

# Online Education Countermeasures Based on the Context of Epidemic Prevention and Control

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**Abstract**—This paper seeks to discuss some of the issues and countermeasures for online education during the COVID-19 pandemic. This paper begins by examining the context of online education in the current pandemic preparedness, including the challenges and opportunities for online education, and the impact of the pandemic on the education system. It then analyzes various responses to these challenges and their feasibility. In the face of the current pandemic control situation, numerous schools have adopted online education measures to reduce the risk of virus spread. However, this new form of education also poses some challenges. The report also reviews current online education practices in China, the problems that have emerged, and some of the countermeasures taken by educational institutions. It then discusses the impact of the epidemic on online education. In order to make online education more efficient and effective, this paper mainly adopts a questionnaire method. Through the questionnaire survey and analysis of teachers and students, some potential countermeasures are proposed as much as possible, including strengthening teachers' guidance and support, improving the online instructional design, sharing online teaching experience, and improving technical and equipment support for online education thus improving its effectiveness and reducing the negative impact on students. Training for teachers and students on the use of online education tools should be strengthened to ensure the effective use of online education. Finally, the paper concludes by focusing on the future of online education, exploring its possibilities, improving its shortcomings, and taking feasible countermeasures for its effectiveness and sustainability.

**Keywords**—questionnaires, online education, teachers, education platforms

## I. INTRODUCTION

In recent years, with the development of network information technology and the dissemination of the concept of "Internet + education", the development of online education has shown a booming trend. With the increasing popularity and use of mobile media devices such as laptops, tablets, and cell phones, people are increasingly inclined to choose more convenient and diversified learning media for learning, and the traditional

concept of learning is changing as well [1]. The evolving learning needs make people more efficient and start to focus on personalized online learning methods. Especially in the first half of 2020, when a new coronavirus epidemic was raging and the central government called for a "school closure", online education was in full swing nationwide [2]. From urban to rural areas, from elementary schools to universities, online education became the preferred way to learn the curriculum during isolation because of its advantages of being free of time and space and not being exposed to stop the spread of the virus. Momentarily online education replaced traditional offline forms of teaching and became the main site of basic and higher education. Elementary school subjects became the main focus of online education during the epidemic due to their fundamental role [3]. The Internet fueled the development of online elementary education, with the emergence of many learning media that relied on Internet technology, such as online elementary learning platforms and learning WeChat public sites. During this period, online education gave full play to its advantages but also exposed many problems while safeguarding students' subject learning, and how to use online resources to promote the development of elementary school subject education became an urgent issue to be solved.

## II. LITERATURE REVIEW

Online education can also be understood as distance online education, which is a form of education that uses mobile devices and other communication media to implement teaching and learning activities via the Internet. Online education is not simply the use of technology to transplant traditional education forms onto an online education platform. It is a form of education that pays more attention to students' individual experiences and personalized needs, and is a more extended and expanded learning and teaching method than traditional education [4]. Online education is an imaginative form of education that has more flexibility and potential than traditional education, breaking the time and space limitations of traditional education and making full use of technological possibilities.

As of December 2022, journals and five master's and doctoral dissertations were searched on China Knowledge

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Network using the keyword “online primary education”, and the current situation and development trend of online education, the integration of modern information technology and elementary school curriculum [5], the relationship between online education and offline education, the study of teaching reading, writing and oral communication in online elementary school curriculum, and the application of online education were reviewed. The research work is carried out in the following aspects.

According to the relevant literature, some researchers have studied the current situation and development trend of online education, pointed out the problems of online education and its negative impact on education, and proposed some improvement measures [6]. Some articles analyzed the uneven development of online education from the perspective of online education development, explored the reasons for the imbalanced development of online education, and pointed out the corresponding countermeasures to solve the problem of uneven development of online education [7]. One paper analyzed the background of the era of “Internet+”, explored its impact on elementary school teaching, and elaborated on the development trend [8]. Lu Feng’s article first summarized and described the development process, current situation, development focus, and industry scale of online education at domestic and abroad. In the article, the problems that emerged in domestic online education for primary and secondary schools were summarized and the development trend of online education was predicted [9]. The researchers consistently affirm the development prospect of online education and believe that there are many problems in the development process, which need to be further explored in various aspects to find solutions.

