



Discussion on Online Teaching Reform of Higher Education in Post-Epidemic Era

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Abstract

The outbreak of the novel coronavirus has had a great impact on the teaching of higher education, which has shifted from offline teaching to online teaching. At the end of 2022, the country relaxed its control of the epidemic, and since then it has entered the "post-epidemic era". Although the policy has been adjusted, the impact of the epidemic on the education sector continues. In this era, it is very necessary to explore the characteristics and existing problems of online teaching of higher education during the epidemic period, and timely summarize the work of current and future higher education teaching. After sorting out the previous research results, this paper takes the learners and teachers who participated in online teaching activities during the epidemic period as the research objects, explores the overall situation of online teaching through questionnaires and other forms, and puts forward feasible suggestions for improvement on this basis. It is hoped that the research and writing of this paper can provide reference for the research on online teaching of higher education in the "post-epidemic era" and the organic integration of online teaching and offline teaching in the future.

1. Introduction

In 2020, the novel coronavirus broke out globally. As a result of the severe spread of the epidemic, economic, cultural and educational exchanges all over the world came to an abrupt end, and working and studying at home became the norm. In order to open on time, most higher education institutions have had to switch from traditional face-to-face teaching mode to remote online teaching. Online teaching through the Internet can adopt multiple teaching modes such as one-to-one live teaching, one-to-many live teaching, MOOC teaching, recorded teaching, and O2O teaching, which are not restricted by time and space, and have great flexibility and convenience, and can solve the theoretical teaching problems of most courses^[1]. The change of teaching methods has prompted education researchers to reflect on the limitations of offline education in the past, providing new opportunities for the popularization and development of online teaching^{[2][3]}.

In early December 2022, The State Council issued 10 epidemic prevention policy, marking China's liberalization of restrictions on the epidemic and ushering in a relaxed "post-epidemic era". Despite the epidemic has passed, the impact of the epidemic on the education industry continues. There have been many studies on education and teaching reform in the "post-epidemic era"^{[4][5]}. One view is that the "post-epidemic era" will accelerate the integration of online and offline teaching, home based and school based learning, and on-campus and off-campus education, and will reconstruct of teaching values, teaching structure, teaching order and teaching culture, and ultimately will usher universities into a new era of both online and offline education^{[6][7]}. There are also other views that the large-scale online education practice during the epidemic period, although there are problems with insufficient technical skills of teachers in online education and the need to strengthen students' autonomous learning ability, but at the same time, it also presents a new educational teaching form with flexible teaching and active learning as the basic characteristics^[8-10].

From the above two viewpoints, it can be seen that existing studies mainly focus on the macro trend of future education and teaching methods, and less analyze how to integrate the shortcomings exposed by the education system

during the epidemic from the micro perspective, lacking practical suggestions. In this context, this paper adopts research methods such as questionnaire survey method (note: designing two questionnaires, one for students, and one for teachers. The two questionnaires are distributed to learners and teachers of a certain major participating in online learning and teaching in our school through online means such as questionnaire stars and WeChat, and the questionnaire is finally collected), classroom observation method (through the platform, entering the classroom, observing learners' online learning and teachers' teaching), and other research methods, conduct an integrated study of online teaching during the epidemic period, and provide substantive measures aimed at the characteristics and existing problems of online teaching, with a view to providing a supplement and reference for the development of online teaching in higher education in the "post-epidemic era".

2. Overview of online teaching in the epidemic period

2.1 Changes of higher education teaching model in the epidemic era

Before the outbreak of the novel coronavirus, offline teaching was the main teaching mode, and online teaching, as a useful supplement to offline teaching, belonged to the "minority". During the epidemic period, teaching has shifted to online teaching, using the online education resources and teaching experience accumulated during the epidemic period, combined with offline teaching, and its status is increasingly prominent. At present, we cannot accurately determine whether online teaching is just a substitute for traditional teaching mode under the special circumstances of the epidemic, or whether it is expected to become the new normal of teaching mode in the future. However, no matter how the future trend develops, the profound impact brought by the outbreak of this global event does reflect the fact that the traditional teaching model lacks the ability to cope with the crisis, but also reminds us of the urgency and necessity of reflecting on "how to promote the diversification of teaching model".

