International Journal for Housing Science and Its Applications
Publish August 6, 2025. Volume 46, Issue 3 Pages 8900-8910

https,//doi.org/10.70517/ijhsa463762

Online Teaching Management and Analysis Based on Human-computer Interactive Intelligent Information Management System

Huilin Cao[1,*] and Wenhua Zhang[1]
[1] College of Economics and Management, Wuhan Institute of Shipbuilding Technology, Wuhan, Hubei, 430050, China
Corresponding authors: (e-mail: caohuilin00@163.com).

Abstract Online teaching refers to the use of network platforms for educational activities, which allows students and teachers to communicate and learn online without having to meet face to face. The development of online teaching depends on different countries and regions. In many countries and regions, online teaching has become an important way of education. Especially in recent years, due to the COVID-19 pneumonia epidemic, many schools and universities have turned to online teaching. As people all know, there are many problems in traditional offline teaching. For example, the classroom environment may not be ideal, and the offline teaching schedule is not flexible. Therefore, online teaching mode is gradually accepted by the public, but there are still many problems in online teaching. Therefore, it is necessary to continuously optimize and improve online teaching mode. This paper proposed an online teaching mode based on human-computer interaction intelligence information, which aimed to study and optimize the shortcomings of online teaching mode and optimize the experience of students and teachers. The algorithm proposed in this paper is a gesture recognition algorithm based on human-computer interaction technology. Through this algorithm, the noise in the video image can be removed and optimized, and the hand motion can be extracted and collected through intelligent gesture recognition technology. This can greatly optimize the speed and efficiency of gesture recognition. Through scientific teaching experiments, the results show that after carrying out the traditional offline teaching mode and online teaching mode respectively, people can see that the average scores of Chinese, mathematics and English in the control class are 87.31, 86.54 and 86.21 respectively. The average scores of Chinese, mathematics and English in the experimental class were 88.14, 87.38 and 87.26 respectively. Obviously, online teaching has a better effect on improving students' performance. Through the research of this paper, it can prove that human-computer interaction technology has a good optimization role in online teaching, and this paper also pointed out a new research direction for human-computer interaction technology and online teaching research.

Index Terms Human Computer Interaction, Online Teaching, Offline Teaching, Geography Action Recognition Algorithm

I. Introduction

Online teaching refers to the teaching method of online teaching activities through the Internet or other electronic communication technologies. In recent years, with the development and popularization of Internet technology, online teaching has become an important teaching method. In the current situation, online teaching can be said to be developing rapidly. Due to the impact of the COVID-19 epidemic, many schools and educational institutions have to transfer teaching to online. This has also prompted many educational institutions and teachers to quickly master the skills of using online teaching tools and platforms. Among them, online teaching has many advantages, which makes online teaching welcomed by teachers and students. At present, the research on the related topics of online teaching has yielded fruitful results, which can comprehensively explain online teaching.

Since entering the information society, various intelligent technologies have been rapidly expanded, thus promoting the vigorous development of online teaching. At present, many experts have studied online teaching. Cutri Ramona Maile believed that online course teaching was the mainstream of future education. He studied the theme of emotional dimension and identity destruction around teachers' preparation for online teaching, and discussed their professional weaknesses and teaching difficulties. In addition, he analyzed some problems in online teaching and provided some feasible suggestions for teachers' online teaching mode [1]. Sadiku Matthew NO pointed out that online teaching refers to education through the Internet. A considerable number of universities are shifting from traditional face-to-face courses to online courses. He believed that online teaching has become the latest and most significant form of education [2]. Mahmood Samreen explored the different characteristics of

different teaching strategies. He believed that teaching strategies can help to implement online teaching in education. In addition, he also proposed some teaching methods that would help design successful online learning courses. In addition, his research has put forward different concepts for the development of online education, including teachers' teaching optimization and interactive teaching [3]. Martin Florence pointed out that the online learning of educational institutions has an explosive growth trend. Therefore, there is an urgent need for new and continuous online teaching guidelines to help online teachers better conduct online teaching. His research determines the role of online teachers and classifies the key capabilities of online teaching [4]. These researches topics have studied various aspects of online teaching from multiple directions, which can be used as an inspiration research to help the research work of this topic.

Now, with the rapid development of technology, many intelligent technologies have been applied to multiple cross research fields, including human-computer interaction technology. Therefore, it is possible to apply human-computer interaction technology to online teaching research. This can provide a more intelligent solution for the management and analysis of online teaching. At present, many scholars have begun to jointly study this field. Lavrov Evgeniy believed that a feasible and effective electronic online teaching system model should provide ergonomic quality and characteristics. He developed an online teaching system based on human-computer interaction technology, which meets the requirements of storing electronic online learning data and knowledge base system. He pointed out that the system can provide the necessary conditions for online teaching and improve the quality of human-computer interactive teaching [5]. Long Shirong believed that the smart online teaching model overcomes the shortcomings of traditional offline teaching, can improve students' interest in learning, and can provide students with an opportunity to learn anytime and anywhere. He used particle swarm image recognition technology and human-computer interaction technology to process video teaching images of intelligent online classroom. This technology not only optimizes teachers' teaching experience, but also increases students' learning immersion [6]. Through reading these documents, people can know that their research has carried out a more comprehensive research on human-computer interaction technology and online teaching, which has made a great guiding role for this research.