Studies that explore issues related to the integration of modern information technology and language courses include: how to solve the problems of the information-based classroom and the problems of existing blended teaching, and provide guidance for teachers in blended teaching [10]. How to promote the reform of teaching quality in the classroom. It can be solved by innovative teaching models, scientific design paths, innovative construction of Internet teaching platforms, scientific excavation of Internet teaching resources, and promotion of Internet teaching technology [11]. She proposed to promote the continuous improvement of the quality of classroom teaching reform through innovative teaching models, scientific design of pathways, innovative construction of Internet teaching platforms, scientific mining of Internet teaching resources, and promotion of Internet teaching technologies. Kucuk and Richardson [12] first defined the concept of education informatization, analyzed the current situation and principles of language micro-course teaching design in the context of education informatization, and studied the application of language micro-course in the context of education informatization. The connotation of educational technology and modern educational technology were first started by Mayer, Fiorella, and Stull [13] exploring the nature of language courses, and putting forward the methods of modern educational technology and teaching use. The current

situation of the use of modern information technology in teaching was searched by Bragg, Walsh, and Heyeres [14] and he analyzed the fit between modern information technology and language teaching. Some researchers argued that modern information technology provides a good learning environment for primary school teaching, which enables students’ subjectivity to be truly established, independent learning, exploratory learning, and cooperative learning to be truly realized making lifelong education and socialization of learning possible, greatly stimulates students’ motivation to learn, and cultivates the spirit of innovation and practical ability [15].

In addition, research on reading, writing, and oral communication teaching in online primary education includes: The successful integration of online and offline courses has changed teachers’ ‘teaching’ into ‘leading’ and students’ ‘passive learning’ into ‘active inquiry’ [16]. The integration of online and offline courses will change teachers’ “teaching” into “leading” and students’ “passive learning” into “active inquiry”. At the same time, care should be taken to prevent too much emphasis on the functions of the technological platform from being divorced from the deeper concepts of teaching ancient poetry, and from neglecting the emotional exchange between teachers and students [17]. Some papers suggested that modern online technology cannot completely replace traditional teaching, and therefore traditional whole-book reading cannot be dismissed wholesale. Through defining the concepts related to writing and WeChat, Sandel *et al.* [18] explored the current development of WeChat writing, studied the strategies of using WeChat in teaching writing in junior high school languages, and proposed countermeasures to the problems that arise. These studies fully demonstrate the importance of exploring the specific implementation issues of online education in primary school teaching [19].

### III. MATERIALS AND METHODS

The year 2015 was known as the first year of the development of “online education”, and in the past few years, the rapidly changing Internet technology has led to the development of many online education institutions, and the progress of online education has shown a boom.

Types of online education: The course-based is a type of online education, which are the earliest, most user-friendly, and most numerous in the education field. Most online language courses are conducted in the form of videos, which can be roughly divided into two forms: recorded and live classes.

- Recorded Classes

As the mainstream of Internet+ education, recorded classes are the frontline of k12 subject tutoring. The basic model of recorded classes is relatively simple, with videos of offline courses by famous schools or teachers uploaded directly or edited online for students to watch. The type of video can also be classified as free or paid, and students can choose according to their needs.

- Live Classes

Live classes are a more common mode of online education since the outbreak of the epidemic, and parents and students often refer to them as “online classes”. The most important feature of live classes, like webcasts, is their timeliness and interactivity. There are many online live platforms, commonly used in education, such as Nails, Tencent Classroom, Tencent Meeting, Rain Classroom, etc. These online education live platforms have some common features, such as live check-in, roll call, connected microphones, pop-ups, and comments section communication. Students can ask questions online, speak in a voice link, and interact with teachers and classmates in real-time, trying to restore the real classroom situation.

