

Practice and Exploration of Online Teaching for Medical Postgraduates

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Abstract

In the new situation of normalization of epidemic prevention and control, online teaching has become a guarantee for students to continue studying. 102 graduate students of Wuhan University Medical College who have participated in online and offline teaching were the research objects, and the types of learning knowledge, learning status, learning effects, online teaching satisfaction, etc. of online teaching are known through questionnaires. The results showed that during online teaching, teachers ensured the learning status of the students by implementing the teaching plan on time and compulsory attendance, the interaction between teachers and students was also more than that of offline teaching, and the learning effect was not much different from the offline teaching when the learning progress was about the same. The advantages of offline teaching cannot be ignored, but online teaching also has irreplaceable advantages. Most students were satisfied with the current online teaching.

Keywords

Online Teaching, Medical Postgraduates, Questionnaire Survey, Learning Effect, Learning Status

1. Introduction

Since December 2019, the epidemic situation of new type of coronary pneumonia has swept the country, and the situation is grim. In order to ensure that students are not suspended from classes, Liu (2022b) thought online teaching has become an indispensable teaching method. In recent years, Zhang (2022) thought online education platforms such as “China University Muke Online” and “Wu-

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han University LuoJia Online” have become common auxiliary teaching methods in daily teaching at Wuhan University. However, under the epidemic situation, Ma (2020) reported that online teaching, which was once an auxiliary teaching method has now turned into the main teaching method in the public view, causing widespread concern. But the learning status and learning effect of online classes for postgraduates are still not clear. For this reason, 102 graduate students from the Medical Department of Wuhan University participated in online and offline teaching as research objects, then through questionnaire survey, aiming to objectively evaluate the learning status and learning effect of graduate students of Wuhan University Medical Department in the whole network teaching environment, so as to provide data support for network teaching research.

2. Research Subjects and Methods

2.1. Questionnaire Design

After literature review, the questionnaire was made including 5 points and 25 questions. The survey content specifically includes the following: 1) Types of online learning knowledge; 2) The learning state of postgraduates in network teaching; 3) The learning effect of postgraduates in network teaching; 4) Postgraduates' inclination to offline teaching and online teaching; 5) Problems in network teaching, and then to investigate the teaching effect of online teaching, focusing on the characteristics of the whole network teaching method.

2.2. Investigation Methods

The questionnaire stars were used to import the questionnaire questions online. In order to ensure the authenticity of the answers, anonymous answers were used. The questionnaire was distributed to the postgraduate group through WeChat/QQ and other platforms, and the postgraduate completed the questionnaire online and in limited time by scanning the QR code. Two researchers counted and checked the original data respectively.

2.3. Statistical Methods

Data analysis after questionnaire collection. Measurement data were described as mean \pm standard deviation, and student's t-test was used for comparison between groups. For categorical data, the chi-square test was used to judge the differences between groups, and the Cochran-Armitage trend test was used to analyze the significance of the trend changes in multiple groups. Statistical analysis was done in R software (<https://www.r-project.org/>). Differences were considered statistically significant at $P < 0.05$.

3. Results

3.1. Knowledge Type of Online Learning

According to the questionnaire survey, it was found that students' online teaching and learning content was dominated by school curriculum content (90.2%);

At the same time, the relevant theoretical knowledge (83.33%) and bioinformatics-related knowledge (45.1%) of this major were also the contents that students learn more (**Figure 1**).

