

# Promotion of Urban and Rural Educational Equity Through Online Education: A Case Study on Three Schools

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**Abstract:** Under the guidance of social constructivist theory and by analyzing the interview materials of three schools, in this research, it was found that the level of education informatization in China was marked by significant imbalance between different regions, urban and rural areas, and the constructions of software and hardware before the outbreak of COVID-19; online education in the spring semester of 2020 has not narrowed the gap of education between different regions, urban and rural areas, and key and non-key schools, but instead, it has increased educational inequity in multiple dimensions. The differences in family education ability and informatization levels reinforced the unfair online education outcomes. It was proposed that in the future construction of education informatization, we should focus on meeting the needs of the construction of elementary and secondary schools in rural areas and less developed areas, investing in the construction of software, and improving the informatization literacy of elementary and secondary school teachers in rural and less-developed areas with a plan. We should also address the issue of educational capacity of parents and supporting facilities for families, and create a national mid- and long-term action plan to promote the gradual embedding of online education into the existing education system of elementary and secondary schools.

## 1. RESEARCH BACKGROUND

As a response to the impact of COVID-19, during the Spring Festival in 2020, China's Ministry of Education decided to postpone the start of the semester, proposing to "suspend classes without stopping learning" to minimize the impact of the pandemic on students' education. In response to parents' concerns about the delay in the start of the semester, on February 12, 2020, the Ministry of Education and the Ministry of Industry and Information Technology printed and distributed the Notice on Relevant Work Arrangements for "Suspension of Classes Without Stopping Learning" During the Delay of the Start of the Semester of Elementary and Secondary Schools. At the same time, in response to the call for "suspension of classes without stopping learning", schools at all levels nationwide have sought to principally fulfill their instructional responsibilities through online education. The teaching and learning process of tens of millions of teachers and hundreds of millions of students were completed online through distance learning, which was evidently unprecedented. The success of online education serving 180 million elementary and secondary school students in such a short amount of time is inextricable from the foundation laid in China over the past 30 years through basic education informatization, marked by the promulgation of the Outline of the General Plan of the National Education Management Information System in 1989. Since the Ministry of Education implemented the Ten-year Development Plan for Education Informatization

(2010-2020) in 2010, basic education informatization in China has started to develop rapidly. As of 2019, 98.4% of elementary and secondary schools (including unofficial school in rural areas) in China had network access, 90.1% of elementary and secondary schools had multimedia classrooms, and 10 million teachers participated in the "One Teacher, One Class" activity<sup>[6]</sup>.

However, before the outbreak of COVID-19, there were already some problems in promoting education informatization in elementary and secondary schools in China. For example, most teachers failed to understand the true meaning of education informatization and regarded it only as multimedia-enabled teaching, retrieval of network resources, and other conveniences. Also, information and communications technology (ICT) and classroom teaching, which should be coordinated, were disconnected in many elementary and secondary schools; the official website of most elementary and secondary schools had monotonous content and few functions, failing to play their part<sup>[1]</sup>. Due to these problems, the large-scale online education started in early February 2020 faced many serious problems in the implementation, promotion, and assurance of teaching quality, such as teachers and students who are unfamiliar with the use of tools for distance learning, inadequate support from Internet service provider, flawed course design, makeshift teaching contents and presentation methods, and students from poor families that cannot afford tools for distance learning. Education authorities, schools, teachers, students, parents, other supporting educators, platform operators, textbook authors, and

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researchers reacted quickly to the problems of online education in the initial stage, making adjustments or innovations in a timely manner and developing many ideas and innovation measures in an emergency. More importantly, under the pressure of the situation, in which people across the country worked together to fight against COVID-19, everyone involved responded quickly with a positive attitude, open mind, sincere cooperation, timely connection, smooth communication between upper and lower levels, continually reconsideration, and uninterrupted improvement. Because of such a supportive environment for teaching and learning process created by society, this online education application, which lasted for nearly five months, was described by the Ministry of Education as “a world-unprecedented large-scale online education experiment” [5].