Online teaching mode has been strongly supported in recent years and has gradually become an important teaching method. Online teaching has the advantages of convenience, flexibility and rich resources. At present, there are mainly synchronous teaching mode, asynchronous teaching mode and mixed teaching mode. Although there have been some achievements in online teaching research, there is still much room for development. The innovation of this paper is to apply human-computer interaction technology to online teaching, so as to optimize the accuracy and efficiency of gesture recognition. The online teaching experience of teachers has been optimized.

II. Online Teaching Mode

II. A. Course Design of Online Teaching

Online teaching is a way of using computers and the Internet for distance learning. It allows students and teachers to communicate and learn from computers or mobile devices anywhere [7], [8]. Generally speaking, in online teaching mode, it is necessary to design teaching courses before, during and after class.

(1) Pre-class preview

In the preview before class, students can watch the course video online, read the learning materials, and complete the preview test. First of all, the video watching of online teaching refers to the video content of online education courses conducted through the Internet [9], [10]. This way of teaching allows students to watch course videos on their own computers or mobile devices, without leaving their homes or offices. The process of watching videos is usually viewed in an online browser, or by downloading video files to a local device. Online teaching is a convenient way to learn, but there are also some limitations, such as lack of communication opportunities with teachers or other students, or lack of practical opportunities. Secondly, students can also read learning materials online, which usually include course manuals, textbooks, classroom notes and other relevant texts. Students can browse these materials on their own computers or mobile devices, or download files to local devices for reading. Finally, the completion of preview test for online teaching refers to the process in which students are required to complete some test questions before learning the course content in online education courses. These test questions usually include multiple choice questions, blank filling questions, short answer questions and other forms of questions, which are designed to help students test their understanding of the course content and help teachers understand students' learning. Completing the preview test can help students better understand the course content and learn more effectively.

(2) Learning in class

In class learning, in this case, students can sign in through the Internet and complete class learning by watching live videos or participating in learning discussions. In the online teaching process, students confirm their presence

or absence by some technical means (such as software or website) at the beginning or end of the class. The advantage of this method is that it is convenient for teachers to understand students' attendance, and it can also help students better record their attendance. Secondly, students should also learn by watching the live broadcast. Online teaching, also known as virtual teaching or distance learning, is a way to use network technology to transmit course content to students' computers or mobile devices for teaching. Online teaching can be realized in various ways, one of which is live teaching. Live teaching refers to the way of real-time transmission of teaching content to students' computers or mobile devices for teaching. In live teaching, teachers usually make speeches in front of their own computers. Students can watch the live content through computers or mobile devices, and can communicate with teachers through voice or text chat. Finally, students can also conduct online learning discussion, which is a group learning method through computers and the Internet. Students can communicate and discuss through online discussion areas and forums, e-mail or instant messaging tools. Through learning and discussion, students can better master the knowledge of learning.

(3) Review after class

After finishing the class, review is also important. After class review is mainly divided into finishing homework and answering questions. Among them, the homework after online teaching refers to the homework that students are required to complete after the course in the long-distance teaching activities conducted through the Internet or other electronic media. After class homework of online teaching is generally completed on students' own computers or mobile devices. Students can complete homework in their own convenient time, or submit homework via email or other online tools. Then, in the online teaching process, teachers provide students with the opportunity to answer questions. This may include answering students' questions in class, or outside the classroom, such as through email, forums or chat tools. The purpose of teachers' question answering is to help students understand the course content, solve the difficulties encountered in learning, and provide students with learning support. In online teaching, teachers can answer questions through video conference, chat tool or other online tools.

Among them, the curriculum design of online teaching is shown in Figure 1.

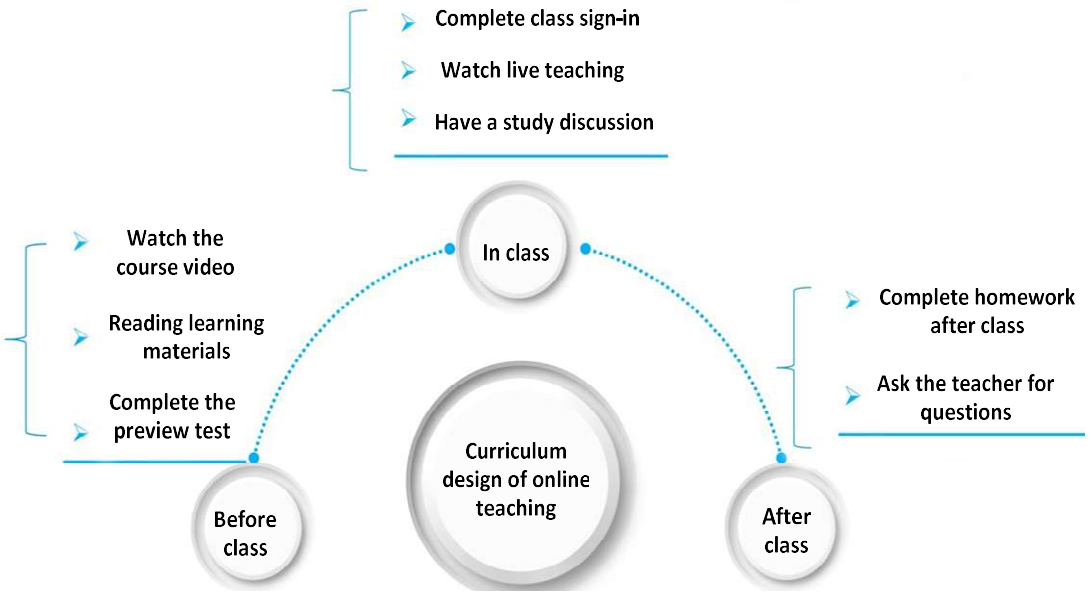


Figure 1: Course design of online teaching

II. B.Main Process of Online Teaching

As a way of distance education using computer and Internet technology, online teaching allows students and teachers to communicate and learn in different places, and can communicate through video conferencing software, chat tools, electronic tutorials and tests [11], [12]. The teaching process refers to the steps and rules followed in online teaching. The importance of the process is that it can help organizers and participants better understand the process of teaching activities and help ensure the quality of teaching. A good process can help teachers prepare and organize the course content, and also help students understand the learning objectives and requirements of the course. The process can also help teachers and students to use their time more effectively and avoid confusion

and waste in the course. In short, the main process of online teaching is divided into: online learning, online discussion, online homework completion and online review.

