



Problem-Based Analysis of the Effectiveness of Online Education in China's Secondary and Primary Schools

A Reflection on the Online Education During the Pandemic

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Abstract. Blended learning, an educational approach that combines online and face-to-face components in the classroom, is becoming the basic mode of education in the future. The comprehensive online teaching during the COVID-19 pandemic in China in 2020 provides direct experience and lessons for blended learning. This paper first uses data collected from previous researchers' survey to analyze the problems faced by students and teachers in primary and secondary schools in western China during the pandemic and presents the typical problems in forms of percentage. It then accordingly studies the strengths and weaknesses of online teaching at secondary and primary school levels during the pandemic. Combined with the characteristics of secondary and primary school education, the author puts forward suggestions on how to improve the effectiveness of online teaching from the aspects of teachers' information literacy, students' psychological characteristics, online teaching design and emotional care, and home-school collaboration.

Keywords: Pandemic · Online Teaching · Teaching Effectiveness · Information

1 Introduction

During the novel coronavirus pneumonia pandemic situation, China's Ministry of education called for "suspended class, ongoing learning". Schools at all levels responded quickly, and the whole country began to involve online teaching with more than 2.65 billion primary school students and nearly 16 million teachers. This ensured that teacher education and student learning proceeded on the Internet, and the impact brought by the delayed start of new semester was reduced to minimum. It is of special significance in the context of China that students' learning and education should continue without physically going to school. It is necessary to explore the cooperation of family, school and society in the new situation, guide students to carry out meaningful learning in a purposed and organized way and pay attention to children's comprehensive and personalized growth [10]. Teaching and learning activities during the pandemic period are an

unprecedented challenge for teachers, students and parents. The number, scale and form of online learning are unprecedented, and the integration of information technology and teaching has reached an unprecedented level [3]. The integration of information technology into education and teaching has become the driving force of educational reform and innovation in primary and secondary schools. At present, most of the primary and secondary schools in China have resumed classes. According to *China's 13th Five-Year Plan for ICT in Education*, it has become an irresistible trend for primary and secondary education to promote the deep integration of information technology and school education, innovatively apply high-quality educational resources, explore effective teaching modes under the information environment, and promote information literacy, normalization, generalization and scale in education. The effective control of the pandemic situation and the resumption of school do not mean the end of online teaching supported by information technology. On the contrary, it is the right attitude for educators to fully summarize, analyze, reflect and improve the online teaching during the pandemic period, so as to promote the effective integration of information technology and education.

2 Teaching Reflections

Learning space changing from offline to online, it exposed all kinds of problems faced by online teaching and learning. Such a large-scale online teaching in the first half of year 2020 has formed a washback mechanism, which promotes the formation of online teaching and learning habits of teachers and students and provides a great opportunity to promote the educational reform in the information age.

In April 2020, Chinese scholars Zheng Zhiyong and Song Naiqing conducted an online survey about the real dilemma of online teaching in primary and secondary schools in western China [15]. They randomly distributed questionnaires on the Internet among 308787 teachers and 30562 students from 12 provinces in western China and collected 27759 samples for teachers and 301645 sample for students. The main findings are displayed in the Table 1, on which this research is mainly based.

Table 1. DILEMMA OF ONLINE TEACHING IN WESTERN CHINA SCHOOLS

Question items	Percentage of responses
Not doing well at online teaching IT software	51.4%
Lack of pedagogical knowledge of online teaching	38.1%
Students' low enthusiasm for communication in online class	55.6%
Very low learner autonomy	82.4%
Limited collaboration from students' parents	57.7%
Parents coaching and checking children's study	45.6%

2.1 Online Teaching Creates Favorable Conditions for Autonomous Learning and Inquiry-Based Learning

Acquiring knowledge is not only a construction process of accepting new knowledge, but also a process of discovery and creation. The teacher's duty is to guide students to discover and explore by themselves. Multimedia network equipment and technology is the best condition to promote students' autonomous learning. The Internet connection and hardware test during the pandemic period provides a good technical platform for secondary and primary school students' autonomous inquiry learning and creates a good condition and foundation for autonomous learning and inquiry learning, which, in essence, is to require us to implement a variety of activities to promote students' autonomous learning in secondary and primary school classroom teaching. As long as we pay attention to cooperative learning and create a relatively free and relaxed environment, we will have effective outcome from independent inquiry. During the pandemic, many teachers used online platforms such as Lejiao Lexue and 17zuoye to carry out pre-visit and course introduction activities, so as to allow students sufficient space for thinking, let students conduct independent knowledge exploration activities while developing students' cognitive structure in the coordination of doing, speaking and thinking.

