

Application of Computer in Online Teaching of Professional Courses

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Abstract—Due to the ongoing public health crisis, computer online teaching has become a new normal. It is very meaningful to explore how to effectively apply computer in online teaching. In this paper, the online teaching situation of teachers and students in a college was surveyed and analyzed. Then, DingTalk, the most popular online teaching platform among the respondents, was introduced in detail. Next, the online teaching situation was tracked, and the learning situation was evaluated in terms of pre-class preparation, in-class teaching, and after-class homework. After that, the satisfaction with the course design and teaching effect was surveyed. The results show that the students felt satisfied with the course design, but regarded practical teaching a weak link in online teaching; the students highly recognized the work attitude, teaching ability, and interactive ability of their teachers, yet calling for better innovation awareness among teachers. The research results provide a good reference for computer-based online teaching of professional courses.

Keywords—Computer, online teaching, application, survey.

1 Introduction

Under the influence of the public health crisis, it is difficult to conduct face-to-face teaching in colleges. In many countries, the entire curriculum is mainly conducted on the Internet, because the online education itself has been developed for many years and meets their needs of students' education [1-3]. The popularity of the Internet has promoted the development of universal learning. With the support of the digital world, students are placed in a real learning environment through the Internet [4-11].

With the increase of computer network users, the scholars have been more and more interested in computer network as an innovative teaching tool. Osipov et al. [12] introduced an online language learning platform based on computer network which allows voice or video communication between participants, and provides teachers with the prepared teaching materials, bringing great conveniences for teachers and students. Claypool and Claypool [13] added fun factors to the course teaching and developed game-centered teaching software, involving students in practical problems in the game, and improving their participation and positive performance. Bellemare et al. [14] presented a learning environment based on artificial intelligence technology

platform to achieve the reinforcement learning, model learning, and imitation learning, etc.; the most important is to provide methods for evaluating and solving problems. Simões et al. [15] proposed to apply games to education; for this, a social game framework was built and applied to the social learning environment. Hwang et al. [16] put forward a context-aware learning platform that enables students to provide immediate support as they learn; when learners encounter problems, they can obtain help through the hints given by the learning system; based on the new learning platform, students' learning efficiency and academic performance have been significantly improved. Huang et al. [17] proposed an intelligent learning diagnosis system according to the Web-based theme learning mode, which cannot only train learners' knowledge integration capabilities by selecting topics of interest to learners, help improve their learning behavior, and score teachers' online classrooms, but also predict the learner's achievements, and effectively expand their knowledge.

Hummer et al. [18] believes that online courses attract students to participate, and encourage teachers into the field of online teaching, but as a new teaching method for many teachers, many factors should be taken into consideration before online teaching. Meseguer-Martinez et al. [19] analyzed the number of buttons clicks in the teaching video through the teaching video samples of Spanish national microeconomics and found that users and learners prefer online teaching videos. Dillon and Tucker [20] thinks that online education can change the original education system as an interactive technology, which personalizes learning, meets the needs of each student, ensures quality teaching, and continuously innovates and improves over time. Cavanagh and Mitchelmore [21] studied the computer online teaching process of teachers; through in-depth observation, it's found that teachers did not have any experience when starting to use the online teaching system, and after the guidance, all teachers made some progress in using the system, but not consistently; finally, the implications of online teaching for teacher professional development was discussed, and for those who wish to obtain a final academic degree through distance education, online education is now a viable option. Snelson et al. [22] states that online education can incorporate the use of multiple technologies, including email, social media, blogs, Weibo, Web conferences, learning management systems, forums, and online videos, etc.

Online education increases communication and timely feedback on the course, but it's also faced with some challenges, e.g., online teachers can encounter different technical problems (such as network connection, hardware incompatibility), students lack the experiences in online education, and there is some difficulty in teaching certain procedural topics online [23-25]. Despite of these problem, the new online teaching method has still become an important auxiliary measure of traditional teaching [26, 27]. Some scholars compare online teaching with face-to-face teaching, tests the effect of both and blended learning, and analyzes the influence of interaction on teaching effect [28-30]. There are different directions for the research of online teaching, such as learning skills and attitudes, the influence of information literacy, and the practice of different courses. Some scholars have carried out research in these aspects [31-34]. Some scholars think that online teaching provides support for learners during the epidemic period, which is more important than before [35-37]. During the epidemic of novel coronavirus pneumonia, educators are trying to teach online and practice,

and there will be a certain degree of sustainability in the coming period [38, 39]. Due to the importance of online teaching, Kaup et al. [40] Call online teaching a course of the future.