(1) Online learning

Online learning of online teaching is a form of distance education, in which teachers and students use the Internet and related technologies for online communication and learning [13]. This form of teaching allows students to learn anywhere and at any time without going to the classroom face to face. Online learning of online teaching usually uses video conference software or online learning platform to teach courses. Students can watch video courses online, participate in interaction, submit homework, etc. This form of teaching requires students to have a certain self-study ability and consciousness, and also requires teachers to have strong network teaching skills.

(2) Online discussion

Online discussion of online teaching refers to the process of online communication and discussion between students and teachers using the Internet and related technologies during online teaching. This form of discussion can use video conference software or online learning platform, and students can communicate with teachers and other students through text, voice or video. The online discussion of online teaching can enable students to participate in the discussion anywhere and at any time, and also enable teachers to communicate with students more conveniently. This form of discussion helps to improve students' interest in learning and participation, and also helps teachers to understand students' learning status more comprehensively, so that teachers can carry out personalized teaching for students.

(3) Complete online work

Completing online homework in online teaching refers to the process in which students use the Internet and related technologies to complete online homework assigned by teachers during online teaching. This form of homework can be submitted using the online learning platform or other tools, and students can complete the homework through text, pictures, audio or video. The completion of online homework in online teaching allows students to complete homework anywhere and at any time, and also allows teachers to collect and correct homework more conveniently. This form of homework helps improve students' learning efficiency and consciousness, and also helps teachers better understand students' learning.

(4) Online review

The review of online teaching usually refers to the learning activities carried out on computers or mobile devices. Online review can be conducted by watching recorded lectures, completing online exercises or tests, participating in discussion groups or video conferences, etc. These activities are usually provided by schools or educational institutions, and students can access and complete them through the learning management system. In addition, online review can help students consolidate the content of classroom learning and improve learning efficiency. However, it should also be noted that too much screen time may lead to eye fatigue, physical discomfort and other problems. Therefore, it is recommended to take proper rest and exercise during the learning process. In addition, when reviewing online, students should determine clear learning goals and make a plan to achieve them. In this way, students would have a clear goal and path to learn more effectively. In addition, the importance of offline learning cannot be ignored. Online learning is only a part of the learning process. In order to deepen the understanding of the learning content, it is suggested to conduct appropriate offline expansion, such as reading relevant books, watching relevant videos, conducting relevant experiments, etc.

The main process of online teaching is shown in Figure 2.

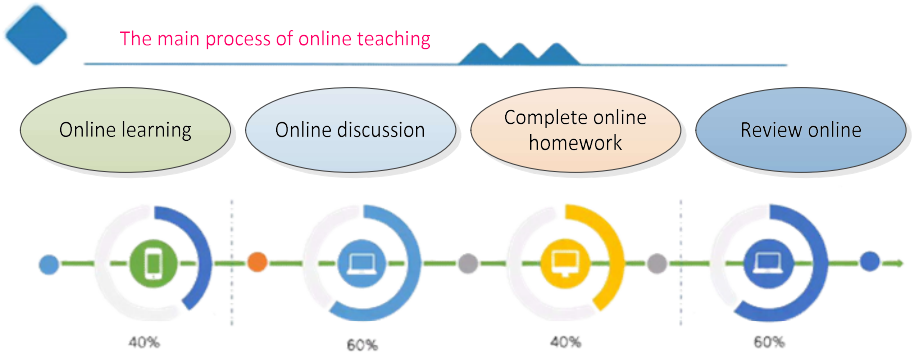


Figure 2: Main flow chart of online teaching

To sum up, the process plays a crucial role in online teaching. A good process can help teachers and students better organize and implement teaching activities, and improve teaching quality and efficiency. In addition to the functions, the process can also help maintain teaching order and ethics. In online teaching, the process can specify the student's code of conduct to ensure a good learning environment. The process can also guide teachers how to deal with students' problems and complaints to ensure fairness and justice. In addition, the process can help maintain the quality and reliability of teaching. By specifying the schedule and content of the course, the process can ensure that students can get sufficient learning opportunities and ensure that the content learned meets the teaching objectives. The process also helps teachers regularly assess students' learning progress to ensure learning effectiveness.

II. C.Strategies for Optimizing the Teaching Quality of Online Teaching

Online teaching is a teaching method gradually popularized with the development of science and technology in recent years. It enables teachers and students to communicate and learn remotely through the Internet [14], [15]. With the impact of the epidemic, more and more educational institutions and schools began to use online teaching to ensure the continuity of teaching. The importance of online teaching quality optimization strategy lies in that it can help teachers and students get better learning experience in online environment and improve teaching quality. Some common online teaching quality optimization strategies include student experience feedback, curriculum and teaching adjustment and optimization, supervision and evaluation suggestions, and online teaching effect testing

(1) Student experience feedback

Student experience feedback refers to students' feelings and feedback on the course after participating in online teaching activities. Student experience feedback can help teachers understand students' views on online teaching and help improve the curriculum. In learning experience feedback, the content of feedback includes curriculum quality, teacher performance, experience of online teaching platform, and online learning effect. The process of collecting students' experience feedback can also provide students with an opportunity to express their views and suggestions, which is conducive to improving students' participation and satisfaction. At the same time, student experience feedback can also help teachers improve teaching methods and curriculum content, making online teaching more effective and smooth.