3.2. The Study Status of Postgraduates in Network Teaching

This paper investigated course attendance, homework settings, weekly learning hours, students' attendance and attention, and comprehensively evaluates the learning status of students in online teaching. 91 students (89.21%) previewed the classroom teaching content in advance according to the timetable and syllabus. The vast majority of teachers set up class sign in, and only 3 students (2.94%) said that teachers have never set up class sign in. 74 students (72.55%) said that teachers would leave homework after class. The number of people who choose offline teaching for less than 10 hours per week was significantly less than the number of people who choose online teaching (19, 18.63% vs 39, 38.24%); The number of people who chose offline teaching for more than 10 hours per week was significantly higher than that of online teaching (83, 81.37% vs 65, 63.73%). The weekly teaching duration of the two teaching methods showed significant difference ($\chi^2 = 7.975$, $P = 0.005 < 0.01$). Through cross analysis of offline teaching and online teaching students' attendance, it was found that there was a significant difference in the overall attendance of students between the two teaching methods ($\chi^2 = 13.017$, $P = 0.005 < 0.01$). The specific analysis of the differences showed that the proportion of students choosing to "attend each class on time" in online teaching is significantly higher than that of offline teaching (86.27% vs 77.45%). However, the proportion of "late experience" in online teaching was significantly lower than that in offline teaching (15.69% vs 25.49%). 55 students (53.92%) thought that there was not much difference in concentration between online teaching and offline teaching (**Figure 2**).

3.3. The Study Effect of Postgraduates in Network Teaching

Through the statistics of the number of interactions between offline teaching and online teaching (**Figure 3(a)**), it was found that there was a significant

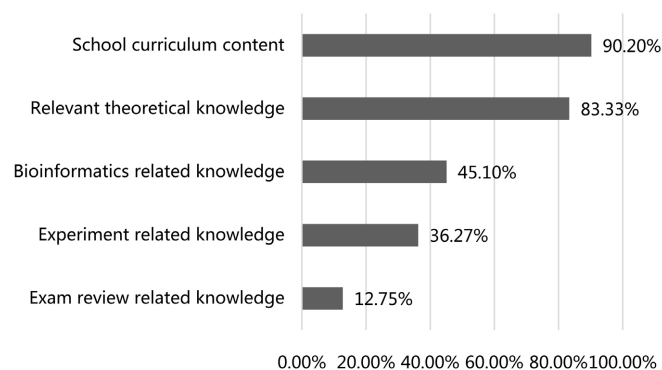


Figure 1. Knowledge type of online learning.