2.2 Online Teaching Accelerates Teaching Feedbacks

Teaching is a process of multi-directional information exchange, which requires teachers to evaluate and adjust teaching according to the feedback of students' learning situation and learning needs. In teaching, teachers should not only observe the students' learning behavior in class, but also obtain the feedback gained through students' homework to generalize information about the students' mastery of knowledge, ability development and emotional experience in learning. In the traditional offline classroom teaching, there are some problems with the feedback, such as simplistic mode, lack of timeliness, insufficient participants and so on. The main reason is that quite a number of teachers lack the concept of timely feedback evaluation and the strategy of large-scale feedback evaluation, which affects the teaching effect and limits the full development of students [13]. A survey conducted by McCollum, Calder, Ashby, and Morgan in 1995 showed that students ranked feedback as the highest factor in determining course quality. Educational psychology research shows that the shorter the feedback time and the more appropriate the way are, the better the learning effect is. Timely feedback can better meet the expectations of primary school students to achieve self-value, so as to enhance their learning confidence and stimulate their learning motivation.

2.3 Online Teaching Promotes Home-School Contact but with Simplistic the Communication Content

China's obligatory education needs parents' engagement in particular. Parental engagement is seen as an effective strategy to ensure students' success, which is beneficial to a series of school related outcomes. Many studies have assessed the relationship between various dimensions of parental engagement and the improvement of specific academic achievements, including reading and comprehension scores, and vocabulary

and mathematics performance. Parents' engagement has a great influence on students' mathematics learning, including increasing learning motivation, improving performance and positive influence on attendance. More research shows that the wider the scope of parents' engagement becomes; the faster the children's reading performance improves. It can be seen that parents' engagement can create a good reading environment for students and avoid the mutual counteraction between family education and school education [14]. Various online teaching apps provide parents with intuitive statistics of students' learning records, such as attendance rate, classroom participation, homework completion, homework accuracy and other information. According to the information, parents have a more objective understanding of their children's learning and make corresponding responses, such as helping children review, check homework, make learning plans, etc.

Unfortunately, the content of interaction between teachers and parents is simplistic and narrow. Less guidance and evaluation are put on how to achieve students' ability and emotional goals, especially in the current pandemic situation, how to cultivate students' social responsibility and patriotism and core literacy [6]. Teachers' feedback is still focused on academic performance, and every little is on moral education, personal growth and school education concept. Similarly, parents contact teachers mainly for information about students' academic performance.

2.4 Online Teaching Increases Students' Academic Differences

Different from the traditional school learning, online learning requires a high degree of self-management and self-learning ability for students. Secondary and primary school students' psychological and mental development has not been fully developed yet. It is not easy for them to concentrate in class. Younger age may lead to more possibility of fatigue in the learning process. During the pandemic period, some whole live courses aggravated the students' fatigue and weariness. Online teaching teachers cannot timely monitor the learning status of each student and remind or intervene those students who are not focused and absent-minded in class. Those who are good at autonomous learning usually develop good learning habits and their learning effect will be more significant. Many other students, however, are absent-minded, tired and failed to homework and so on, leading to a big gap in academic performance between students. If this phenomenon is not paid attention to, the differences between students will be further increased.

3 Suggestions for Online Teaching

First, let's discuss findings and conclusions concerning teaching effectiveness in traditional classrooms. One of the most widely cited sources for teacher effectiveness in traditional classrooms is Chickering and Gamson (1987), who suggested seven principles as guidelines for good practice of faculty members, students, and administrators in undergraduate education. The principles include "encourages student-faculty contact; encourages cooperation among students; encourages active learning; gives prompt feedback; emphasizes time on task; communicates high expectations; respects diverse talents and ways of learning". If the power of the new technologies is to be fully realized, they should be employed in ways consistent with the seven principles [1].

Blended learning, an educational approach that combines online and face-to-face components in the classroom, is becoming the basic mode of education in the future. With the alleviation of the pandemic, the mere online teaching has been gradually replaced by the online and offline blended teaching. Teachers should study Chickering and Gamson's principles and sum up the experience and draw lessons from the online teaching during the pandemic period to make the principles operationally appropriate for research in online classrooms so that online teaching can better serve the offline teaching.

3.1 Developing Teachers' Professionalism by Enhancing Their Information Literacy

China's secondary and primary teachers mostly graduate from teachers' college and normal universities with focus on pedagogical and content knowledge. They gain information literacy from continuing professional development training. Information literacy covers information awareness, information knowledge and information ability. According to Zheng and Song's research, 46.8%, 22.7%, 38.4% and 42.8% of primary and secondary teachers from western China have a good command of skills like "resource sharing and collaboration", "study management system", "study results evaluation" and "use of excel" respectively. The improvement of teachers' information literacy not only directly affects the whole process of education informatization, but also is an inevitable requirement to conform to the development of information society and the trend of education development and reform. Secondary and primary school teachers should strive to improve their information literacy, learn basic educational technologies like courseware making, image processing, screen recording, audio processing, video editing, etc., and have a good command of at least one kind of online teaching platform. Excellent online teaching platform can feed back students' attention, overall test results, error types and other learning data. Teachers should learn how to analyze these data to make data feedback better serve teaching.