The achievements of this “forced” educational revolution in the education informatization of elementary and secondary schools, the extent to which it reversed the unfavorable situation of education informatization before the pandemic, the aspects in which the integration and innovation of ICT and education were realized, the formation of new informational educational resources, and the problems that remained to be solved were obviously of concern. However, this research was more concerned with whether this online education application for elementary and secondary schools can play its role in promoting educational equity, as set out in the Ten-year Development Plan for Education Informatization (2010-2020). This problem was proposed in part because in May 2020, when summarizing the experiences of online education during the pandemic, the Ministry of Education noted that online education still had “significant problems such as inadequate support from Internet service providers, insufficient systematic high-quality digital educational resources, teachers’ poor ICT applicability, and insufficient interaction and emotional exchange between teachers and students in online education.” [15] However, the ministry did not mention whether online education had the potential to promote educational equity.

## 2. RESEARCH SIGNIFICANCE

The unequal distribution of educational resources has been China’s most significant educational challenge for a long time. Although online education has potential advantages such as high-quality teachers, new teaching methods, forward-looking, a large body of knowledge, repeatability for viewing, and unrestricted by time and space, it is of great significance to research on the utilization of new technologies and promotion of distance learning and online education for the purposes of breaking the urban-rural dual structure education and promoting and realizing the integration of urban and rural education. [16] Therefore, when the Ministry of Education set major goals for constructing the national education informatization system in the Ten-year Development Plan for Education Informatization (2010-2020), it specifically mentioned that we should “promote the popularization and sharing of high-quality educational resources” and “promote educational equity”. However, literature on the current

conditions of informatization of rural education indicates that the goal of promoting urban and rural educational equity through online education may not be achieved [3].

COVID-19 in 2020 may be a one-time catastrophic event. For distance learning, however, it is a rare opportunity for all-around “experimentation”. This is because, first, many entities are involved, and many innovations and ideas are inspired by the emergency state. The entities are also less restricted as at present, there are few restrictive clauses, thus it is easier to turn the ideas into innovative practices. Therefore, it is worth waiting to see if online education can reverse the adverse situation of a wider gap between urban and rural education and promote educational equity amid the COVID-19 pandemic. If online education has indeed promoted educational equity amid the COVID-19 pandemic, finding out the vital measures has great practical significance. If not, it is also very important to analyze the factors that prevent online education from fulfilling its role in realizing educational equity.

## 3. LITERATURE REVIEW

There are three aspects to literature on this research topic. First, it relates to the characteristics (advantages and disadvantages) of online education; second, it relates to how to overcome the inherent shortcomings of online education; third, it relates to fulfilling the educational equity function of online education amid the COVID-19 pandemic. Since online education, unlike traditional offline education, is not restricted by time and space, and realize 4A education (anyone, anytime, anywhere, any style), that is, anyone can learn and receive education in any way they wish, anytime, anywhere [11], it can promote high-quality and balanced development of basic education and instructional reform, respond to the shortage of teachers or courses, provide opportunities for elective courses or remediation, and resolve the conflict of study time [14]. Given the unique advantages of online education, both online education and traditional offline education should coexist and support one another in the future [10]. Online education also comes with some disadvantages. For example, it is difficult to realize multi-dimensional interaction between teachers and students, between students, and between students and learning resources in limited time; teachers often cannot intuitively see students’ performance and reaction, adding to the difficulty to interact and communicate with each other. In addition, as students come from different family backgrounds and environments, it is difficult to exclude various external influences when learning online. They might also fail to feel concerned and cared for by teachers, and find it difficult to adapt without the collaborative learning environment, which can make them tired and lonely in the learning process [7].

Long Zusheng et al. believed that by paying more attention to guidance of learning methods and strategies and students’ independent learning in online education, and to appropriate guidance and full use of parents’ role in students’ learning process, teachers could solve problems such as young students losing the ability to think