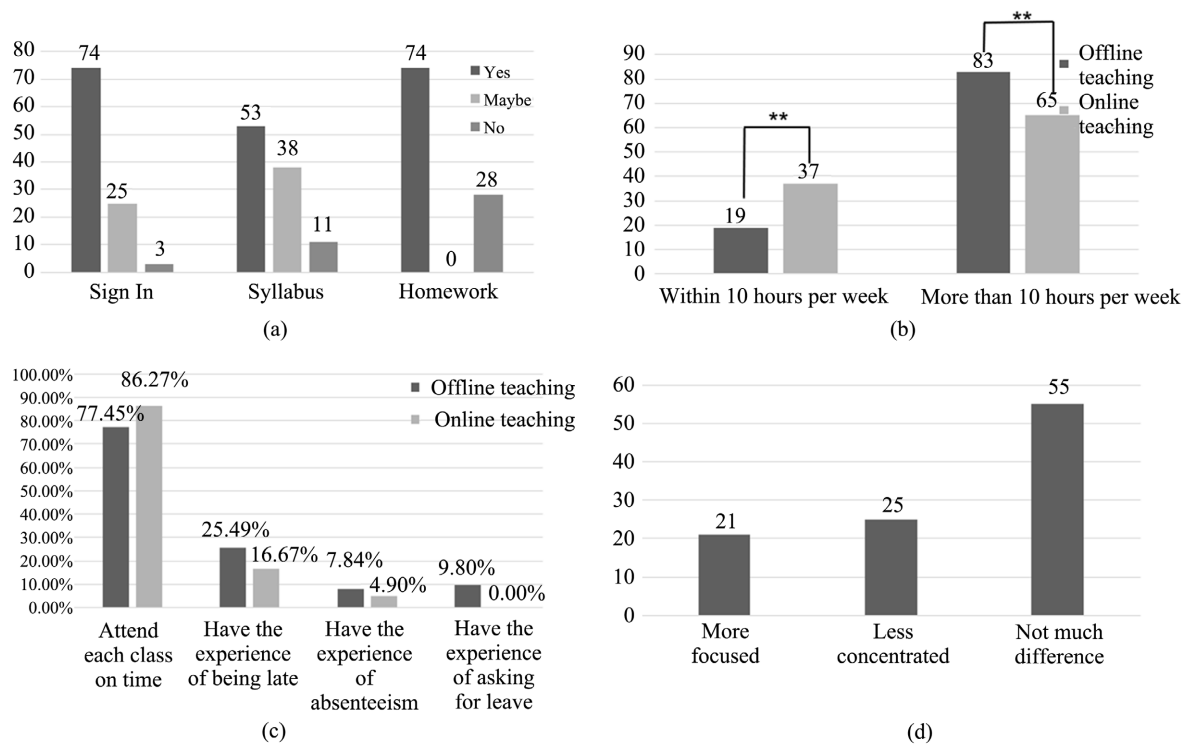


Figure 2. The Study Status of Postgraduates in Network Teaching: (a) Online teaching commuting; (b) Weekly teaching duration of the two teaching methods; (c) Attendance of the two teaching methods; (d) Online teaching compared to offline teaching’s concentration. **: $P < 0.01$.

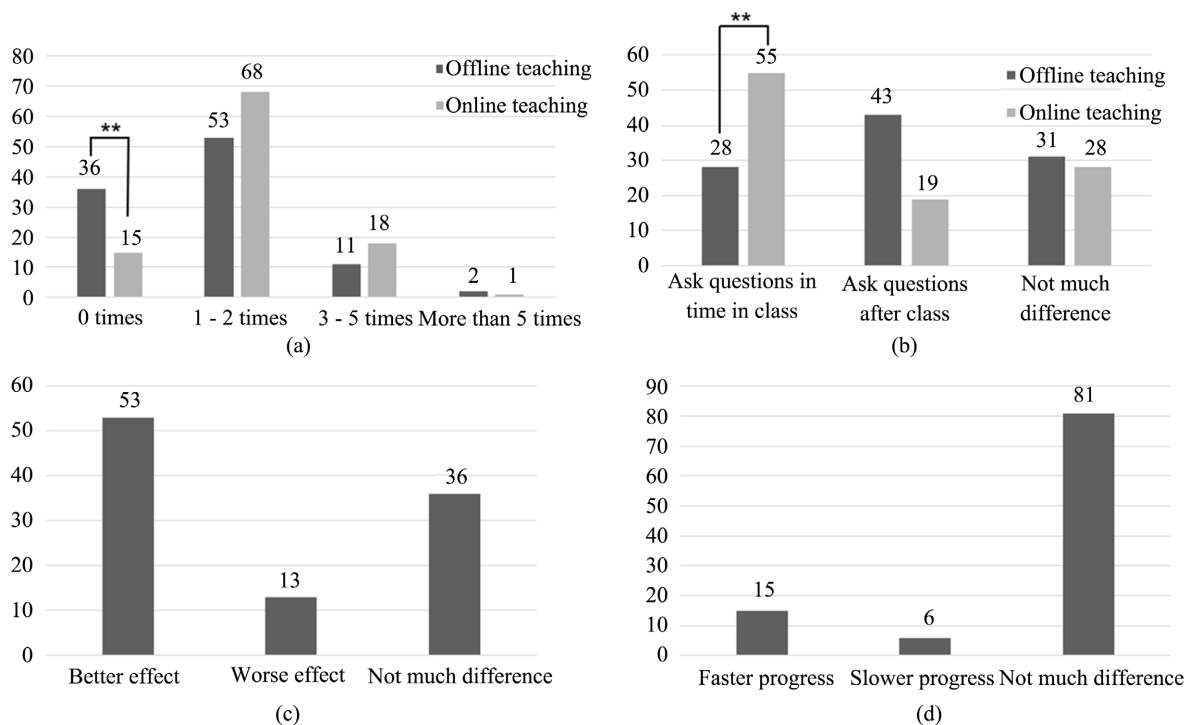


Figure 3. The Study Effect of Postgraduates in Network Teaching: (a) Interaction frequency; (b) Interaction ways of the two teaching methods; (c) Online teaching compared to offline teaching’s interactive effect; (d) Online teaching compared to offline teaching’s progress. **: $P < 0.01$.