The remainders of this paper are as follows: the second part conducts a survey on the situation of computer online teaching in colleges; the third part introduces Ding-Talk, the most popular online teaching platform among the respondents; the fourth part is the application of computer in the online teaching; the fifth part summarizes the effect of online teaching; the sixth part is the conclusion of this paper.

2 Current Situation of Computer Online Teaching

Facing the public health crisis, Chinese universities generally use computer online teaching. To understand the situation of the computer online teaching, a statistical survey was conducted on the computer online teaching situation of teachers in the School of Energy and Environment of a college. There were 76 respondents, as shown in Figure 1. Among then, 44 respondents used DingTalk online teaching platform, and 16 applied the Tencent Meeting, Tencent Classroom, and QQ) etc., which together accounted for 79% of the total. Both DingTalk and Tencent platforms operate smoothly, and there is basically no situation when they cannot log in or the webpage cannot be opened. During the large-scale use by teachers and students, they can still maintain the stability of the network, reflecting the advantages of the software platform. Some other platforms have been also adopted before, such as Chaoxing and Yuketang, which were originally used only as an auxiliary measure for face-to-face traditional teaching. There are fewer users on the platform simultaneously, with no network congestion. But due to the large-scale use of network, the users often feel it difficult to log on or open the webpage. Therefore, many teachers give up using software platforms such as Chaoxing and Yuketang and choose a smoother network platform to ensure the quality of teaching. Some teachers still using the software take the form of recorded broadcast and courseware instead of live broadcasting, which enables the course teaching to continue, but the quality of the teaching is not as good as online live broadcasting.

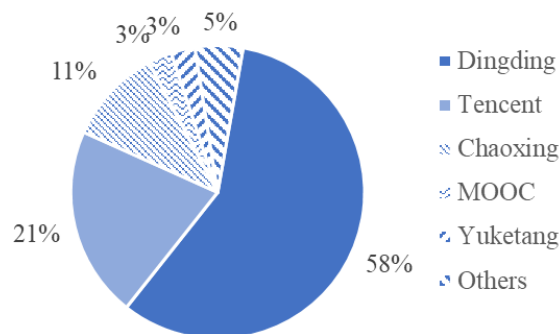


Fig. 1. Use of online teaching platform

Through the survey, it is found that due to the impact of the public health crisis or the computer network, some teachers and students failed to conduct online teaching and learning. The main reason is that teachers could not return to school in time in high-risk areas and didn't have laptops available. Also, only one teacher of the college has not conducted online computer teaching for personal reasons. The survey was also performed on the reason for some students not attending classes online. The results in Figure 2 show that among these students, those with poor network occupy the largest proportion, 7 in total; some students didn't have computers or other related hardware, or some mountainous areas have no network connections. Most students know the use of online education software, and those who will not use it can master the online education software after learning.

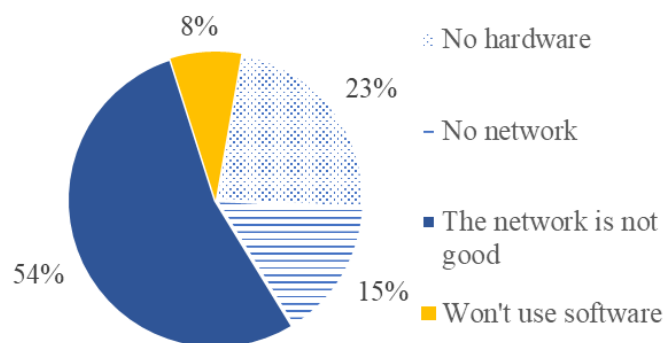


Fig. 2. Reasons for students not attending classes online

3 Online Software Platform Functions

The DingTalk software platform is very popular among the online users. To understand the functions of the online software platform, this paper takes the DingTalk software as an example, because its functions are basically similar to other online software platforms. The software working platform is mainly divided into different modules such as safe return to work, school management, teaching assistant, home-school interconnection, teacher service, student service, and collaborative efficiency, etc. The specific functions related to online teaching mainly include video conference, live broadcast, course sharing, course replay, sign-in function, screen sharing, video playback, communication and interaction, instant testing, homework function, and data export, etc. DingTalk is not only an online teaching platform, but also a school teaching management platform.

