attention to the teacher's high-efficiency teaching process. Despite the fact that 79.07% of students consider that the teaching materials as PPT, e-books, videos from their teachers are very helpful for their study, which shows that students paying no longer attention to e-learning materials, even though they are an indispensable auxiliary teaching tool for online teaching. Students pay more attention to the rich teaching process, efficient teaching interaction and effective teaching feedback, which are the key points to improve the teaching satisfaction in student' s side.

By analysing the key words in answers to the question "do you have any constructive suggestions or requirements for teaching", the highest occurrences of words are "interaction", "speed", and "communication". Thus, students still pay more attention to the completely teaching process. However, online teaching increases the sense of separation between teacher and students actually, the teacher could not be able to see the students' feedback. Under the guarantee of the knowledge dimension therefore, teachers should be appropriate to explain a little slower, focus on the key points, solve the difficult contents, and especially often organize students to participate in online learning activities, discussion, or inquiry learning. To find an efficient online teaching mode that is both

suitable for teachers and their students, teacher should enrich online teaching mode, enhance effective interaction between teacher and student [We20].

### 3.4    Degree of complexity of teaching contents and students' understanding

The chi-square independence test results show that students who feel that online teaching knowledge is easy to understand and online learning is easy to accept have higher satisfaction with the final learning effect. Specifically, 95.6% and 71.7% stated to be satisfied (or very satisfied) with the learning effect in groups of students who understood all or most of the knowledge. In contrast to only 3.6% and 5% of students who stated to be satisfied with their final learning effect if they only understood a little or no at all the new knowledge. In addition, 98.2% and 83.3% of the students stated to be satisfied with their final learning effect in groups of students who were satisfied or very satisfied with the complexity of the knowledge. In contrast to the group who feels unsatisfied or very unsatisfied with the complexity of the knowledge, or we say who think the learning contents difficult is, only 0.0% and 4.6% respectively satisfied or very satisfied with their final learning effect. This result fully indicates that the difficulty of teaching content and the degree of students' understanding of knowledge should be strengthened and enhanced. Teachers should provide a clear plan in online teaching, and the students' understanding should be paid more attention to. Considering the particularity of online teaching, teachers should be fully prepared for difficult courses.

### 3.5    Learning environment at home

The main factors affecting the use of online learning platforms are "unstable online learning platform, easy to be stuck, dropped line and noise". In addition, "limited learning environment at home" is also an important factor that cannot be ignored. Compared with the fixed and good learning environment in class, more uncontrollable factors affecting students' attention in online learning environment. Learning in the classroom means a strong influence on the learning atmosphere as well as teachers' supervision, while the home environment, including family members' activities, affects online learning at home. Without a disciplined classroom atmosphere, students' initiative, enthusiasm, attention, and friendliness of teacher-student interaction at home would be impaired. Moreover, study at home implies greater autonomy, which means that students must have good motivation and self-discipline to complete the study. In the survey, students (over 80%) considered their "autonomous learning ability" and "good online learning behaviour habits" as the most two important factors that affect [LZ20].

Some students have problems with distraction; such as "I can easily lose concentration in class without the teacher's supervision"; "the learning environment at home often interrupts my study". Therefore, a good family learning environment is particularly important. Colleges and universities should pay more attention to the cultivation of students' learning skills, such as awareness, methods, monitoring and self-motivation of autonomous learning while focusing on knowledge transmission. Successful education

cannot be separated from students' self-education. In this sense, the key point of both offline and online teaching is to cultivate students' autonomous learning ability.

### 3.6    Factors influencing the online teaching effect

*Students pay more attention to the advantages of online teaching.*
Both students and teachers need time to get used to from offline to online, and the teaching effect therefore needs to be further tested by time and practice. Effective online teaching comes from the learners' clear understanding of independent learning, to carry out student-centred curriculum setting, learning design, learning material preparation and learning activity organization. The design process of online teaching will influence its quality. In online teaching in emergency, teachers lack the correct understanding of online teaching, nor do they carry out rigorous and systematic instructional design. Therefore, their online teaching practice fails to adapt to the characteristics and needs of students, the teaching effect is not ideal [MW20]. Compared to the effect of face-to-face classes, teachers have no clear views on the effect of online teaching. In the students' evaluation, the mean value of "overall satisfaction with online teaching" is 3.53. Among them, the item "effect is worse than traditional offline teaching" got the highest average value with 3.18. It indicates that students are overall not satisfied with online teaching. Moreover, there is little difference in the value of students' evaluation, which indicates that online teaching quality still needs to improve. Although students are not sure about the effect of online teaching, they still think that the benefits of online teaching outweigh its drawbacks: the average value of students' evaluations on the positive and negative aspects in online teaching is both above 3.00, while they rate the advantages of online teaching slightly higher than the disadvantages.