(2) Adjustment and optimization of curriculum and teaching

In this part, it can be divided into the adjustment of curriculum content and optimization of teaching methods. Among them, the adjustment of online teaching course content refers to the adjustment of course content according to students' needs or course effects in online teaching courses. This may include adding or deleting parts of the course, or adjusting the structure and progress of the course. The course content of online teaching can be adjusted through online platform or software, video conference or other communication tools. The adjustment of online teaching course content can help students better understand the course content, improve learning efficiency, and respond to the needs of students more flexibly.

In addition, the optimization of online teaching means to improve the teaching method in the online teaching process to make it more suitable for the characteristics of online teaching and help students learn more effectively. The optimization of online teaching methods can include various improvements, such as increasing interactivity, using teaching tools and software more suitable for online teaching, and providing diversified learning resources and activities. These improvements can help students better understand the course content, improve learning efficiency, and more flexibly respond to the needs of students.

(3) Supervision evaluation suggestions

The supervision and evaluation suggestions of online teaching refer to the process of evaluating teachers' teaching quality and giving suggestions for improvement during online teaching. Supervision evaluation suggestions can be made by professional supervisors or teachers themselves. In the process of supervision, evaluation and suggestion of online teaching, many factors can be considered, such as teaching methods and tools used by teachers, depth and breadth of teaching content, student participation and learning effect. The results of supervision and evaluation suggestions can help teachers better understand their teaching quality, and help teachers improve teaching efficiency and students' learning effect.

(4) Online teaching effect test

The online teaching effect test of online teaching refers to the process of evaluating the teaching effect in the online teaching process. The online teaching effect can be tested by many methods, such as students' homework, examination results, discussion and feedback. The results of online teaching effect test can help teachers better understand students' learning, and help teachers improve teaching methods, so that students' learning effects can be improved. In addition, the results of online teaching effect test can also be used as a reference for online teaching, helping schools and education departments better adjust the development direction of online teaching.

Among them, the teaching quality optimization strategy of online teaching is shown in Figure 3.

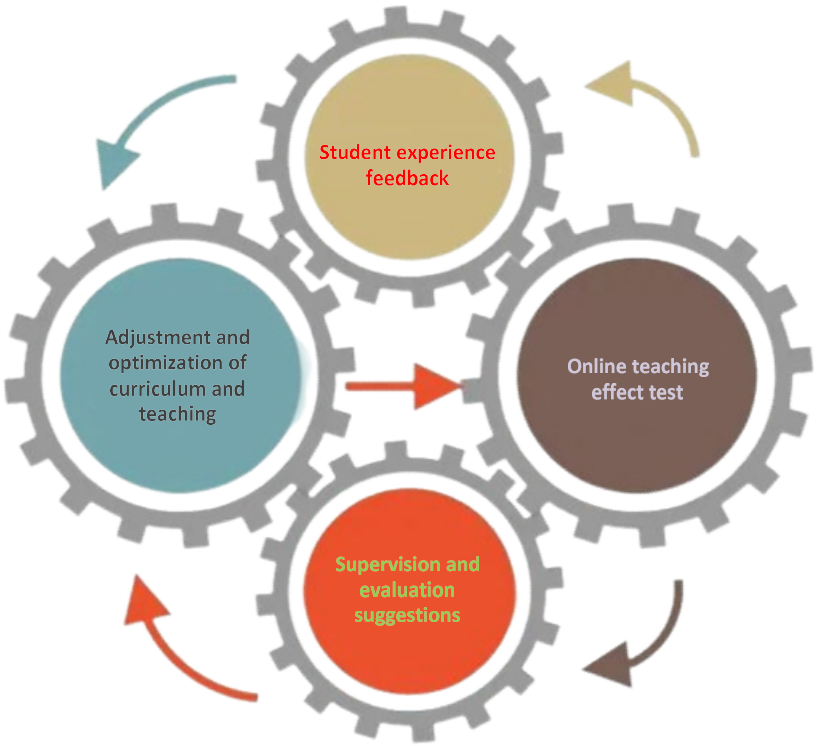


Figure 3: Teaching quality optimization strategy of online teaching

Therefore, by strictly implementing the online teaching quality optimization strategy, a cycle of adjustment, renewal, practice, inspection, evaluation and feedback can be formed in online teaching. This cycle can deal with the problems and challenges in the teaching process in real time to ensure the teaching quality. This cycle is called the "spiral loop". In this spiral loop, people constantly adjust and update to ensure that the teaching content and methods match the current learning needs. Then, practice and test can be carried out to ensure that students understand the teaching content and can apply it to practice. Next, this paper conducted evaluation and feedback to understand the learning situation of students, and timely adjusted according to the feedback results. In addition, this closed-loop cycle would be repeated to ensure the quality of teaching.

III. Human-computer Interaction Technology

III. A. Human-computer Interaction Technology and Online Teaching

Human computer interaction technology refers to the interaction between computer systems and people. These interaction modes usually include computer screen, keyboard, mouse and other input devices as well as speaker, display, printer and other output devices. The purpose of human-computer interaction technology is to enable people to use computers more easily and quickly. Through continuous improvement of human-computer interaction technology, computers can be easier to use and people can use computers more conveniently. With the popularity of smart phones and other mobile devices, human-computer interaction technology has been more and more widely used in mobile applications. Among them, human-computer interaction technology plays an excellent role in online teaching.