2.2 Main characteristics and existing problems of online teaching during the epidemic

The epidemic has brought a crisis to education, but the crisis also breeds new opportunities. Online teaching not only has its own advantages and characteristics, but also conforms to the teaching rules. Although it has made up for the inconvenience brought by the epidemic, it also has some problems.

2.2.1 Relying on network technology to implement teaching, not limited by time and space, puts forward higher requirements for the comprehensive ability of teachers and learning subjects: during the epidemic period, online teaching focused on the development characteristics of the "Internet Plus" era, took the increasingly mature information technology as the development basis, combined with stable network and efficient audio and video equipment to carry out teaching. Compared with offline teaching, which requires a fixed location and time, online teaching can realize the ability to listen to the lectures of famous teachers anytime and anywhere as long as there is a network. Therefore, online courses are not limited by time and region, and online courses can also be watched for unlimited times, which is convenient for the consolidation of knowledge.

In the implementation process of online teaching, whether it is the selection of teaching courses, the establishment of classroom links, or the development of teaching and learning activities, all need to rely on network technology. In this case, higher requirements are put forward for the ability of teachers and students to use multimedia technology, the ability to deal with necessary network emergencies, and the ability of background network maintenance.

In addition, during the epidemic, teachers can choose a variety of teaching platforms, such as Tencent Classroom, Dingding, wechat, QQ, and so on. The functions of each platform are different. Teachers may choose one of the platforms to teach according to their personal preferences, or the same teacher may choose multiple platforms to teach, assign homework and answer questions. Switching platforms frequently can make it more difficult for students to use them and can also cause confusion. Students do not know which platform is used for the course, which will undoubtedly increase the psychological burden and seriously affect the teaching effect of online courses.

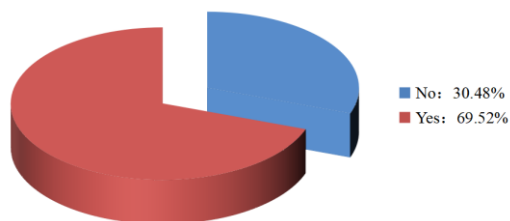


Figure 1 Whether students can proficiently use the online teaching platform

As can be seen from Figure 1, quite a few students are unable to proficiently use the learning platform. On the one hand, it means that students' ability to operate network

equipment needs to be improved. On the other hand, it means that schools or teachers need to choose teaching platforms that are more suitable for students' learning.

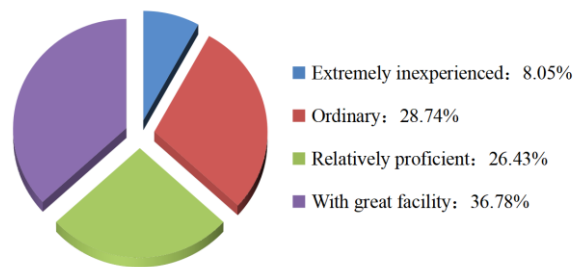


Figure 2 Shows whether teachers can proficiently use online teaching platform

Before the epidemic, most teachers were used to traditional classroom teaching and rarely used online teaching platforms. After the outbreak of the epidemic, most of the teachers had to use the online teaching platform to teach. Although they could complete the basic teaching tasks, it can be seen from Figure 2 that more than half of the teachers had not mastered the skills of using the platform, which indicates that the overall level of teachers' ability to master and use modern teaching equipment needs to be improved.

2.2.2 Subjective learning is more autonomous, and it is difficult to ensure the same quality and effect online and offline: the epidemic has changed students' traditional learning methods, which are mainly arranged by teachers, from offline to online. In the process of online learning, students are more dominant and central. In selecting courses and determining learning content, students often have more initiative. They can easily access various teaching platforms, listen to courses, and choose courses that suit their personal needs. Students' clear learning objectives will enhance their enthusiasm for learning, thus promoting the completion of learning tasks.

Since teachers and students are located at both ends of the network during the teaching of online courses, teachers can only rely on learning platforms, social software, communication tools and other tools to keep in touch with students, and teachers' control over students is reduced. This makes it impossible for teachers to notice students who are in poor learning status in time and provide targeted guidance. At the same time, the learning mode of "home based learning" "encourages" the laziness of students to some extent. Students' learning status is uneven. Some students just finish the action of scanning the code for class mechanically without really participating in the learning of the course.