The class is created on the platform in the form of the chat group. After all students in the class join the chat, they can be in the class. Figure 3 shows the toolbar of the class group. First, the students in the class group are informed of starting the class on time. Then, by clicking the live button in the DingTalk class group, the teacher can start the live broadcast, enter the theme, and choose the mode, such as camera mode,

screen sharing mode, or professional mode, etc. After selecting the mode, click to create a live stream. With the option bar at the top of the computer screen, and the interactive panel on the right, click to start the live broadcast. Thus, the class begins. If the students select the save and playback functions of live broadcast, they can watch the playback video after the class. In the class, the teacher can choose to show their chat head or not, and the teacher and the student can interact through the message.

Table 1. Introduction to DingTalk platform functions

Stages	Functions	Description
Teaching management	Sign-in	Learn about students' late and absence
	Course replay	Students can watch teaching videos after class
	Course sharing	Share the course with students
	Home-school group	Establish the home-school connection
Teaching process	screen sharing	Students can see the teacher's computer interface through teachers' screen sharing
	video playback	Play other videos related to the class on the platform
	Teacher' chat head	Students can see teachers online
	Communication and interaction	Realize teacher-student communication function
Teaching evaluation	Instant testing	Take classroom testing of students at any time
	Homework function	Assign, collect, and modify homework
	Data export	Download the relevant data of the teaching process

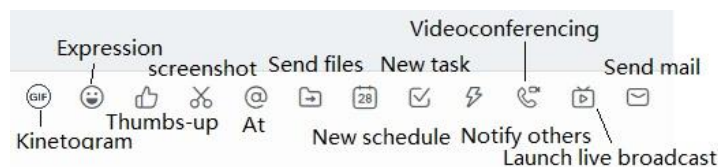


Fig. 3. Toolbar of DingTalk class group

4 Application of Computer in Online Teaching Implementation

4.1 Pre-class preparation

For teachers, pre-class preparation should be made in two aspects: first, in terms of the course, the teachers should prepare the courseware and lesson plans in advance, and get familiar with the teaching content; second, in terms of computer hardware and software, they should prepare the computer, log in to the online software platform, create a class group, add students or let students scan the QR code into the group, send the courseware to the class group in advance, and allow the students to preview.

For students, it is also necessary to prepare hardware such as computers, download and install online teaching software, enter the class group, receive learning materials sent by teachers, preview and preliminarily grasp the content of the course, for better

understanding the learning content. Afterwards, they are ready for the teachers' live broadcast according to the class schedule.

4.2 In-class teaching

In the online teaching, the teacher first initiated the command of sign-in, and the students start to sign in. Within the prescribed time, 26 of the 34 students signed in and 8 did not. In traditional teaching, almost no one is late. In special cases, some students may be late for certain reason. Thus, for computer online teaching, students' self-discipline needs to be improved.

During the teaching process, the teacher-student communication and interaction is carried out through the chat function. If the students do not understand certain problem, they can send a message to the teacher, and the teacher will explain accordingly. The survey on the teacher-student communication and interaction shows that some active students can well communicate with teachers in a timely manner. Due to the convenience of online interaction on the online teaching platform, the overall interaction is better than in traditional teaching. Whereas, there is no much change for students' answering questions, compared with the traditional teaching, i.e., during the online teaching, students are still not active enough in answering questions; when questioned, most students can answer correctly, while a few students answer incorrectly or not.

Throughout the teaching process, the online time of the students was calculated, as shown in Figure 4. It can be seen that 27 of the 34 students could persist until the end of the class; several students had a short class time or left halfway; 1 student was not online. Compared with traditional teaching, computer online teaching is less controlled. It only depends on teachers' regular guidance and students' consciousness. Without the usual teaching supervision mechanism, students become slack in learning discipline.