(1) Enhance interaction

Human computer interaction technology can make the communication between students and teachers more smooth. For example, teachers can use chat tools or video conferencing software to allow students to communicate directly with teachers online. Students can also interact with teachers through roll call, approval, voting and other interactive ways, making the classroom atmosphere more active. In addition, human-computer interaction technology can also make it easier for students to ask questions and give feedback. For example, through online discussion areas or questioning functions, students can communicate more freely with teachers and classmates.

(2) Enhance learning effect

Human computer interaction technology can make students more focused and concentrated. For example, teachers can use interactive videos, animations or games to attract students' attention, and can help students understand and remember knowledge through questions and case studies. The human-computer interaction technology can also improve the learning efficiency through the automatic evaluation and feedback function, so that students can know their learning progress in time.

(3) Improve student participation

Human-computer interaction technology can help teachers manage the classroom more effectively, and can make teachers more flexible to use a variety of teaching methods to adapt to different learning styles. In addition, teachers can use online discussion areas, questioning functions, online voting and other tools to enable students to actively participate in communication and discussion in online classes. In this way, students' interest in learning can be enhanced, and students can learn more independently.

(4) Improve teaching efficiency

Human-computer interaction technology can help teachers manage classroom more effectively. For example, teachers can save time and energy by using online attendance, homework publishing and correction functions. In addition, human-computer interaction technology can also enable teachers to use a variety of teaching methods more flexibly and adapt to different learning styles. For example, teachers can adjust teaching contents and methods according to students' learning progress, learning habits and learning objectives, so as to make teaching more targeted and effective.

The role of human-computer interaction in online teaching is shown in Figure 4.

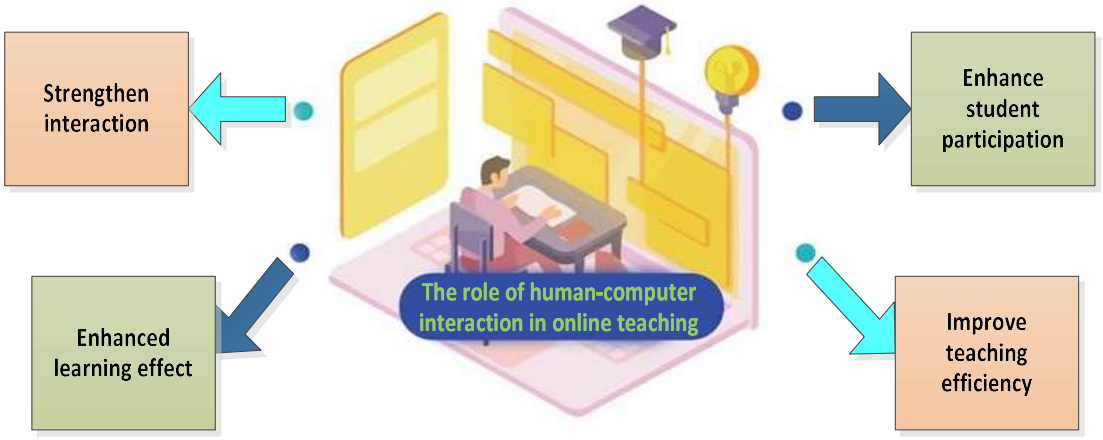


Figure 4: The role of human-computer interaction in online teaching

III. B. Hand Gesture Recognition Algorithm Based on Human-computer Interaction Technology

In the process of online teaching interaction, especially under the condition of human-computer interaction under machine vision, the recognition of gesture action is based on image acquisition and image feature extraction of machine vision. Through the combination of human-computer interaction technology, the design of gesture action recognition algorithm can be realized.

First, it is necessary to confirm the center of gravity of the background image. In order to accurately locate the center of gravity coordinates, it is necessary to use moments to calculate the center of gravity, area, principal axis and other shape features of the object shape. The calculation is as follows:

$$M_{pq} = \iint (x^p) * (x^q)\, dx\, dy \tag{1}$$

Among them, x^p and x^q are the pixel coordinates in the single frame image of the area to be processed. The value range of p and q is [0,+∞].

Suppose (x_c, y_c) is the coordinate of the center of gravity of the image area, which is expressed as follows:

$$\begin{cases} x_c = M_{10}/M_{00} \\ y_c = M_{01}/M_{00} \end{cases} \tag{2}$$

In the video image, M_{00} represents the area of the area.

After that, it is necessary to detect moving objects. The background difference method is used here. This method is a commonly used method for moving area detection. The moving area is detected by comparing the current frame with the background frame.

In the video image, each frame image $I(x,y,t)$ is composed of the background image $b(x,y,t)$ and the moving target $m(x,y,t)$. Therefore, there is the following formula:

$$I(x,y,t) = b(x,y,t) + m(x,y,t) \tag{3}$$

The expression of moving target $m(x,y,t)$ can be obtained from the formula:

$$m(x,y,t) = I(x,y,t) - b(x,y,t) \tag{4}$$

However, in actual teaching, due to the influence of noise, Formula (4) can not get the real moving target, but the difference image $d(x,y,t)$ composed of moving target area and noise. The formula is as follows:

$$d(x,y,t) = I(x,y,t) - b(x,y,t) + n(x,y,t) \tag{5}$$

Among them, $n(x,y,t)$ is the noise image in the video.