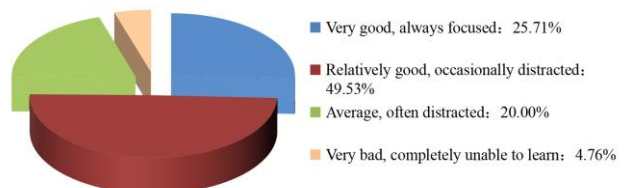


Figure 3 Concentration level

Figure 3 shows that most of the students think that they have a good learning effect in online learning, but they occasionally become distracted. There are also many students think that their attention is very concentrated, and only a small number of students can not concentrate all the time, and the learning effect is not good enough. Figure 4 shows the reasons for students' inattention through a questionnaire survey.



Figure 4 Reasons for inattention

2.2.3 Online teaching meets the theoretical teaching needs of most courses, but application-oriented courses lack the necessary "scenarios": although the learning effect of theoretical knowledge can be achieved by mobilizing students' learning enthusiasm, applied higher education pays attention to the scene, and the improvement of students' abilities in practice and skills still requires accessible practical scene. Therefore, in face of the change and prevalence of this online teaching mode, application-oriented higher education institutions that advocate the combination of theory and practice are in a more passive position in the process of adapting to this new teaching mode.

For the instructors, only through the face-to-face teaching mode can the theoretical education and practical education be combined to achieve the expected teaching objectives. For students, practice place is an effective place to tap their potential and put what they have learned into practice. On the premise of having a certain theoretical knowledge foundation, practical learning can help students to go beyond classroom experience, explore practical ability, and develop professional ability to effectively deal with unconventional problems, so as to better connect with their future careers.

2.2.4 Virtual online teaching improves the sharing of educational resources, but it also has the risk of homogenization of higher education: from books to MOOCs: the emerging teaching and learning mode of higher education transcends the limitations of countries, nationalities, time and places, allowing famous schools, teachers and courses to span time and space; To some extent, Moocs have enhanced learners' right to receive high-quality education, relieved the contradiction of regional imbalance of high-quality educational resources, and greatly deepened the sharing value of high-quality educational resources, which is the advantage and charm of virtual teaching. However, overemphasizing and promoting the advantages of online teaching may lead to the gradual homogenization of higher education. With the rise of MOOCs and the prevalence of network teaching, the original diversified teaching model will likely be unified, and

eventually lead to the blurriness, weakening or even gradual disappearance of heterogeneous concepts and cultural characteristics, which is a defect that cannot be ignored.

3. In the post-epidemic era, "five measures" have been adopted to promote online teaching to the new normal

3.1 Choose suitable online teaching platforms to improve teachers' online education and teaching abilities

Schools or teachers should do a good job of demand analysis and market research before choosing to use the teaching platform, and try to choose the online teaching platform with high service quality and good reputation. When the system malfunction occurs, the platform operator can quickly solve the problem to avoid affecting the teaching progress. At the same time, teachers and students should also do a good job of psychological construction, cultivate their ability to use multimedia technology, maintain the background network, and have the necessary ability to deal with network emergencies.

Secondly, the teaching platform selected by teachers should be able to meet the professionalism and particularity of the class being taught. It can not only play audio and video smoothly and upload learning materials, but also have the function of online submission and correction of homework. In addition, there should be a group discussion area, which is convenient for teachers and students to communicate and interact. Only a platform with rich teaching modes can play an effective role in helping students to learn and provide a guarantee for teachers to realize blended teaching, so as to realize the teaching effect of "one plus one" greater than "two".

Finally, the online teaching mode during the epidemic highlights the importance of information and communication technology, and also indirectly exposes the deficiency of teachers' online teaching abilities. For teachers, only a small number of them have the experience of building online courses after the outbreak of the epidemic, and most of them were hastily put into the role of anchors by "grinding their guns" or "being pushed onto the shelves". About two-thirds of the teachers proposed that in the post-epidemic era, targeted training should be provided for teachers, and a series of relevant online training courses and corresponding standards should be developed to adapt to future online teaching. These standards and courses not only meet the needs of the moment, but also focus on creating a highly personalized online teaching model in the future.

3.2 Maintain the flexibility of online learning and implement differentiated teaching

The online learning environment and characteristics during the pandemic have promoted the flexibility of online learning and required teachers to implement differentiated teaching. On the one hand, the online learning environment requires the maintenance of learning flexibility. There are many factors that restrict synchronous teaching in online learning at home, such as online learning technology, ability, equipment, and parental guidance level; On the other hand, online learning involves reading a large amount of reference

materials and practical operations. For example, teachers simply transplant offline teaching mode to online teaching by using video conference platforms such as Zoom, which will inevitably make learners feel stressed and weary of learning.