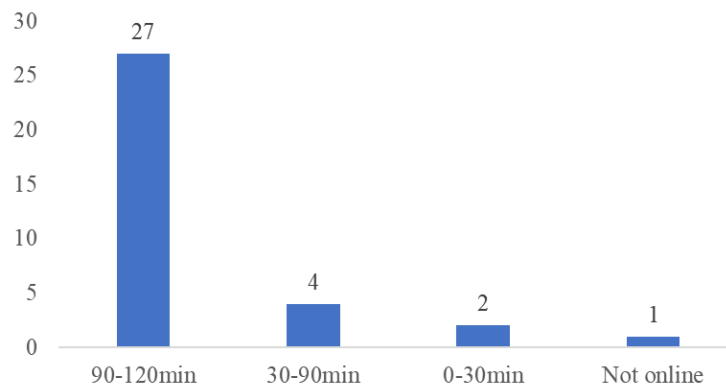


Fig. 4. Students' online time

4.3 After-class homework

Teachers assign homework after class according to the teaching content, and students submit the homework through the online teaching platform. Figure 5 shows the completion of after-class homework. It can be seen that 76% students completed in time, while a small part of students was delayed. In traditional teaching, such phenomenon of procrastination scarcely occurs, and the homework is uniformly collected. Besides, 2 students have not completed their homework. This is rarely the case in traditional teaching. Thus, online education is inferior to traditional teaching in terms of student supervision and control. The non-face-to-face teaching makes students less awesome.

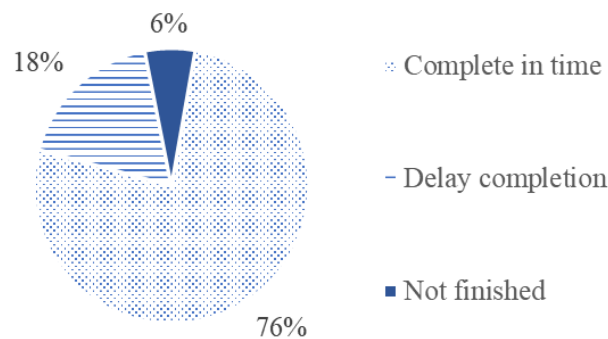


Fig. 5. Completion of students' after-class homework

4.4 Academic record

Students' scores are divided into four levels (as shown in Figure 6). 5 students with 90 scores or above, accounting for 14.71%; 13 students with 80-90 scores, accounting for 38.24%; 13 students with 70-80, accounting for 38.24%; 3 students with 60-70, accounting for 8.82%; the average score of students is more than 80, indicating that the online teaching effect of computer network is good, compared with the traditional face-to-face teaching, students' knowledge of knowledge is better There is little difference in mastery.

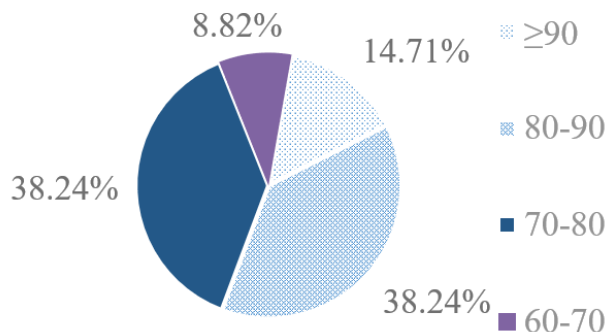


Fig. 6. Academic record

5 Computer Online Teaching Effect

A survey was conducted on the students' satisfaction with the course design and teacher effect. Satisfaction with course design includes overall satisfaction, training satisfaction and course satisfaction; teaching satisfaction is mainly divided into four aspects: teachers' work attitude, teaching ability, interactive ability, and innovation awareness. 425 valid questionnaires were collected in the survey.

The satisfaction with course design is shown in Table 2. Generally, students felt satisfied with the course design; except for practical teaching, 80% students were satisfied or very satisfied about the course design, while less than 2% were dissatisfied and very dissatisfied. Compared with other survey items, practical teaching is less satisfactory, mainly because there is a certain conflict between online teaching and practical teaching, e.g., experiments require students to do it by themselves, but online teaching can only watch the teacher's demonstration video.