In the last step, the obtained moving target is optimized. Here, threshold segmentation is adopted, and the calculation is as follows:

$$\begin{cases} I(x,y,t) & d(x,y,t) \geq T \\ 0 & d(x,y,t) < T \end{cases} \tag{6}$$

In the formula, T is the threshold used to segment and classify moving objects.

This paper presented a set of human-computer interaction algorithm based on hand movement. This algorithm can better remove the noise in the video image, extract and collect the hand movement, and then analyze the gesture movement according to the extracted feature points, so as to improve the fluency and experience of online teaching.

IV. Experiment of Online Teaching Mode Based on Human-computer Interaction Technology

IV. A. Testing of Gesture Recognition Algorithm Based on Human-computer Interaction Technology

In this part, the performance of gesture action recognition algorithm based on human-computer interaction technology would be tested. This experiment, through a comparative experiment, would respectively test the traditional gesture action recognition algorithm and gesture action recognition algorithm based on human-computer interaction technology.

First of all, this paper tested the recognition accuracy of these two algorithms for 15 times, and recorded the test data. The test results are shown in Figure 5.

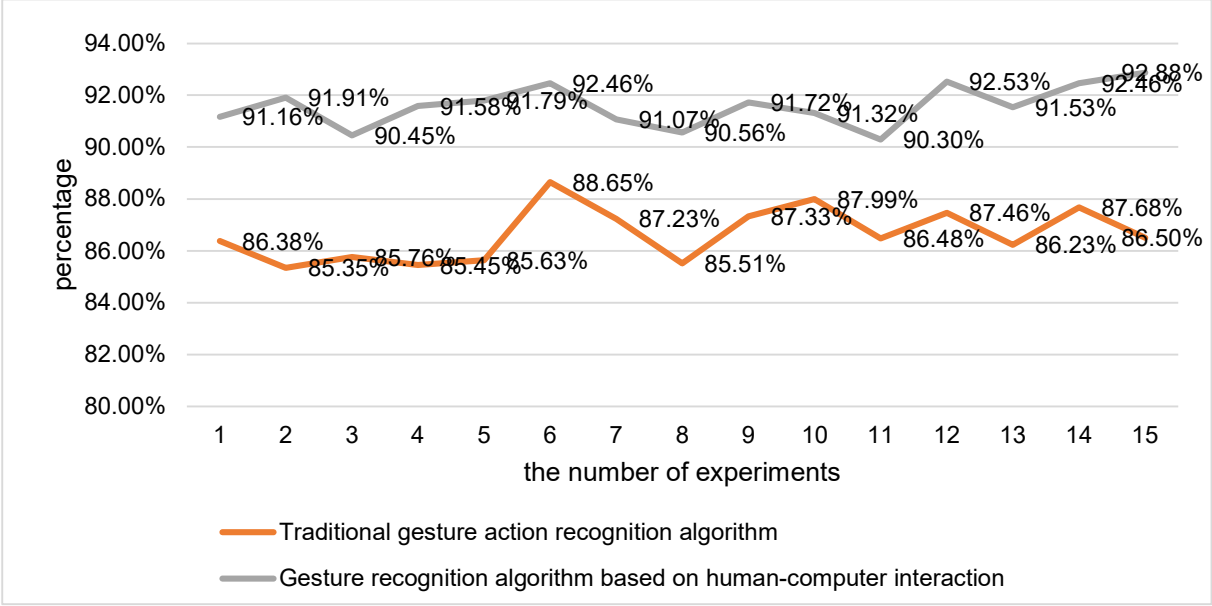
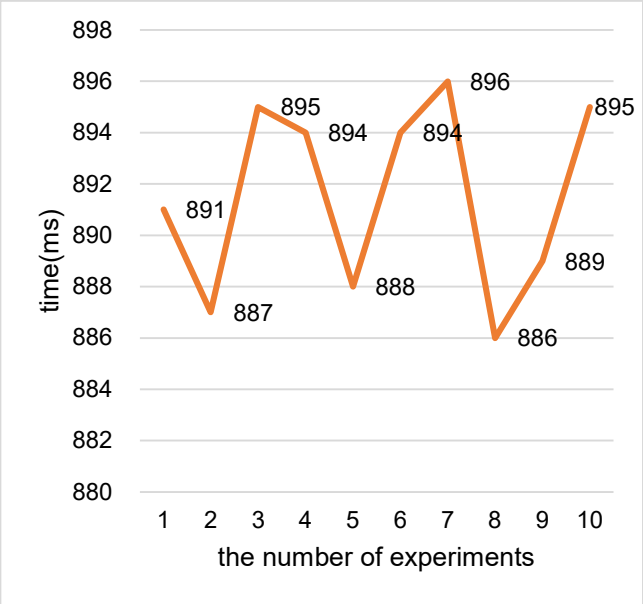


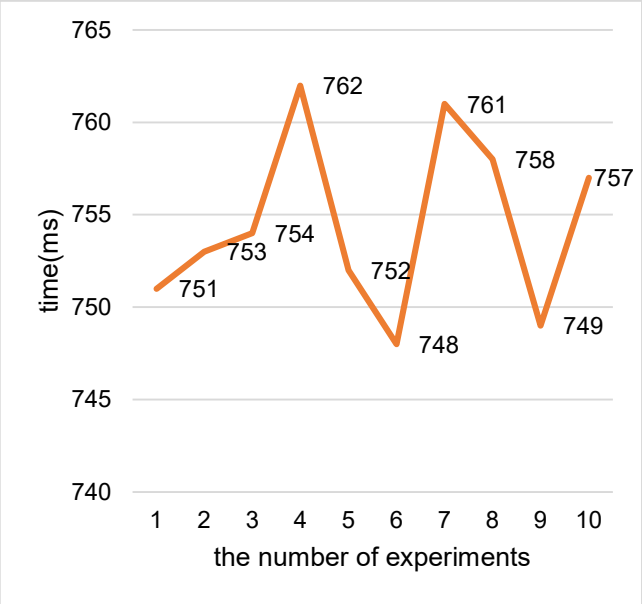
Figure 5: Comparison of recognition accuracy of two algorithms