The effective way is to decompose the learning content into a series of question modules on the premise of meeting the teaching objectives, give students some choice, allow them to set their own learning progress, and show their learning results in different ways. Try to solve the preset learning problems, and the role of teachers has also changed from knowledge imparters to curriculum facilitators and instructors. According to their needs and interests, students can access the corresponding online resources, and can also interact and exchange with the instructors who provide learning resources separately. The process of teacher-student communication is the process of teachers implementing differentiated teaching.

3.3 Strengthen the supervision of online teaching, improve the curriculum design, and strive to ensure the same quality and effect

At present, both official and unofficial online learning platforms hope that online and offline teaching will be of the same quality and effect, but there are differences in reality. The fundamental reason for this situation is that online learning puts forward higher requirements for students' self-adaptation ability and learning motivation. However, students are prone to interference in the process of online learning, and teachers cannot timely supervise them.

To change this situation, teachers should adopt a variety of teaching methods in the teaching process. For example, they can simulate the communication environment according to the content of the textbook, increase the interaction between teachers and students, encourage students to participate in the class by "leaving a message" or "raising their hands to speak on stage" in the discussion area, and create a good learning atmosphere. Guide learners to speak more and practice more, reduce the phenomenon of students' inattention, so that the teaching is carried out in a relaxed and pleasant chat. In the interactive section, the teacher is the organizer, guide, participant and evaluator of the interaction. In addition, teachers can record students' speeches, which not only keep students' enthusiasm and enthusiasm for learning, but also effectively strengthen classroom supervision and management.

Finally, as teachers under the environment of the epidemic, it is necessary to improve their own literacy and ability. By studying the teaching interaction records left on the network, analyzing their advantages and problems in the teaching process based on educational laws, as well as the absorption and shortcomings of students in the learning process, improving the course design, enriching the teaching methods, and respecting the characteristics of students' online learning, transforming the teaching of "emergency situation" in special periods into normal teaching and designing the online courses, rather than directly transplanting the traditional courses to the network.

3.4 Increase the diversity and flexibility of teaching models

Advanced information technology can support the teaching from an abnormal state to a relatively normal state,

helping us to ease contradictions. Therefore, the epidemic crisis is actually an opportunity. The teaching activities concerning "scene" training practical ability still require traditional face-to-face teaching as the main approach, supplemented by virtual online teaching. The reason is not only to consider the impact of physical existence such as practice place on the achievement of educational goals, but also to avoid the increasingly serious homogenization of higher education in the long run.

Taking this opportunity, we can think about how to improve the diversity and flexibility of teaching mode, and make some new attempts in developing the diversified combination mode of teaching and learning. Based on the existing references^[11] and many years of teaching experience, the author believes that the following combination model can be tried.

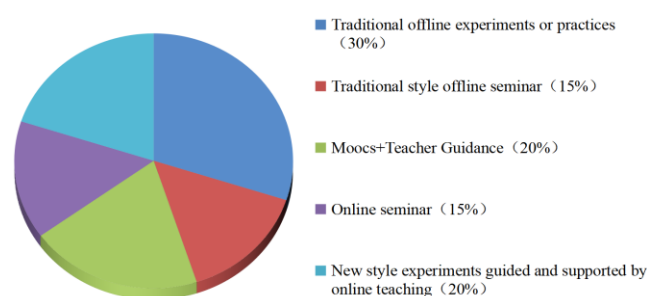


Figure 5 Mixed teaching and learning models

Specifically, a diverse hybrid teaching model can be consisted of five parts.

(1) Traditional style offline experiment or practice (30%): pay attention to the scene of the experiment or practice place, focus on explaining and demonstrating the experimental operation, explain in detail the precautions for the experiment and summarize the errors and wrong operations that are prone to occur in the experiment. Offline experimental teaching should focus on the parts that can not be completed in online experimental teaching. By asking questions about knowledge points, teachers can timely understand the students' mastery of experimental knowledge, and make up for the gaps.