In order to ensure the scientific nature of the paper, research methods such as the literature research method, questionnaire survey method, and comparative analysis method will be used to explore the relevant issues in the research process of this paper. Literature research method: pay attention to the development of online education through various ways (books, literature, conferences, newspapers, internet, research, etc.); keep up to date with the research results of online education; carefully study the theories related to the research, widely understand the research dynamics of others, initially establish their own research ideas, and prepare for in-depth research. Questionnaire survey method: In December 2022, the author conducted a questionnaire survey on the current situation of online education in three schools of different levels: elementary, middle, and high schools in Wuxi City, Jiangsu Province. The questionnaire survey data of students’ online learning and teachers’ online teaching were analyzed and evaluated to provide data support for online education research. Comparative analysis method:

By collecting and organizing a large amount of relevant research data, the author can examine and analyze the connection between online education and offline traditional education, then discover the similarities and differences, and conclude the development direction of online education.

#### IV. RESULT AND DISCUSSION

##### • Teacher questionnaires and analysis

Currently, in the context of the national fight against the novel coronavirus pneumonia epidemic, a variety of online teaching is being carried out in schools and universities across the country. Online teaching is a form of distance learning, which is the separation of teachers and students in time and space, and is a media-based education and teaching practice. However, for many teachers, online teaching is the first time they try it, and they face a lot of challenges. What is the current status of online teaching in such large-scale online teaching activities? What are the difficulties and challenges encountered? In the face of the new situation of large-scale online teaching, a study was conducted to investigate the current situation of online teaching among elementary school teachers in Wuxi.

The questionnaires were administered to teachers in 50 elementary schools in Wuxi, Jiangsu Province in November 2022, so the data obtained were more representative. A total of 1200 questionnaires were distributed and 960 questionnaires were returned, of which 900 were valid (all multiple-choice questions were answered and no-nonsense answers were given) and 60 were invalid (no answers or nonsense answers), with a valid questionnaire rate of 93.8%.

TABLE I. CURRENT STATUS OF TEACHERS’ USE OF ONLINE EDUCATION PLATFORMS

Question	Options and proportion				
<b>How long have you been teaching?</b>					
0–5 years 20%	6–10 years 44%		11 years or more 34%		
<b>Have you ever used an online teaching platform?</b>					
Never used 16%	Has been in use for some time 80%		Always in use 4%		
<b>Do you know anything about the teaching style of online education?</b>					
Very well 12%	Relatively good 24%		A little 45%		Not at all 19%
<b>Through what channels did you learn about online teaching?</b>					
Network 23%	School Training 71%		Study Abroad 4%		Colleagues 2%
<b>Which online Chinese teaching platforms are you familiar with? (Multiple choice).</b>					
WeChat, QQ, and other social platforms 92%	Recorded class platforms, such as Mooc, StudyTalk, etc. 2%		Live class platforms such as DingDing and Tencent Classroom 96%		E-book bag 1%
<b>What is your preferred method of assigning homework and testing students? (Multiple Choice)</b>					
DingDing 29%	Cloud Platform for Primary Schools 9%		QQ 84%		WeChat 12%
<b>What is your preferred method of interacting with students online? (Multiple choice)</b>					
Asking questions in class 80%	Discussion 68%		Assigning after-class homework 91%		Brainstorming 5%
					WeChat, QQ, and other social platforms 44%
					Live platforms with the voice function 53%
<b>What problems or obstacles do you encounter when you teach Chinese online? (Multiple Choice)</b>					
Platform lag 77%	Unfamiliar with platform operation 21%		Low sense of involvement 54%		Less feedback 47%
					Eyes tired 55%
					Other 10%