3.2 Studying Students' Psychological Characteristics to Align with Their Cognitive Development

Research suggests that the unknown element of the online students' characteristics makes designing appropriate delivery difficult [8]. Online learning meets higher dropout rates than traditional face to face class because teachers are likely to ignore students' cognitive level without timely communication and feedback. Cognitive load in learning occurs when the amount of cognitive processing required for the task exceeds the individual's processing capacity, resulting in reduced learning.

Secondary and primary teachers should study the psychological characteristics and the personality characteristics of their students. When designing online courses, they should give full consideration to students' cognitive level, concentration characteristics and memory ability. Learning is impeded in settings where there are excessive demands on working memory [7]. With the help of slides, online teaching presents in high cognitive load of knowledge, and students of low proficiency find it hard to comprehend and memorize.

In teaching, teachers should strengthen the guidance of students' autonomous learning methods, guide students to actively explore so as to improve their learning efficiency.

3.3 Keeping in Consideration Student Differences and Give Them Emotional Support

Online learning has been regarded as a means of meeting students' diverse needs [12]. These needs should never be limited to academic performance. They should include addressing individual differences in emotion which students encounter in the learning processes as well. Emotion is highly context dependent and situated in nature [4]. Students' may have quite different emotional performance in virtual classroom from real classroom. Teachers' empathy might promote students' motivation to learn online and improve the learning outcomes.

Secondary and primary school teachers should pay attention to students' differences and give them emotional support. A major problem for teachers is that students are different, they learn differently, and at different rates. Good teachers are concerned about individual differences of the learners such as physical characteristics, intelligence, perception, gender, ability, learning styles. Students present more individual differences in online classes. Some students are technically resistant, some students are bad at screen reading. Teachers should not only focus on the students with excellent learning behavior and performance, but also care for those students who have not adapted to online learning and are even resistant to this learning mode, so as to ensure the fairness of education. Integrating emotions into the instructional design and technology, teachers narrow the emotional distance between them and students.

3.4 Establishing Good Home-School Relationships

Home-school relationships and communication play an important role in promoting children's and adolescents' development and learning. Internationally, extensive researches have provided evidence of the positive correlations between parents' active engagement in their children's schooling and better outcomes and behavior of their children in school [2]. According to Zheng and Song's research, 16.3% of teachers communicate with their students' parents once a month, 8.1% twice a month, 8.1% even never. Collaboration between home and school is regarded as a difficult but an important task in online learning and should be particularly emphasized. Teacher can have surveys among parents to get understanding of their engagement. For instance, surveys can include questionnaires that involve questions about time spent on checking children's homework and attitudes towards children's failure in learning. This helps teachers understand parents' engagement and remind parents of their role in children's schooling. Teachers can conduct surveys among parents to see how much they are engaged in children's learning and what they think of the online tasks. By doing so, teachers and parents exchange ideas and parents know what they can do to contribute to their children's learning.

3.5 Designing Class Activities to Maintain Students' Participation

Attrition and absent-mindedness are two serious problems confronting online learning. Among other reasons, the fact that teachers cannot monitor the whole class all the way when teaching should not be ignored. According to a survey about data analysis of online class during the pandemic, 20.51% of the students think that the biggest disadvantage of online teaching is monotony and lack of interaction between teachers and students [5]. How can the teacher know the students are engaged is what teachers need to take seriously in lesson planning. In this case, teachers use frequent communication to ensure students' engagement. Interactivity is an essential characteristic of effective online communication and plays an important role in keeping message threads and their authors together. Interactive communication (online as well as in traditional settings) is engaging, and loss of interactivity results in a breakdown of the communicative process [9]. Teachers can use methods like random roll calling, challenging questions, group discussions, peer reviews and problem-solving tasks to for asynchronous instructor-student and student-student interactions. Problem-solving tasks have features that enable students to engage in subject related problems in their own ways. According to the authors observation, primary school students like peer reviews very much. Peer reviews can build up learners' confidence by their helping peers check the work. Teachers keep message threads with these activities and enhance students' motivation for participation in online learning.

4 Conclusion

Teaching effectiveness refers to how an instructor can best direct, facilitate, and support students toward certain academic achievement and satisfaction. Teaching effectiveness has been investigated extensively in traditional classrooms for more than seven decades [11]. Previous studies focused on the way teachers teach and students learn, how students work with one another, and how students and faculty talk to each other. Online learning, web-based and virtual classrooms that rely on diverse instructional technologies, requires different standards for teaching effectiveness. Teaching effectiveness in the digital context is an ideal status that all education stakeholders expect. Teachers, students, administrators and parents should all work together on cognitive presence, teaching presence, and social presence to achieve teaching effectiveness.

Acknowledgment. This paper was sponsored by the following two projects: Research Project Co-founded by College of Foreign Language Education and pigai.org (GPH21002); 2016 Education Reform Project of China West Normal University Pedagogical Practical Education Base.

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