difference in the number of classroom interactions between the two teaching methods ($\chi^2 = 7.119, P < 0.01$). By comparison, the number of people who never interacted with teachers during offline teaching was significantly higher than that in online teaching (36, 35.29% vs 15, 14.71%) ($P < 0.05$).

In addition to the difference in interaction frequency, students also have different ways of interaction in the two kinds of teaching (Figure 3(b)). In offline teaching, 43 students (42.16%) tend to ask questions after class, while in online teaching, 55 students (53.92%) asked questions in time in class. The analysis showed that there was a statistical difference between the three questioning methods in online teaching and offline teaching ($\chi^2 = 18.226, P < 0.05$); By comparison, it was found that compared with offline teaching, students were more willing to ask questions in the classroom during online teaching (55, 53.92% vs 28, 27.45%) ($P < 0.05$). Figure 3(c) showed that 53 students (51.96%) think that the interactive effect of online teaching was better. As for the teaching progress (Figure 3(d)), 81 students (79.41%) believed that there was not much difference between the two teaching methods.

3.4. Postgraduates' Tendency towards the Two Teaching Methods

Figure 4(a) and Figure 4(c) showed that 28 students (27.45%) who prefer offline teaching believed that strong learning atmosphere (89.47%), easier concentration (89.47%) and more intuitive communication with teachers (63.16%) in