Through the analysis of the data in Figure 5, it can be seen that the recognition accuracy of traditional gesture action recognition algorithms is basically below 90%, while the recognition accuracy of gesture action recognition algorithms based on human-computer interaction technology is basically above 90%. From the figure, it is clear that the recognition accuracy of gesture recognition algorithm based on human-computer interaction technology is higher than that of traditional algorithms. This shows that the algorithm has more powerful recognition ability.

In addition, the recognition speed of gesture action recognition algorithm is also very important. Faster recognition speed can reduce the recognition delay and bring users a smoother experience. Similarly, the two algorithms are tested 10 times respectively and their recognition time is counted. The experimental results are shown in Figure 6.



(a). Comparison of recognition time of traditional algorithms



(b). Comparison of recognition time based on human-computer interaction algorithm

Figure 6: Comparison of recognition time of two algorithms

By calculating the data in Figure 6, the average recognition time of the two algorithms can be obtained. The average recognition time of traditional gesture recognition algorithm and gesture recognition algorithm based on human-computer interaction technology is 891.5 ms and 754.5 ms respectively. It can be seen that the average recognition time of gesture recognition algorithm based on human-computer interaction technology is smaller, which indicates that the recognition speed of this algorithm is faster, and this algorithm can better optimize the user's experience.

IV. B. Experimental Research on Online Teaching Mode

In this part, this paper would carry out experimental research on the online teaching mode based on human-computer interaction intelligence informatization, which can explore the actual teaching effect of the online teaching mode. Based on the content of this article, this article has sorted out the objectives and requirements of online teaching, as shown in Table 1:

Table 1: Objectives and requirements of online teaching

Category Project	Target requirements
Strengthen interaction	Make the communication between students and teachers more smooth.
Enhanced learning effect	Make the students more focused and concentrated.
Enhance student participation	Let the teachers and the students communicate freely
Improve teaching efficiency	Make the teaching more targeted and effective.

In this teaching experiment, the experimental subjects selected in this paper are all the students in Class 1 and Class 2, Grade 3 of a senior high school in a city. Among them, Class 1 of Senior Three is the control class, and

Class 2 of Senior Three is the experimental class. In the experiment, the two classes were taught by the same teacher. Class 1 of Senior Three adopted the traditional offline teaching mode, and Class 2 of Senior Three adopted the online teaching mode.

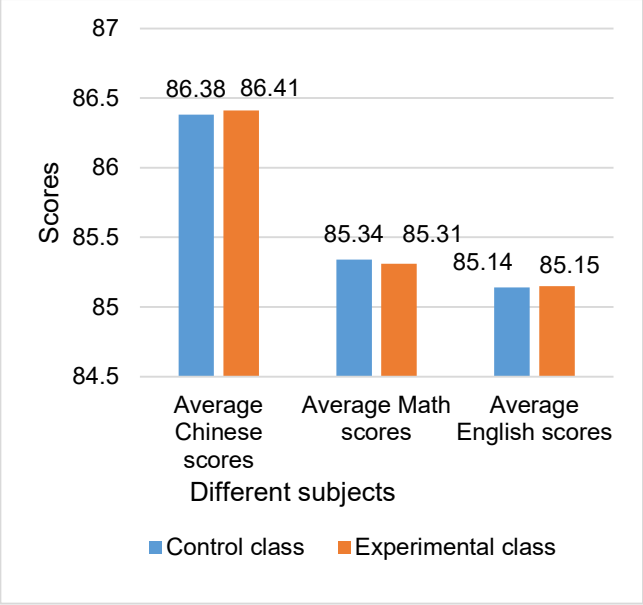
First of all, this paper issued questionnaires to the students of the two classes to understand the basic information of the students of the two classes. The data is shown in Table 2.

Table 2: Comparison of basic information between two classes

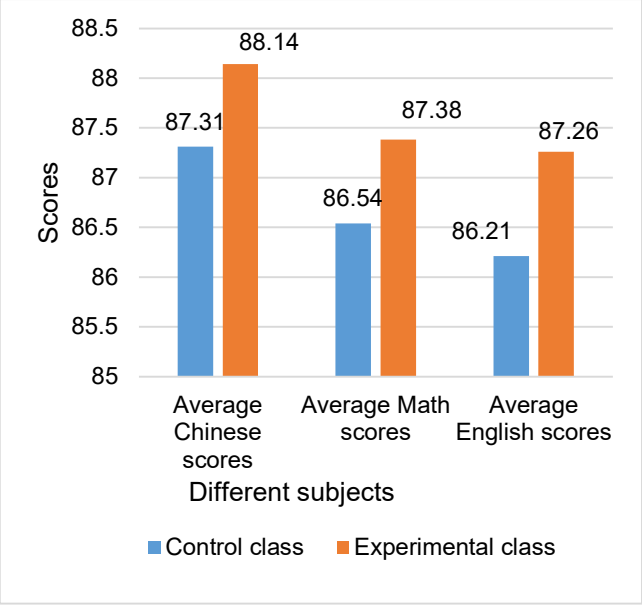
		Control class	Experimental class
Gender ratio (male / female)		52%	51%
Mean age (age)		17.6	17.7
Knowledge of online teaching	Not familiar with	31.21%	31.25%
	Comparative understanding	32.84%	32.88%
	Understand very well	35.95%	35.87%

It can be seen from Table 2 that the sex ratio and age of students in the two classes are relatively close. In addition, their understanding of online teaching is similar. These data show that the differences between the students in these two classes are relatively small, which can ensure the authenticity and value of the teaching experiment.