independently and in depth due to fragmented knowledge from the Internet and the lack of self-supervising, self-management, and self-evaluation skills in the learning process. Teachers could develop students' thinking ability by adopting the question-based teaching method, changing the focus of teaching from finding existing knowledge and answers to finding "problems" in knowledge, and switching from knowledge-based to problem-based to solve problems such as students' distraction when they study at home. Teachers could also become organizers and leaders of classroom learning by changing teaching methods, appropriately determining lesson duration, grasping teaching pace, and controlling teaching content, since online lessons were not conducive for teacher-student interaction [7]. After summarizing the K-12 online education in Florida, Fang Yuanyuan pointed out three effective measures to overcome the shortcomings of online education and ensure the quality of online education, including certification of online course providers to ensure the quality of online course resources and services, monitor students' online learning to ensure their full participation, and provide the evaluation test after completing the online course to ensure students have learned something. According to Evergreen Education Group's report, the average final test score of Florida State Virtual School students who studied entirely online (meaning that they did not participate in traditional classroom instruction and studied all subjects online) exceeded that of the students in traditional schools of Florida in the spring of 2015.<sup>[4]</sup> In particular, the average score of biology, civics, and American history was 4%, 16%, and 10% higher than the other schools in Florida, respectively.<sup>[13]</sup>

Beijing Normal University's News Communication Research Center and Guangming Daily's Education Research Center conducted an online survey in early March and found that online education failed to promote educational equity amid the COVID-19 pandemic in China. The survey revealed that the teacher interaction index decreased in the order of urban area of municipalities directly under the central government, suburban area of municipalities directly under the central government, urban area of provincial capitals, urban area of prefecture-level cities, suburban area of provincial capitals, counties, towns, and villages, while increased in the order of the educational stages of elementary school, junior high school, and senior high school. The form of interaction of the teachers at key or demonstration schools was also significantly better than that of the teachers at regular schools; teachers at key or demonstration schools used more types of tools than teachers at regular schools. The interaction index had a very significant positive impact on the interaction effect<sup>[2]</sup>, indicating that online education in elementary and secondary schools, at least in the initial stages, did not play role in educational equity but instead, widened the educational gap. The extent to which positive actions by entities such as education departments, teachers, students, parents, and service providers changed the situation over the following three months was a cause for concern.

From the above literature review, it can be concluded that:

First, online education has both advantages and disadvantages; second, the disadvantages of online

education can be reduced or its adverse effect can be avoided through a series of measures; third, online education can, in theory, replace traditional education; fourth, online education in elementary and secondary schools in China may not promote educational equity during the COVID-19 pandemic.

#### 4. THEORETICAL BASIS

Throughout the 20th century, there has been a constant confrontation between two traditional knowledge-based views (theory of the external cause and theory of the internal cause) in education. In both knowledge-based views, it is assumed that there are two independent worlds, that is, the outer world of material entities and the inner world of cognition or subjectivity. In the theory of external cause, it is advocated that the outer world is prioritized, and knowledge is formed when an individual's inner world reflects or accurately represents the existence of the outer world. In the theory of external cause in education, students are viewed as white papers, and the essence of the world is drawn on them during the educational process. Accordingly, when evaluating the learning process, the focus is on the level and accuracy of an individual's acquisition of knowledge. Meanwhile, the theory of the internal cause argues that the inner world of humans is self-evident and that the brain itself has an accurate mode of operation. Therefore, the key to the formation of knowledge lies in the reasoning, logic, or concept-processing abilities of humans. In the theory of the internal cause in education, it is advocated that what matters is not the amount of knowledge the students process, but the training of thinking and reasoning skills. Accordingly, people who advocate the theory of internal cause pay attention to the study of mathematics, philosophy, and foreign language courses, which can develop students' thinking ability. Since both the theory of the external cause and the theory of the internal cause, which were based on the separation of the factual world and the subjective world, had logical problems difficult to overcome, the social constructivist theory emerged.

In the social constructivist theory, it is argued that the relationship of the community should replace the ideology of individualism in the traditional concept of knowledge. It emphasizes that meaning is achieved through the joint effort of two or more people. In this way, proponents of social constructivist theory place the acquisition of knowledge at the level of the microscopic social relationship of dialogue or exchange between members of the community. Knowledge is the transient positioning of some part of dialogue at a specific point in time in the dialogue space, and is constantly being produced when there is dialogue. The dialogue relationship can be between students and teachers, between students, between students and the environment, and between teachers and the environment. In the field of education, the social constructivist theory advocates that: (1) Teachers should eliminate fixed authority and play multiple roles such as learners, coordinators, facilitators, resource consultants, educators, and coaches. They should understand and appreciate subcultures equally, try to listen to the students'