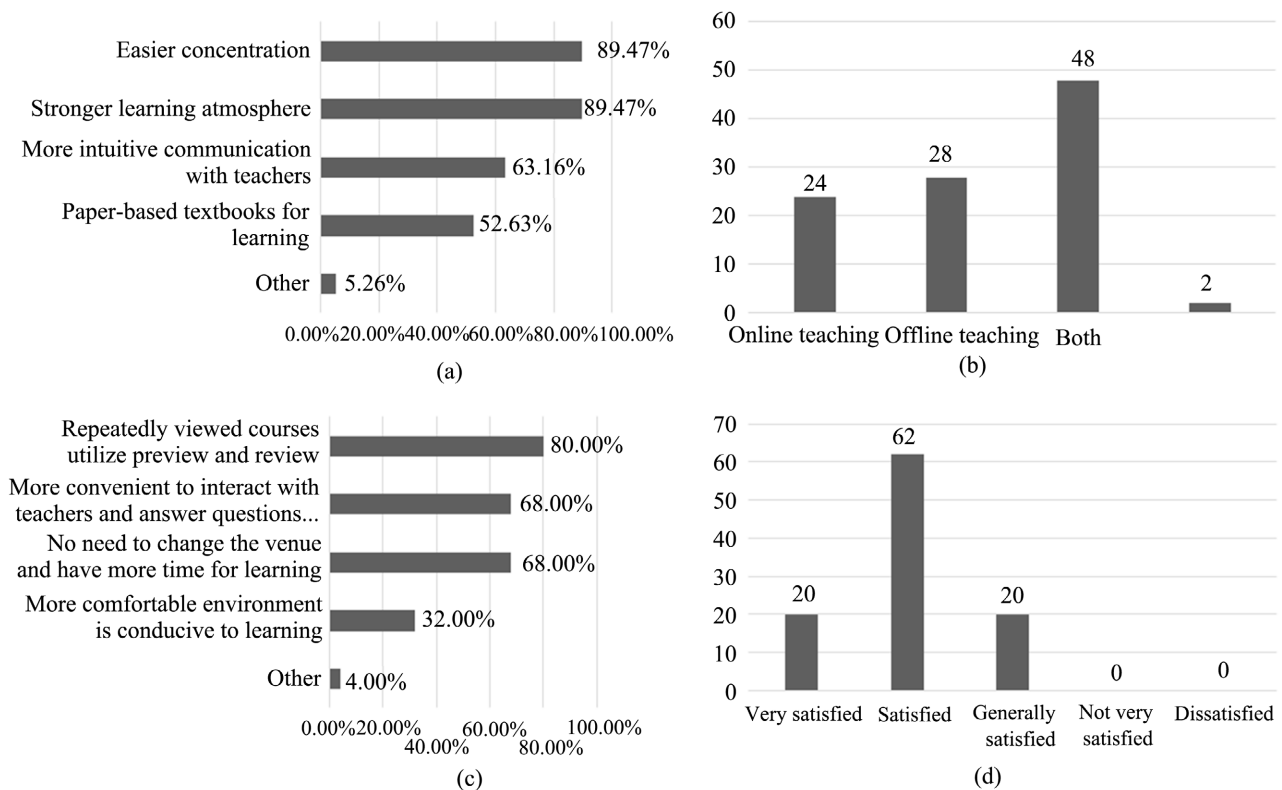


Figure 4. Postgraduates' tendency towards the two teaching methods: (a) Advantage of Offline teaching; (b) Advantage of Online teaching; (c) Tendency of the two teaching methods; (d) Satisfaction of online teaching.

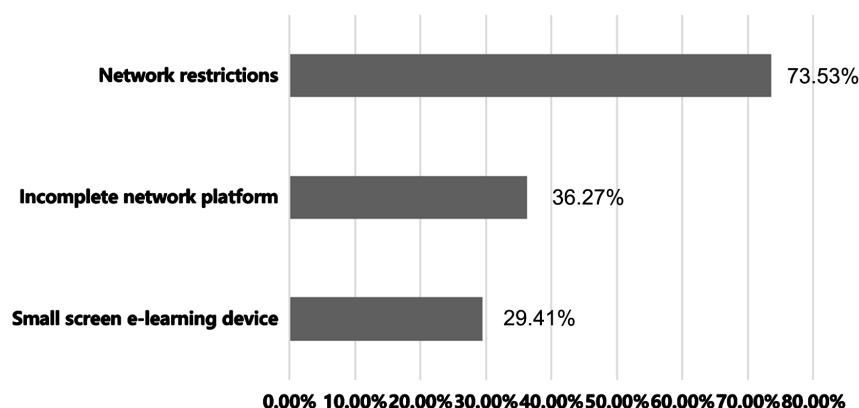


Figure 5. Problems in online Teaching.

the classroom were irreplaceable advantages of offline teaching. **Figure 4(b)** and **Figure 4(c)** showed that 24 students (23.53%) prefer online teaching, and the advantages mainly focus on the following points: resources can be viewed repeatedly, which was conducive to preview and review (80.00%); It was more convenient to interact with teachers and answer questions in time (68.00%); There was no need to change the venue, and there was more time for learning (68.00%).

For online teaching during the epidemic, 20 students (19.61%) were relatively satisfied, while 20 students (19.61%) were generally satisfied.

3.5. Problems in Online Teaching

Among the problems that students encountered in online teaching, network restrictions had the greatest impact on everyone's learning (73.53%); Secondly, the network platform was not perfect enough, which had a certain impact on the complete reception of classroom information (36.27%); The electronic screen used for learning was too small, which also had a certain impact on students (29.41%) (**Figure 5**).