As shown in Table I, most of the teachers who participated in this survey had 6–10 years of teaching experience, among which 180 teachers had less than 5 years of teaching experience, accounting for only 20% of the total number of respondents; 400 teachers had 6–10 years of teaching experience, accounting for 44% of the total number; and 300 teachers had more than 11 years of teaching experience, accounting for 34% of the total number. In terms of teachers' knowledge of and exposure to online education platforms, most teachers already had some IT skills, and only 16% of teachers were completely unaware of online education platforms. 84% of the teachers had some experience in online teaching. This also indicates that teachers have less knowledge of online classroom teaching methods, mostly through online teaching training in schools, and most have used online forms of teaching at the time of the epidemic. Overall, the development of online teaching needs to be continuously promoted and penetrated.

Regarding the types of online education platforms teachers tend to use, 92% of teachers are familiar with social platforms such as WeChat; only 2% of teachers are proficient in recorded class platforms such as Mooc and StudyTalk; 96% of teachers are proficient in live platforms such as DingDing and Tencent Classroom; and only 1% of teachers are proficient in eBookbag. It can be seen that most teachers are only familiar with social platforms such as WeChat QQ and live class platforms, and know very little about recorded class platforms. This indicates that most of the online lectures are now conducted on WeChat and live platforms, and live lectures are more popular and accepted by teachers than recorded lectures. According to the statistical results of this questionnaire, Tencent Classroom, QQ, and WeChat are the online teaching platforms that are used more frequently by teachers, and they are also the platforms that are used more often by teachers for quizzes or assignments. Most elementary school teachers use the QQ platform to test the learning effect of the course by assigning homework after class, and the QQ group function, at this stage, can basically meet the functions of teachers to release homework details, count the number of homework after class, and upload homework photos by students. This indicates that online lectures are now mostly conducted on WeChat QQ and live platforms, and live lectures are more popular among teachers than recorded lectures.

Regarding the main difficulties and challenges teachers focused on in online education, it was found that 77% of teachers said it was the platform lag, which seriously affected the progress and consistency of education and teaching; 55% of teachers said staring at the electronic screen for a long time, their eyes were easily fatigued and they were more tired than teaching in the classroom; 54% of teachers said online classroom participation was low and they could not grasp students' learning at the first time; 47% of teachers said there is less feedback in the classroom and they cannot interact with students face-to-face instantly. Several teachers (21%) also said that they were not proficient in platform operation and often

wasted time in finding platform functions, etc. It can be found that although online teaching has the advantages of convenience and abundant resources, there are still many problems in the specific teaching implementation process, such as teachers not familiar with the operation of the online platform, does not have the hardware conditions to meet it, and do not know how to properly integrate and use online teaching resources. Therefore, despite the advantages of online education in improving students' knowledge, the effect is not obvious.

Based on the survey and analysis, the following suggestions are made.

First, regarding the problems of platform lag and network congestion in online teaching, on the one hand, schools should continue to cooperate deeply with online education platform parties such as Tencent Conference and DingDing, which have the support of top domestic Internet companies like Tencent behind these mainstream education platforms. When the amount of platform users reaches a certain number, the platform will also definitely cooperate with schools to further improve education and teaching curriculum resources and pay more attention to the experience of the user community. Schools can negotiate with the platform to deploy relevant technical staff to provide "on-site" services to solve problems encountered by teachers and students in the teaching and learning process at any time.

Second, focus on online teaching design. Online teaching is not simply a copy of the traditional face-to-face teaching model onto the Internet. Online teaching separates teachers and students in time and space, and teachers' real-time supervision and mandatory binding of students will be weakened. Teachers need to make students learn actively through effective design of learning activities to increase their participation.

Third, share the experience of online teaching and promote the efficient development of online teaching. The teaching supervisors of the university and the teaching managers of the faculty should consciously summarize the successful experiences and typical cases of teachers in the practice of online teaching, select those teachers who have good, basic, and experienced development of online teaching, and give support from policies and funds.