voices in the classroom using narrative skills, guide students to obtain the required content from a large number of books with a lack of background knowledge, support them to defend their opinions, encourage them to be good at generalizing common phenomena in daily life, increase students' impact in determining the form and direction of dialogue progression, and consider how to introduce students to the creation of lesson plans. (2) Teachers should activate the relationship between people engaged in dialogue and ensure that they participate effectively in the dialogue. (3) Students and teachers are advocated to determine the practical topics and activities that are important to themselves. In other words, educational dialogue should be closely linked to the use of the living environment to gain significance in practice. (4) Teachers should embed the educational process in the real application situation and encourage students to separate their discourse from the accumulation of their fields of discipline, so that they can listen to voices from different fields with different metaphors and methods of expression in every dialogue space. Students are no longer restricted by concentrated subject content. They should be freely engaged in any necessary fields to achieve their purposes and take any necessary measures<sup>[8]</sup>.

Online education is closely related to ICT; its impact depends on the degree of integration of the education system and ICT, not only because education makes full use of the advantages or ICT determines the evolutionary direction of education. The social constructivist theory is the fundamental theory leading educational revolution, so it can be used to analyze and guide online education, which is embodied in four aspects. First, ICT and education are not independent of each other. Online education should be a process product of joint construction of ICT and education, and the endeavor to explore the rules and mechanisms of mutual effect and co-evolution of ICT and education should be the main direction of research on online education. Second, education is a part of the social system. The concept, method, and practice of education are heavily influenced by social, political, economic, and cultural systems. Although ICT is neutral, online education can only be adaptive and mature after localization and nationalization. Third, teachers and students are the main subjects of action in online education and the main common and collaborative actors. Only through active learning and use of ICT and dynamic communication can both parties effectively promote education informatization. Fourth, the application of ICT in education should not be a task completed by ICT workers once and for all, but one that requires continuous design and creation with teachers and students as users to improve its educational function.

## 5. RESEARCH METHODS

In light of the fact that online education in elementary and secondary schools in China before the pandemic was significantly unbalanced between regions, schools, and educational stages<sup>[12]</sup>, this research focused on the equity of online education, and aimed to find out measures to solve the inequity caused by the "forced" online educational revolution and the results obtained during the

pandemic through empirical investigation. Considering the ongoing impact of COVID-19, the typical case study methodology was used in this research, and data was mainly collected through semi-structured interviews supplemented with secondary data for analysis. Respondents were the participants in online education during the COVID-19 pandemic, specifically elementary and secondary school teachers, students, parents, and authorities who run the schools. The content of the interview primarily included the general conditions of education informatization of the schools as of the end of 2019 (infrastructure, network operation, use of digital educational resources, informatization literacy of teachers, etc.), the implementation of online education in the spring semester of 2020 (time, teaching-learning method, teaching discipline, network operation, etc.), difficulties faced by actors such as teachers and students in the adaptation process (problems of hardware, software, teacher-student relationship, parent-child relationship, etc.), innovative adjustments (update of teaching resources, change of teaching measures, the addition of teaching staffs, etc.), the gains of entities such as teachers and students (teaching ability, learning ability, change in academic performance, change in cognition, etc.), and the impact and traces that online education has left after classes resume (on schools, teachers, students, etc.). To find out whether online education promotes educational equity, the researchers established three principles for selecting respondents. First, they can highlight the differences between urban and rural areas and regions; second, online education has been implemented for more than three months (to ensure there is enough time for reflection, adjustment, and improvement); third, respondents are selected with schools as a unit (to ensure their answers check out and truly reflect the overall situation of the sample school). According to these three principles, three schools were determined through the researchers' contact. The first was a school affiliated with a regular university in a prefecture-level city in Jiangsu Province (hereafter referred to as School A, a municipal key school which online classes lasted for three months); the second was a prefecture-level township school (hereafter referred to as School B, a regular school which online classes lasted for three months); the third was a school in a poverty-stricken rural county in Hubei Province (hereafter referred to as School C, a regular school which online classes lasted for the entire spring semester). According to the plan, 10 teachers, 10 students, and 10 parents were selected as respondents from each of the schools. Teachers were recommended by the school on the conditions that they had an obvious age difference and participated in online education during the pandemic, whereas students and parents were recommended by the teachers interviewed. Ultimately, 9 teachers, 8 students, and 8 parents in School A, 10 teachers, 8 students, and 7 parents in School B, and 7 teachers, 5 students, and 5 parents in School C were interviewed via phone and Weixin across the last ten days of November 2020.