(2) Traditional style of offline seminar (15%): suitable for a small number of students, which helps them to participate in the discussion and thinking. In order to avoid plagiarism and perfunctory phenomenon of individual students, teachers should set multiple different topics for students to freely choose according to their own interests, so as to realize personalized teaching. Students can also learn new techniques and applications from other students' designs by reporting on the course. During the presentation, the teacher should also comment on each group of students' designs, pointing out their strengths and weaknesses.

(3) MOOCs + teacher guidance (20%): Before class, the teacher collects relevant course materials, makes PPT courseware and records MOOC videos, and then upload them to the MOOC online learning platform. Students log in to the online learning platform according to the course schedule, watch MOOC videos, browse text materials, and complete self-learning tasks. Each MOOC video is accompanied by text materials that explain the theme, objectives, and knowledge

points of the lecture content to students, assist them in completing individual or group learning tasks, and allow students to communicate and discuss with each other on online platform.

(4) Online seminar (15%): Questions and discussions can be conducted on difficult points in simulation experiments to enhance students' initiative in independent learning and promote communication and thinking.

(5) New type experiment (20%): It is necessary to change the experimental result-oriented to the experimental process-oriented, change the single experimental mode to the multiple experimental mode, carry out new types of experiments, and form the student-centered experimental teaching mode. Teachers conduct comparative teaching of theory and practice through online teaching guidance and support. Provide guidance on the basic concepts, design ideas, and implementation methods of problems that arise during students' experiments, and cultivate their ability to solve problems independently.

In the teaching development of higher education in the future, virtual online teaching modes such as MOOCs based on educational information technology will likely occupy a higher proportion. The diversified and mixed teaching modes listed above can not only promote the division of labor and mutual benefit between the traditional mode and the online mode, make up for the limitations of the online teaching mode in the context of epidemic prevention and control, but also promote the innovative development of the teaching mode of higher education.

3.5 Enrich the online teaching quality monitoring system

Assessment and evaluation are conducive to promoting curriculum construction, reform and development, and are effective means to improve teaching quality. In the "post-epidemic era", the teaching mode, teaching method and teaching content of higher education, as well as the students' learning method and content will keep pace with the times, and the corresponding teaching quality monitoring system should also be enriched and innovated.

(1) Teachers' assessment and evaluation of students' online learning effect

Relying on the online teaching platform, the teacher evaluates the progress of students in completing tasks, the completion of online homework and the results of group discussions according to the "learning output" target. At the same time, teachers should observe students' cognitive degree, foundation and learning ability in the teaching process, fill in students' learning log of each class timely after class, and conduct comprehensive summary and evaluation of students, which is helpful to understand the learning status of learners, coordinate teaching arrangements reasonably and efficiently, and ensure the quality of teaching.

(2) Students' comments on teachers' teaching

As students are the direct audience of teachers' classroom teaching, they have the most intuitive feeling of teachers' teaching attitude, teaching quality, etc. In order to improve the quality of talent training and strengthen teaching management, it is necessary for students to evaluate the teaching teachers. After the end of each academic year's course teaching,

students log in the course teaching platform and anonymously evaluate the teacher's teaching situation (teaching content, teaching method, teaching progress, etc.), and score each item separately. According to the feedback of students, teachers make appropriate adjustments, so that they know themselves and the other, and can better promote the development of teaching work.

(3) Peer evaluation of online teaching process

Colleges and schools organize senior teachers and teaching experts with rich teaching experience to set up supervisory expert groups to evaluate the online teaching effectiveness of courses according to the established "learning output" objectives. According to the feedback opinions of students and supervising experts, teachers should revise the teaching content of the course appropriately and improve the teaching methods.

4. Conclusion

The epidemic has forced higher education to quickly change its thinking and philosophy, give full play to the advantages of "Internet plus" education, adopt online mode of teaching, and strive to minimize the negative impact of the epidemic. With the continuous improvement of online education, online teaching mode may develop into an independent teaching mode in the "post epidemic era". In this situation, how to turn passive into active and find a new path suitable for the development of higher education teaching is currently a problem that the academic community should pay attention to. For this reason, this paper takes online teaching during the epidemic period as the research entry point, discusses the advantages and limitations of online teaching model in detail and depth, analyzes its shortcomings, and puts forward corresponding measures, which has certain practical significance for constructing the "new normal of online teaching in the post-epidemic era" and promoting new and more effective teaching methods reform and teaching innovation.

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