Fourth, to strengthen the guidance and support for teachers in information technology. Through the survey, most teachers basically have no experience in online teaching before this large-scale online teaching. The direct conversion from traditional face-to-face teaching to online teaching format will definitely devote more time and effort than traditional teaching. Today's society has gradually progressed towards informatization and digitalization, and the ability to handle information technology and adapt to digital transformation will be increasingly important in future teaching life. Therefore, in order to better adapt to future educational and teaching activities, schools and society should strengthen the capacity of teachers in the future to handle information technology and digital teaching.

In order to test the validation of the analysis above, the t-test is applied to prove the reasonability and reliability. This paper randomly draws a 300-size sample. As the questionnaires are made up of multiple choices, the choices are assigned one, two, three, etc. in order to compute. The procedures are listed as follows: (1) make hypotheses  $H_0$  and  $H_1$ ; (2) calculate the t statistics and p-value; (3) make conclusions.

Do you know anything about how online classes are taught?

Regarding this question, the null hypothesis ‘means is larger than or equal to 3’ is accepted. It proves that more teachers have little or no knowledge about online teaching. Teachers with few experiences in online teaching tend to use inefficient teaching methods and attitudes in the face of online-unmanageable students. The 2nd and 3rd suggestions can be applied to relieve the pressure.

Through what channels did you learn about online teaching?

It was found that the ‘School Training’ channel is significantly more important than other channels. As teachers’ online teaching knowledge almost comes from schools, school-relevant leaders should put more effort into teaching reform, which is more detailed stated in the 4th suggestion.

What problems or obstacles do you encounter when you teach Chinese online?

The conclusion that which problem is more significantly urgent cannot be made through t-tests. ‘Other’ Choice only takes up 10%. So, it assumes that the five mentioned problems are the main challenges of online education. And t test proves that. Platform problems and inefficient online teaching are the main concerns. The 1st suggestion can be referred to with respect to platform problems.

- Student questionnaires and analysis

A total of 1200 students were surveyed and 1036 questionnaires were returned, of which 990 were valid (all multiple choice questions were answered and there were no random answers), with an effective rate of 95.6%.

TABLE II. CURRENT STATUS OF STUDENTS’ USE OF ONLINE EDUCATION PLATFORMS

Question	Options and proportion				
<b>Current academic section</b>	Primary School		Junior High School		High School
	30%		51%		29%
<b>What is your preferred electronic device to use when using an online education platform? (Multiple options)</b>	Cell phone	Computer	Tablet	TV	Other
	74%	19%	26%	5%	1%
<b>What do you usually do when using electronic devices? (Multiple options)</b>	Social Chat	Browse the web	Play Games	Study	Other
	67%	43%	33%	46%	14%
<b>Which online class form do you prefer?</b>	Live Classes		Recorded Classes		
	91%		9%		
<b>How do you give feedback to your teacher about the problems? (Multiple options)</b>	Pop-up screen	Connected microphone	Make a phone call	Send private messages to the teacher	Other
	77%	33%	13%	17%	5%

Table II shows that 81% of the students were in the low to middle-age group, as the author’s study focused on the younger, less self-controlled group of learners. 74% of the students prefer to use their cell phones to listen to lessons. Cell phones are more popular and lightweight than computers or tablets, making them portable. Students have limited time to use electronic devices, and most of them tend to use electronic devices for chatting and browsing the web. Although the data shows that 46% of students use electronic devices for studying, the true situation should be less than the figure of 46% because the question is multiple choice and some children will consider using cell phones to find homework answers occasionally as using cell phones for studying, so most children still prefer to use electronic devices for pleasure. The fact that 91% of students prefer the live class format shows that the live education format is absolutely dominant. The reasons for preferring live classes can be broadly categorized as students think they are more interactive, more interesting, and can improve their focus on learning. In terms of feedback questions, 77% of students chose to communicate with pop-ups, only 33%

chose to connect teachers with a microphone, and 13% chose to make a phone call. This shows that most students have the desire to express their ideas and want to be noticed by their teachers and classmates, but they are too shy to use the mic or voice function to communicate with their teachers directly on the platform, and they are afraid of making a fool of themselves in front of their classmates by communicating on the public platform or answering the wrong questions, so pop-up interaction has become the primary feedback method for most students.