## 6. ANALYSIS OF SURVEY DATA

### 6.1. Level of education informatization before the COVID-19 pandemic

According to the social constructivist theory, the end results of education informatization should include a change in the mode of teaching and an improvement in the learning effect and students' autonomy, which is evidently made possible by improving the informatization literacy of teachers and students. On this basis, the researchers designed five core questions in the interview draft to measure the level of education informatization of the three schools in the second half of 2019: ① The proportion of teachers with their own computers for private use in the school; ② The proportion of teachers who typically use electronic tools, such as PowerPoint, in their classes at school; ③ The proportion of courseware from online educational resources that has been independently integrated by teachers at schools; ④ The proportion of students at school who have computers or smartphones at home; ⑤ The proportion of students at school who frequently preview, review, and complete homework using online resources with computers or smartphones at home. The first three questions are aimed at teachers and relate to the dimensions of hardware, software, and the integration of teaching and ICT, the average score of which shows the level of instructional informatization of the teacher group with the school as a unit. In fact, estimates of these proportions by teachers in the same school are neither accurate nor consistent, and the average scores in the table below are somewhat speculative; the combination of Questions ② and ③ shows how adapted the teachers with the school as a unit are to online education, and the

informatization literacy of the teachers can be measured with the product of the two questions. Meanwhile, the last two questions are aimed at students and parents, and concerned the dimensions of hardware and the integration of learning and ICT, the average score of which shows the level of learning informatization of the student group with the school as the unit. Question ⑤ can be used alone to show the informatization literacy of the students. The product of the teacher's level of instructional informatization and the students' level of learning informatization in the same school can be used to represent the school's overall level of education informatization. Accordingly, the average score of informatization literacy of teachers and students can be used to show the education informatization literacy of the same school.

From the table below, it can be seen that: (1) The level of informatization of teachers in key schools in developed areas is much higher than that of their rural counterparts, while that of teachers in rural schools in developed areas is much higher than that of their counterparts in less developed areas; (2) Even for School A, a key school in the developed areas in the east, it does not have a high level of education informatization, not to mention the regular schools in rural areas and less developed areas, the education informac of teachers, not to mention e regular schools in rural areas and less developed areas; (4) The investment of the state, teachers, and parents of students is very important for education informatization, but there is currently no corresponding incentive and support policy; (5) In general, the national education informatization reform of 30 years has fully prepared for the transition to online education under special circumstances. The findings of this research are essentially consistent with the conclusions of other research [9].

**Table 1.** Level of education informatization of schools before the COVID-19 pandemic

	School A	School B	School C
① Proportion of teachers with their own computers for private use	85%	45%	20%
② Proportion of teachers typically use electronic tools when teaching	50%	15%	5%
③ Proportion of courseware from online educational resources	20%	5%	1%
④ Proportion of students who have computers or smartphones at home	95%	80%	60%
⑤ Proportion of students who frequently preview, review, and complete homework online	8%	5%	1%
⑥ = $(①+②+③)/3$ ; teachers' level of instructional informatization	51.6%	21.7%	8.7%
⑦ = $(④+⑤)/2$ ; students' level of learning informatization	51.5%	42.5%	30.5%
⑧ = $⑥*⑦$ ; school's overall level of education informatization	26.6%	9.2%	2.7%
⑨ = $②*③$ ; informatization literacy of the teacher group	10%	0.6%	0.05%

### 6.2. Difficulties in online education during the COVID-19 pandemic

Owing to the government's excellent administrative mobilization ability, the long-term construction of education information hardware, relatively rich digital

educational resources (especially among teachers), and the high utilization rate of smart mobile phones, education departments in various places can start online education of elementary and secondary schools in the shortest possible time. However, online education had many difficulties as schools in various places responded to the outbreak of the pandemic in a hurry and there were shortcomings in

education informatization. By summarizing the interview data from teachers, students, and parents in three schools, the researchers found online education had problems in the five aspects as follows (From the table 2) :

(1) Some teachers do not have enough supporting facilities. We can see from Table 1 that most teachers in

elementary and secondary schools in rural areas and less developed areas do not have computers for private use. The teachers interviewed also reported that some teachers did not take home computers and other teaching equipment because they felt that the school break was tceffectively assess students’ mastery of knowledge.