First of all, this paper tested the performance of the two classes, mainly on Chinese, mathematics and English, and counted the average score of each subject. After that, after a month of teaching with different teaching modes, this paper would test the results of the two classes again, and analyze the effect of online teaching mode according to the results of the two tests. The results of the performance test are shown in Figure 7:



(a). Statistics of pre-teaching performance test



(b). Statistics of post teaching performance test

Figure 7: Statistics of the scores before and after teaching

It can be seen from Figure 7 that before the experimental teaching, the scores of each subject in the experimental class and the control class were very close. Then, after carrying out the traditional offline teaching mode and online teaching mode respectively, people can see that the average scores of Chinese, mathematics and English in the control class are 87.31, 86.54 and 86.21 respectively. The average scores of Chinese, mathematics and English in the experimental class were 88.14, 87.38 and 87.26 respectively. The results before and after the experiment show that online teaching is more effective and can better improve students' performance.

V. Conclusions

Online teaching, also known as distance learning or online teaching, is a way of teaching through the Internet or other electronic media. This way, students can learn anywhere, and teachers can use their time more effectively. The development prospect of online teaching is very broad. With the continuous development of Internet technology, the quality and efficiency of online teaching are constantly improving. At the same time, online teaching can also provide learning opportunities for more and more people, especially those who live in remote areas or do not have enough resources. In addition, online teaching can also provide teachers with more teaching resources, and make it easier for teachers to use multimedia tools, such as video, audio and images, to help students understand concepts. In a word, online teaching is a teaching method with a bright future. It can provide more people with learning opportunities and help teachers to impart knowledge more effectively. In this paper, the optimization of online teaching mode using human-computer interaction technology was proposed. Through the test of gesture recognition algorithm based on human-computer interaction technology, the powerful gesture recognition performance of the algorithm is proved. In addition, through comparative teaching experiments, it has been proved that this online teaching mode can better improve the students' performance than the traditional offline teaching mode, thus proving the excellent teaching ability of the online teaching mode. In the future, online teaching may continue to develop and may become a more important education method. This development may be affected by the improvement and popularization of technology, and may also be affected by people's demand for online learning.

References

[1] Cutri, Ramona Maile, and Juanjo Mena. "A critical reconceptualization of faculty readiness for online teaching." Distance Education 41.3 (2020): 361-380.
[2] Sadiku, Matthew NO, Philip O. Adebo, and Sarhan M. Musa. "Online teaching and learning." International Journals of Advanced Research in Computer Science and Software Engineering 8.2 (2018): 73-75.
[3] Mahmood, Samreen. "Instructional strategies for online teaching in COVID-19 pandemic." Human behavior and emerging technologies 3.1 (2021): 199-203.
[4] Martin, Florence. "Award-winning faculty online teaching practices: Roles and competencies." Online Learning 23.1 (2019): 184-205.
[5] Lavrov, Evgeniy. "Development of models for the formalized description of modular e-learning systems for the problems on providing ergonomic quality of human-computer interaction." Eastern-European journal of enterprise technologies 2.2 (2017): 4-13.
[6] Long, Shirong, and Xuekong Zhao. "Smart teaching mode based on particle swarm image recognition and human-computer interaction deep learning." Journal of Intelligent & Fuzzy Systems 39.4 (2020): 5699-5711.
[7] Albrahim, Fatimah A. "Online teaching skills and competencies." Turkish Online Journal of Educational Technology-TOJET 19.1 (2020): 9-20.
[8] Sepulveda-Escobar, Paulina, and Astrid Morrison. "Online teaching placement during the COVID-19 pandemic in Chile: challenges and opportunities." European Journal of Teacher Education 43.4 (2020): 587-607.
[9] Davis, Nicole L., Mimi Gough, and Lorraine L. Taylor. "Online teaching: advantages, obstacles and tools for getting it right." Journal of Teaching in Travel & Tourism 19.3 (2019): 256-263.
[10] Putri, Nina Rosiana, and Fatimah Mulya Sari. "Investigating English teaching strategies to reduce online teaching obstacles in the secondary school." Journal of English Language Teaching and Learning 2.1 (2021): 23-31.
[11] Noor, Shaista, Filzah Md Isa, and Faizan Farid Mazhar. "Online teaching practices during the COVID-19 pandemic." Educational Process: International Journal 9.3 (2020): 169-184.
[12] Adams, Annis Lee. "Online teaching resources." Public Services Quarterly 16.3 (2020): 172-178.
[13] Van der Spoel, Irene. "Teachers' online teaching expectations and experiences during the Covid19-pandemic in the Netherlands." European journal of teacher education 43.4 (2020): 623-638.
[14] Gewin, Virginia. "Five tips for moving teaching online as COVID-19 takes hold." Nature 580.7802 (2020): 295-296.
[15] Todd, Richard Watson. "Teachers' perceptions of the shift from the classroom to online teaching." International Journal of TESOL Studies 2.2 (2020): 4-16.