## Various factors jointly affect the online teaching effect.

According to the mean value analysis of students and teachers' answer, the impact factors from high to low can be roughly divided into five dimensions:

- Teachers believe that the students' ability had the greatest influence on the online teaching effect, such as "autonomous learning ability, good learning habits, active participation consciousness, etc." (mean value 4.65). This fully demonstrates that online teaching can reflect students' subjectivity so that it is conducive to teachers to guide students to study autonomously. Different from traditional classes, the independent learning ability of students and the consequences caused by uncertain environmental conditions must not be ignored.

- The second factor is teacher quality (mean value 4.53), such as teachers' attitude and energy for teaching, teachers' educational strategies and methods. This indicates that teachers already realize that teaching is a bilateral activity where teacher and student interact. Thus, teachers' personal teaching ability and quality will directly affect the teaching effect and the quality of education, including talent training in universities.

- Third, school policy, software and hardware support (mean value 4.42) show an effect, such as function and stability of online teaching platform, teachers' and students' physical online learning space, terminal equipment support, the school's support policy for online teaching, speed and stability of network, suitable online teaching curriculum and content, technical services, etc. This underlines education as a relatively independent subsystem, consisting of teachers, students and educational intermediaries (like policies and infrastructures).

- The fourth dimension is technical trainings (mean value 4.33), such as teachers and students' familiarity with teaching platforms and tools, e-teaching resources for courses, etc. Whether teachers and students receive training on online teaching or not and whether they have enough knowledge or not are important factors for the smooth progress and the outcome of online teaching. The survey revealed that 80% of teachers received training on online teaching, and more than 66% of them believed to be proficient or very proficient in using the relevant online teaching platform. This provides a good support for teachers to carry out online teaching.

- Fifth, educational evaluation and classroom discipline and management (mean value: 4.08) shows an affect, such as choosing appropriate evaluation methods, controlling and maintaining classroom teaching order, and providing a certain number of teaching assistants.

The impact factors of online teaching effect from the students' side are consistent with teachers' evaluation. Not every teacher was able to master online teaching related methods and strategies in a short time, resulting in some online courses with a poor online learning experience, which indeed affects the quality of teaching and learning.

## 3.7    Obstacles, difficulties and problems in online teaching

*The current online teaching still has problems from different aspects.*
The root cause of the problems or difficulties lies in the fact that teachers do not really understand the nature of online teaching. Online teaching is essentially the online version of offline teaching, which is to reproduce on-site classes through the Internet. Some teachers will adjust their teaching according to the change of teaching environment, but they use the teaching methods that they familiar with in traditional class. Some teachers try to use teaching resources and learning management platform to organize and implement online teaching. Only a few teachers define the characteristics of learning clearly, design learning resources and activities for this purpose and organize teaching in line with the characteristics of online learning [MW20]. The items of "Problems in Online Teaching" show an overall mean of 3.49. Teachers believe that "the nature of teaching content", "students' learning ability and maturity of information technology" are the main problem fields in online teaching. With the highest mean value (3.97), they consider that some contents are not suitable for online teaching. Second, students have weak independent learning ability (3.89), students do not own good online learning habits (3.84), coupled with the network speed and platform instability (3.79), which result in

poor classroom teaching order (3.70) and not enough participation and interaction of students (3.69). Other aspects, such as "students' and teachers' equipment support", "educational evaluation methods", "teaching strategies and methods", "teachers' and students' proficiency in the teaching platform", "e-learning resources", and "the school's online teaching support policy" were all lower than the average value of 3.49. The lowest item of teachers' evaluation is "teachers' teaching attitude and insufficient teaching contribution"; only less than 40% teachers consider it as a problem. From that, we will learn that teachers have invested considerable energy and contribution in online teaching.