**Table 2.** Problems in online education proposed by teachers

<b>(Divided into five equal parts)</b>	<b>School A</b>	<b>School B</b>	<b>School C</b>
Degree of consideration for instructional contents	Relatively high	Relatively low	Relatively low
Difficulty in follow-up of students with poor academic performance	Average	Relatively high	Relatively low
Decrease in teacher-student interaction	Relatively significant	Very significant	Very significant
Speed at which students focus on learning	Normal	Relatively slow	Relatively slow
Students’ learning awareness	Relatively high	Relatively low	Relatively low
Students’ direct online retrieval of correct answers	Rare	Seldom	Seldom

(2) Online teaching places high demands on family education and goes beyond the ability of some parents to cooperate. Some parents of students of schools in urban areas and most parents of students of regular schools in rural areas are relatively uncultured, have backward educational beliefs, and do not often practice scientific education methods. After the start of online education, some of the teachers’ educational duties were transferred to the parents, greatly increasing the parents’ supervisory responsibility for children’s education. Children were not aware of the importance of online learning and have low

learning efficiency, which further increased parents’ responsibility for supervision and assistance in their learning process. However, most parents did not adapt to the challenges brought by the change in teaching method. Some parents have not learned how to use applications such as Dingtalk and how to submit children’s homework online. Under great pressure, parents often resort to physical punishment or verbal punishment, which in turn leads to deterioration of the parent-child relationship and escalation of family conflicts.(From the table 3)

**Table 3.** Problems in online education proposed by parents of students (parents)

<b>(Divided into five equal parts)</b>	<b>School A</b>	<b>School B</b>	<b>School C</b>
Conflict between work and supervision of children’s study	General	Relatively significant	Very significant
Ability to instruct children	General	Relatively poor	Relatively poor
Ability to assist children with application operation	Relatively good	Relatively poor	Relatively poor
Children’s awareness to study	Relatively high	Relatively low	Relatively low
Children’s level of concentration during online classes	Normal	Relatively low	Relatively low
Children often play games secretly during online classes	Occasionally	Often	Often
Ability to create an environment for online education at home	Relatively good	Relatively poor	Relatively poor
Parent-child conflicts exacerbated by online classes	A little	Greatly	Greatly

### 6.3.Effectiveness of online education during the COVID-19 pandemic

At the press conference on May 14, the Department of Basic Education of the Ministry of Education announced in advance that the several months of online education had “shown positive results” and “had revolutionary significance in promoting education reform and teaching methods by means of informatization”. The impact of this online education experiment, involving hundreds of millions of elementary and secondary school students and

tens of millions of teachers, on teachers and students in elementary and secondary schools and the extent to which it has promoted educational equity are matters of concern. The researchers surveyed teachers from four aspects as follows: First, the completion of instructional tasks through online education. As can be seen from the situation reported by the teachers interviewed, the key schools did well with the instructional tasks. 90% of the instructional tasks were completed, and the student group’s mastery of knowledge was close to that of traditional offline education. However, this was not the case for rural schools; the

completion of teaching tasks and effective transfer of knowledge in rural schools in less-developed areas is even worse. Second, Second, the student group’s adaptation to online education. As evidenced by the situation reported by the teachers, a small number of students in key schools successfully improved their academic performance by taking advantage of online education. However, according to rural teachers in both developed and less developed areas, such cases are extremely rare. It is worth noting that online education has led to internal differentiation of students in key schools. The most striking manifestation is the apparent decline in the academic performance of some students, and the proportion of students who have declined in academic performance is greater than those who have improved in academic performance. Compared to key schools, the differentiation of students in regular schools in rural areas is clearer. In particular, the proportion of rural students in less developed areas who have declined in

academic performance is up 70%, which is worrying. From the comparison, we could see that online education during COVID-19 did not promote education equity, but rather widened the gap, perhaps because it was not yet well developed. Third, the improvement of informatization literacy of teachers. From teachers’ feedback, it can be seen that some teachers who have actively participated in online education (teaching, coaching, etc.) have really benefited, broadened their horizons, and increased their ability in teaching.(From the table 4). It is a pity that this proportion of rural teachers is relatively small in less developed areas. This means that if similar situations arise again, the gap between rural education in the east and west may widen further. Acknowledging the positive impact of online education on improving teaching skills, most teachers said they would like to improve online education training, but did not agree that online education would replace traditional offline education.