However, the above data also reveals some problems with online teaching. According to a study, when children watch electronic devices for 20 minutes continuously, the degree of damage to students’ eyesight is projection < TV < tablet < cell phone, and cell phones are the most harmful to the eyesight of teenagers. Therefore, in the face of online teaching, the author recommends the use of projection equipment for online learning, projecting images onto a white wall or curtain for learning, and many cell phones or platforms now have the function of projection. 70% to 80% of students like to use pop-ups to answer questions. In live classes, we often find that

sometimes before the teacher starts to ask formal questions, students who are quick to react or like to express themselves will immediately post their answers in the pop-up area, affecting other students who are thinking, and a small number of students will even copy and paste directly on the pop-ups, which does not reflect the results

of their independent thinking. Therefore, the platform can set a button in the teacher's pop-up section that can control the appearance of pop-ups at the student's end and control the time of students sending messages in real-time.

TABLE III. STUDENTS' ADAPTATION TO ONLINE TEACHING

Question	Options and proportion				
<b>What do you think of your Chinese teacher's online teaching level?</b>	Very good 21%	Relatively good 43%	Medium 34%	Lower than medium 14%	Poor 11%
<b>How much do you usually remember after taking an online Chinese class?</b>	All 12%	Most parts 34%	Small parts 42%	A little 7%	Not at all 5%
<b>Which do you prefer, the online classroom or the school classroom?</b>	Online Class 38%		School Class 51%		All the same 11%
<b>What are the reasons for choosing school offline classes? (Multiple choice)</b>	More adapted to the teaching style of school classroom 75%	Abundant campus activities 43%	Real classroom, more situational 36%	Real-time communication and interaction 46%	
<b>Are you familiar with the process of online education delivery?</b>	Not at all 1%	Do not know many 5%	Do not know some 29%	Basically know 39%	Know very clear 26%
<b>Do you think the teaching pace of online classes is appropriate?</b>	Too fast, can't keep up 11%	It's too slow. Hurry up. 6%	A little fast 18%	A little slow 3%	Just fine, can be acceptable 62%

Table III shows that 21% of students think their instructor's online teaching is very good; 31% think it is good; 34% think it is moderate; 14% think it is below moderate and 11% think their instructor's online teaching is very poor. 65% of the students think the teaching level of their instructors is moderate to high, but not much of the classroom knowledge can be remembered by the students after the class. 46% of the students can remember most of it and 42% of the students can remember a small part of it, indicating that the supervised review session after the class is still very important, but online teaching lacks a post-management supervision system. However, teachers can set after-class assignments and group discussion summaries to urge students to consolidate their knowledge in class.

75% of students prefer offline classes because they are more comfortable with the school classroom teaching style, 46% of students like the feeling of real-time interactive communication, and 43% of students like the rich campus activities offline. From the data, the main factor for students to prefer traditional school classrooms is that they are used to the long-term traditional offline teaching mode, and it is difficult to adapt to the online teaching mode for a while. Students pay more attention to the learning atmosphere and experience, but the online learning format is rather homogeneous and lacks interactivity. The limited learning space does not allow for many extracurricular activities. Therefore, if the country wants to promote online education in the future, it must develop a teaching model that can adapt to the online teaching system, rather than rigidly applying the traditional offline education model. For example, the situation can be improved by using VR virtual reality technology. VR virtual technology can be combined with

different professional characteristics to solve the incompatibility between traditional online education platforms and daily teaching activities in order to achieve a new educational balance. If VR technology can be applied to online education, it can improve the drawbacks of a single mode of online teaching and restricted venue, which has a broad prospect and great development potential.