Table 2. Students' satisfaction about course design

Survey items	Very Satisfied	Ratio	Satisfied	Ratio	General
Overall satisfaction	194	45.65%	154	36.24%	72
Training satisfaction	178	41.88%	164	38.59%	77
Liberal education	190	44.71%	160	37.65%	68
Basic course	190	44.71%	166	39.06%	62
Core course	200	47.06%	151	35.53%	69
Practical teaching	180	42.35%	155	36.47%	83
Survey items	Ratio	Dissatisfied	Ratio	Very dissatisfied	Ratio
Overall satisfaction	16.94%	4	0.94%	1	0.24%
Training satisfaction	18.12%	5	1.18%	1	0.24%
Liberal education	16.00%	5	1.18%	2	0.47%
Basic course	14.59%	4	0.94%	3	0.71%
Core course	16.24%	3	0.71%	2	0.47%
Practical teaching	19.53%	4	0.94%	3	0.71%

In addition, students’ satisfaction about the teaching effect was evaluated by the students, as shown in Table 3. It can be seen that the respondents recognized the teacher’s work attitude the highest; 88.94% were satisfied or very satisfied about the teachers’ work attitude, while only 0.95% were dissatisfied. Satisfaction with teachers’ teaching ability and interactive ability is also relatively high, up to more than 86%. Students’ satisfaction with teachers’ innovation consciousness also accounted for more than 80%, but 9 were dissatisfied or very dissatisfied, accounting for 2.12%, indicating a gap between the survey items. Thus, teachers’ innovation consciousness should be improved.

The students evaluated the teaching effect, as shown in Table 4, from four aspects: academic report, learning atmosphere, knowledge mastery and skill mastery. Among them, the learning atmosphere was evaluated the highest, with satisfaction and relatively satisfactory accounting for 83.77%. Secondly, they are satisfied with the academic reports. In all the survey contents, the students’ Evaluation on the mastery of skills was poor, with 75.53% of them were satisfied and satisfied, with the highest proportion of dissatisfaction and very dissatisfaction. Therefore, online teaching has weaknesses in mastering students’ skills, especially in classroom experiments and practical exercises, which cannot be operated by hands. Only by recording video and classroom explanation, the expected effect cannot be achieved.

Table 3. Students’ satisfaction with the teacher’s teaching effect

Survey items	Very Satisfied	Ratio	Satisfied	Ratio	General
Work attitude	226	53.18%	152	35.76%	43
Teaching ability	214	50.35%	163	38.35%	43
Interactive ability	213	50.12%	156	36.71%	49
Innovation consciousness	196	46.12%	159	37.41%	61
Survey items	Ratio	dissatisfied	Ratio	Very dissatisfied	Ratio
Work attitude	10.12%	3	0.71%	1	0.24%
Teaching ability	10.12%	3	0.71%	2	0.47%
Interactive ability	11.53%	6	1.41%	1	0.24%
Innovation consciousness	14.35%	6	1.41%	3	0.71%

Table 4. Satisfaction of teaching effect.

Survey items	Very Satisfied	Ratio	Satisfied	Ratio	General
Academic report	200	47.06%	138	32.47%	77
Learning atmosphere	211	49.65%	145	34.12%	60
Knowledge mastery	180	42.35%	148	34.82%	87
Skill mastery	182	42.82%	139	32.71%	91
Survey items	Ratio	dissatisfied	Ratio	Very dissatisfied	Ratio
Academic report	18.12%	5	1.18%	5	1.18%
Learning atmosphere	14.12%	5	1.18%	4	0.94%
Knowledge mastery	20.47%	7	1.65%	3	0.71%
Skill mastery	21.41%	9	2.12%	4	0.94%

6 Conclusion

The statistical survey was conducted on the online teaching situation of teachers and students. It's found that most teachers successfully carried out online teaching and a small number of teachers did not for the hardware or network reasons, while the situation of students is similar to that of teachers, and some students failed to study online due to poor network.

DingTalk and Tencent, as the common online teaching platforms, were taken as examples for statistical analysis, and the related functions were introduced. These functions can ensure the smooth progress of online teaching. Besides, the entire implementation process of class online teaching was also introduced in detail. Compared with traditional teaching, students in the online teaching mode performed better in terms of pre-class preparation, in-class teaching, and after-class homework; the students may become slack in learning discipline due to its weak supervision and control.

The satisfaction with the course design and teaching effect was surveyed. The results show that students had a higher degree of satisfaction about the course design; the respondents were satisfied and very satisfied with course design except for practical teaching, accounting for more than 80%, while practical teaching requires innovative ideas; the students' satisfaction about the teaching effect is generally higher than course design, but teachers' innovation consciousness needs to be improved.

7 References

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