**Table 4.** Effectiveness of online education during the pandemic (teachers)

	School A	School B	School C
Percentage of normal (offline) teaching progress completed through online education	90%	70%	60%
Percentage of students whose mastery of knowledge through online education is equivalent to that through traditional education	90%	65%	40%
Percentage of students whose academic performance has significantly improved through online education	< 5%	0%	0%
Proportion of students whose academic performance basically remained through online education	85%	60%	30%
Proportion of students whose academic performance has significantly declined through online education	15%	40%	70%
Proportion of teachers whose teaching skills have been significantly improved through online education	40%	50%	30%
Proportion of teachers whose confidence in online education is significantly increased after class resumption	50%	40%	20%
Proportion of teachers who believe more in the advantages of traditional education after class resumption	80%	90%	95%
Proportion of teachers who ask to improve online education training after class resumption	60%	70%	70%

## 7. CONCLUSION, REFLECTION, AND SUGGESTIONS

During the COVID-19 pandemic, online education in China has made a great contribution to preventing hundreds of millions of elementary and secondary school students from being infected with the virus and preventing the further spread of the pandemic. At the same time, it has also played a key role in achieving the objective of the “suspension of classes without stopping learning” policy. It is closely related to the Chinese government’s sustained construction of education informatization over the past three decades.

### 7.1. Conclusion

By asking whether online education promoted education equity during the pandemic, which was a core issue, this research found that: (1) the level of education informatization in China had significant imbalance between different regions, urban and rural areas, and the constructions of software and hardware before the outbreak of COVID-19; (2) online education during the COVID-19 pandemic has not narrowed the gap of education between different regions, urban and rural areas, and key and non-key schools, but instead, it has increased educational inequity in multiple dimensions; (3) the differences in the level of education informatization of families would not

only weaken the function of online education, but also increase the inequity of outcomes of online education; (4) online education is currently unable to parallel some courses in elementary and secondary schools in parallel, let alone replace traditional education. Of course, the conclusions of this research do not deny the potential advantages of online education.

## 7.2.Reflection

Education informatization involves teaching and learning; both teachers and students should be actively involved to give full play to the potential advantages of online education. As can be seen from the analysis process and conclusion, it is appropriate to use the social constructivist theory. At the same time, it also indicates that this theory can be used to guide the development planning and policy making of instructional informatization in China. From the research methods, it is also evident that problems can be presented more clearly through the quantitative processing of qualitative research data, which is appropriate and feasible. However, the main disadvantage of this research is the small number of samples.

## 7.3.Suggestions

To further promote the construction of education informatization in China, according to the findings of this research, we propose that: (1) To realize education equity, it is necessary to focus on meeting the demand for the construction of elementary and secondary schools in rural areas and less developed areas in the construction of education informatization in the future. (2) To fulfill the function of education informatization, it is necessary to focus on investing in software construction and improving the informatization literacy and ICT application ability of teachers in elementary and secondary schools, especially to raise the level of education informatization of teachers in elementary and secondary schools in rural areas and less developed areas with a plan. (3) To enable students to participate in the construction of education informatization, several measures must be taken to resolve the problem of inadequate support facilities for families. For example, the government can learn from the experience of “home appliances aid for the rural area” project, and help rural parents to replace mobile phones with higher configurations that meet the needs of online learning with reasonable financial subsidies, and take into account poor families and parents with students graduating from elementary to junior high school, from junior high school to senior high school, and from senior high school to university. At the same time, enterprises and all sectors of society are encouraged to donate or provide low-priced notebook computers and other educational equipment for rural teachers. (4) To prevent online education from returning to its original state after the pandemic, it is necessary to strengthen the research, summarization, and sharing of experiences and lessons of online education. (5) We should draw up a national action plan, promote the integration of online education into the existing education system of elementary and secondary schools, ensure that

every school has several active online education courses, and promote the optimization and growth of digital educational resources in practice.

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