Teachers are quite positive about online teaching. More than 45% will continue to use online teaching after the pandemic, while only about 20% still stick to offline teaching. However, more than 70 % considered a mix of online and offline the best way for future teaching. [Su20] listed 18 possible Suggestions for improvement, whereof each description is consistent with the existing problems above. The average value of 17 items is above 4.07, except for the item "offer teaching assistants for courses" indicating that teachers have high expectations for the improvement of current online teaching. The average value of the teachers' overall evaluation of the 18 improvement suggestions is 4.28. Teachers believe the necessary improvements should focus on strengthening the guidance of students' learning, namely improve students' autonomous learning ability (4.51), guide students to develop good learning habits (4.49), and further improve students' participation in class (4.42). Secondly, improve the teaching content (4.43) and teaching resources (4.41), and improve the stability of the existing teaching platform (4.42). The third is to strengthen the available technology such as hardware facilities (4.33) and increase policy support (4.32). Finally, strengthen the training of teachers and students (4.07 resp. 4.23), and encourage teachers to put more effort on teaching (4.09).

*Teachers still face certain pressure from "offline" to "online".*
During the pandemic, many colleges and universities have prepared for teaching and learning actively by providing training and some practical support to teachers. They have provided various forms of training, including customized courses based on the company, live Q&A training and sharing with online teaching experience. Most colleges and universities have provided training with equal emphasis on professional skills and teaching methods. However, teachers are not satisfied with their current knowledge and skills related to online teaching and think that they need further training and improvement. The survey described the biggest challenges in online teaching (OT) teachers may face as seven aspects and each challenge ranged from high to low with the following values:

(1)  "Need to change the teaching strategies and methods in OT" (mean value 4.01);

(2)  "Need to change the old teaching habits in OT" (3.96);

(3)  "Need to change the teaching concept in OT" (3.96);

(4)  "Need to learn various kinds of educational technology in OT" (3.95);

(5)  "Blurred boundaries of time and space in and out of classroom in OT" (3.92);

(6)  "Increase burden of teaching workload in OT" (3.88);

(7)  "Increase the psychological pressure in OT" (3.56).

In the mean value, all seven dimensions are higher than 3.5, which shows that online teaching still gives great challenge to teachers. Although more than 81% of the teachers had some training on online teaching before the pandemic, there is certain difficulty for teachers to master and improve their skills and ability in the short term. We may conclude that universities should provide teachers with continuous systematic training and mentoring, especially for teachers who are less prone to technology; it is possible to provide young teachers as teaching assistants for this group.

Teachers are overall satisfied with self-evaluation. They consider that they can complete the online teaching related activities and tasks, such as "submit/modify teaching materials", „online assignments, marking and feedback of homework", "recommend students using a variety of electronic learning resources", "organize online teaching effective and maintain the teaching order" and "interact with students through various platforms", etc. In these items, teachers gave higher self-assessment than the mean value for "overall self-evaluation" of 3.88.

In contrast to this, teachers gave for several items an evaluation below the mean value:

- "Control the rhythm of class to avoid excessive fatigue of students",

- "Appropriate teaching strategy to improve student's attention",

- "Design appropriate and effective online teaching plan",

- "Use a variety of test or evaluation tools for course",

- "Use the online data to analyse and recognize students learning behaviour",

- "Record by using technical tools".

This indicates that teachers have the corresponding technical knowledge and skills of online teaching overall, but there is still room for teachers to make efforts and improve in teaching art, teaching strategies, teaching evaluation, teaching reflection and other aspects.

## 4    Summary and reflection

Although the pandemic has promoted the pace of online teaching, it cannot completely replace traditional teaching, and it still has some drawbacks. According to the analysis above, we find that online teaching especially during the emergency period still has deficiencies in technology, curriculum, teacher quality and students' ability. Chinese

studies also showed that especially students with disabilities are affected by the Corona situation. Some benefit from the flexibility of online learning, but many suffer from missing competencies (e.g., self-management, self-organization, self-discipline – especially for students with psychological burdens) or from missing aids (technical or social support). How do these group of students benefit from the educational media technology? We should consider how to promote and enhance the accessibility of educational media technology, so that any individual, including physically handicapped individuals, can use the media effectively from their own side. Media inclusion is a hierarchical concept with varying degrees, including four different levels, namely availability, accessibility, usability and digital literacy. [LL13] We should consider how to combine these four aspects with online teaching in university to provide better support for online teaching from the perspective of media educational technology. In addition to technology, teaching reform of colleges and universities involves many aspects, such as building a stable and efficient online teaching platform, strengthening online course planning and teaching design, carrying out teachers' information literacy training, and cultivating students' independent learning ability and so on. Although most universities have started online teaching, it remains to be seen whether online teaching will become a part of daily teaching in some universities or some courses after the pandemic. Anyway, online teaching is one of the important directions of future education reform.

## 5    Acknowledgements

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