In terms of the online education delivery process, 65% of students think they are clear about the process, while 34% are not sure about the process and only 1% choose not to know. Teachers are constantly exploring appropriate online education formats, with some teachers starting out with recorded classes, then trying live classes, and some choosing a combination of live and recorded classes. As the teaching style changes, the teaching process will also change. Therefore, online teaching should form a more fixed teaching mode, so that students can know the teaching process by heart, know what the teacher is going to teach, and how to teach, in order to fully prepare for the class.

In terms of the teaching pace, 62% of the students thought the pace of online teaching was just acceptable, 29% thought it was fast, and 9% thought it was slow. In terms of teaching pace, some teachers are influenced by the traditional teaching mindset and follow the usual pace of classes, without taking into account the acceptance ability of elementary school students and the fact that online learning is more likely to be fatiguing. In addition, elementary school students are not bound by the "classroom rules" when they learn online, so they are in a more relaxed state. Therefore, they should learn in segments rather than in a centralized way. Online teaching should subdivide the knowledge points that are

usually taught in face-to-face classes, and set different knowledge points in the progress bar of live playback. Considering that online learning students' acceptability is also weaker, the teaching pace should be slowed down, and the usual knowledge points of one lesson should be split into multiple lessons while controlling the teaching time.

In the context of the information age, online education is applied to teaching with its advantages of convenience and efficiency, and the study of online education helps to enrich the development of information-based teaching. It helps to clarify the development direction of online education. It helps to promote the deep integration of Internet information technology and education practice reform. In today's era, offline traditional teaching methods and contents can no longer fully meet the current learning needs of students. Although Internet information technology has been practiced in the field of education for many years, there are still deficiencies and problems to a certain extent, such as teachers' low information literacy, teaching form over content, and students' subjectivity being neglected, which hinder the development of the integration of Internet information technology and education; therefore, the research on the topic of online education will help to solve these problems.

## V. CONCLUSION

The epidemic situation brings great challenges to the development of network education, but also great opportunities for the development of online education. In order to effectively meet the challenges of epidemic prevention and control, it is necessary to strengthen the construction of network education platforms, improve the level of online teaching, optimize the content of online teaching, strengthen the guidance of online teaching, increase the research and development of online teaching tools, and establish an effective evaluation system of online education. At the same time, new teaching methods such as blended teaching should be actively explored to further promote the development of online education. On the other hand, studying the advantages and disadvantages of online education in the information technology era will help teachers recognize, understand, and use the advantages of online education and avoid its disadvantages in the process of online teaching. Hence, the study of this selected topic will provide an experience summary for the development of online education, promote the mutual integration of online education resources and teaching, and provide some ideas for the development of an online education business. In short, the advantages of online education are flexible learning methods, students can study at home and reduce transportation costs; there is no time limit which supports the after-school review and is conducive to time arrangement; resources are maximized and targeted, and students can study courses according to their personal needs. According to statistical analysis, the disadvantages of online education are that it is not as interactive and

engaging as offline education, and it requires a certain amount of adaptation time.

In the post-COVID-19 era, online education holds great promise and plays an important supplementary and complementary role to offline education. How to promote the integration of online and offline education, improve the efficiency of online teaching, and use technology to make up for some defects of existing online education platforms will be the development direction of future research, and will continue to be focused and researched in depth.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## AUTHOR CONTRIBUTIONS

Qianlin Hu summarized the literature and data, wrote the main body of the article, collected data, and analyzed it. Ahmad Yahya Dawod deconstructed and organized the article as a whole to make it more logical, refined the language and corrected grammatical errors and format. All authors had approved the final version.

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