4. Conclusion and Reflection

In traditional offline teaching, **Feng (2022)** thought students are taught in the same classroom, which has a strong learning atmosphere. At the same time, teachers can dynamically observe students' learning status. In online teaching, students' learning status has been tested to some extent due to the loss of collective atmosphere and certain supervision. The survey showed that there was a significant difference in the attendance of students between offline teaching and online teaching. The proportion of students who choose to "attend every class on time" in online teaching was significantly higher than that of offline teaching; at the same time, the proportion of "late experience" in online teaching was significantly lower than that in offline teaching. What are the main factors influencing this situation? The survey results showed that: first, there was a significant difference in the weekly teaching hours between offline teaching and online

teaching. [Zhai \(2014\)](#) reported that a large learning load is a major reason for learning burnout, while medical students, a special group, have been in a tense state of high learning pressure and heavy academic load for a long time, and learning burnout is also more prominent. Therefore, when the teaching duration of online teaching is appropriately reduced and the load of passive listening is reduced, the students' arrival in class will be more ideal. Second, Attendance and homework ensure that students arrive at class on time to a certain extent.

In addition to the learning state, [Zhang \(2021\)](#) showed that the effective interaction between teachers and students had a significant positive impact on students' learning effectiveness. The survey showed that there was a significant difference in the number of classroom interactions between the two teaching methods. The number of students who never interact with teachers during offline teaching is significantly higher than that in online teaching. At the same time, in the two teaching methods, the interactive way of students' tendency is also different. Compared with offline teaching, online teaching students tend to ask questions in class. In offline teaching, students may be "unable to let go", "I'm sorry to speak", but I don't want to ask questions in class. It was believed that the teaching progress of the two teaching methods is not much different. During online teaching, teachers and students have reduced eye contact and other physical communication, and teachers are more focused on promoting curriculum knowledge. Therefore, [Wang \(2019\)](#) thought while reducing teaching time, teaching progress is still guaranteed.

The research showed that the flexible and independent learning environment that was not constrained by the site is the main advantage of online teaching. In this survey, the advantages of online teaching mainly focus on the following points: resources can be viewed repeatedly, which was conducive to preview and review (80.00%); it was more convenient to interact with teachers and answer questions in time (68.00%); There was no need to change the venue and more time to learn (68.00%); at the same time, the comfortable and free learning environment at home (32.00%) also accounted for a certain proportion. For students who prefer offline teaching, the strong learning atmosphere in the classroom (89.47%), easier concentration (89.47%), and more intuitive communication with teachers (52.63%) were irreplaceable advantages. [Davis \(2019\)](#) thought problems that can be expressed clearly in a few words in offline teaching may require more complex expression in online teaching, and may even cause misunderstanding.

Although students were satisfied with online teaching at present, only 20 students (19.61%) are generally satisfied. But it is undeniable that there are still problems to be solved in the current network teaching. The survey shows that the network restrictions have the greatest impact on students' learning (73.53%); secondly, the network platform is not perfect enough, which has a certain impact on students' complete receipt of classroom information (36.27%). A good information environment is the basic guarantee for the application of network teaching. Therefore, in addition to the efforts of students and teachers, the tech-

nical support of information technology personnel also plays a very important role in the smooth development of online teaching. Zhou (2022) thought in addition to the problems mentioned above, students' health may be affected if they face the electronic screen for a long time, which cannot be ignored.

This survey also provided some reference opinions for the follow-up network teaching: from the perspective of teachers, Chen (2020) thought reasonable arrangement of teaching content and teaching duration was conducive to maintaining students' learning state. Yao (2022) thought strengthening interaction, encouraging students to ask questions, and improving students' participation in the classroom will help students achieve better learning results. From the perspective of students, reasonable arrangement of learning and daily life and improvement of autonomous learning awareness are the basic conditions to ensure the learning state. Liu (2022a) thought it was also an important way to ensure the learning effect by actively interacting in class, solving your questions in time and reviewing after class.

Ethics Approval and Consent to Participate

The project was approved by the Human Research Ethics Committee at Wuhan University. Students were informed about the study and signed consent forms.

Availability of Data and Materials

The dataset used and/or analyzed during the current study is available from the corresponding author on reasonable request.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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