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The Application of Student-Centered Online and Offline Blended Teaching Model in Histology and Embryology

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(Received 10 May 2022; revised 29 May 2022; accepted 25 June 2022; first published online 30 September 2022)

Abstract

Under the teaching goal of "Golden Course" proposed by the Ministry of Education, student-centered online and offline blended teaching has become a new hot topic. Combining online and offline teaching and applying it to the teaching practice of histology and embryology, this study takes the offline course as the main line supplemented by online pre-review and review, group discussion, flipped classroom and other forms of learning. This paper takes class 3 students of 2018 and 2019 eight-year clinical medicine as the research subjects, evaluates the teaching effect through the data analysis of experimental results, final evaluation results and teaching feedback survey, and applies SPSS20.0 software to statistically analyze the students' grades. The results have shown that the students' experimental scores and final evaluation scores in the online and offline hybrid teaching group are better than those in the traditional offline teaching group, although the differences are not significant ($P > 0.05$), and the student participation is also higher. It shows that the online and offline blended teaching mode is better than the traditional teaching mode, which can improve the teaching quality of histology and embryology, promote the interaction between teachers and students, and improve teaching and learning.

Keywords: histology and embryology; online and offline blended teaching; teaching reform

Histology and embryology mainly studies the normal structure and function of human body[1], which is one of the basic courses of medicine, pharmacy and nursing and other majors. For one thing, its teaching content has an important value, acting as a bridge and interpenetrating with human anatomy, pathology and other disciplines; for another, it is the basis for learning obstetrics and gynecology, urology and other subsequent professional courses[2]. As the study of histology and embryology is the microscopic world invisible to the naked eye, it is rather abstract for the junior students who have just come into contact with medical professional courses. Moreover, the theoretical knowledge of histology and

embryology is complicated, with many professional concepts and tissue structures, which is one of the professional basic courses with great difficulty for students. How to arouse students' interest in learning, make the learning process more efficient, relaxing and interesting, and how to improve the teaching quality of histology and embryology has become a problem that teachers pay close attention to.

With the development of the Internet era, information technology has been applied to the field of education[3]. At the same time, since the epidemic of novel coronavirus pneumonia swept the world in early 2020, it has disrupted the traditional teaching order. The instruction of "Stop classes but don't stop teaching, stop classes but don't stop learning" issued by the Ministry of education also puts forward higher and faster requirements for the reform of teaching mode[4 6]. In this special case, colleges and universities have built online teaching platforms suitable for their own schools[7]. Online teaching can make up for the disadvantages of traditional offline teaching restricted by time and location, break the fence of traditional teaching. Students can control their own learning time and rhythm, and make full use of the rich resources of online courses for independent learning[8]. However, teaching and education is always the relationship between people, and real communication and interaction between teachers and students in the same space and time cannot be replaced by the cold Internet[9]. In recent years, we have been actively exploring and adopting the online and offline blended teaching mode of "online self-study before class, offline teacher tutoring in class, and online review and consolidation after class". Through continuous reflection and summary, the understanding and application of blended teaching has become more and more mature, and this teaching mode has also achieved good teaching results.

1. Research Objectives and Methods

1.1 Research subjects

As the research subjects, class 3 students of 2018 and 2019 eight-year clinical medicine are divided into two groups by grades, namely, the traditional teaching group (33 students in class 3 of grade 2018) and the mixed teaching group (32 students in class 3 of grade 2019).

1.2 Teaching materials and lectures

Both the traditional teaching group and the blended teaching group adopt the textbook of Histology and Embryology, 9th edition, published by People's Health Publishing House and edited by Li Jicheng for the theory class, and the experimental courses adopt the textbook of Histology and Embryology Laboratory Guide, published by People's Health Publishing House and edited by Li Jicheng. Both classes are taught by the same teacher, and the course standards and teaching schedule are the same.

1.3 Teaching implementation

1.3.1 The traditional teaching group adopts the form of traditional teachers' teaching

The theory class is arranged for 2 class hours each time, with 45 minutes for each class hour, a total of 90 minutes. Of which 75 mins is used as the intensive lecture time to exhaustively explain the basic knowledge points, key points and difficulties in the course. At the same time, it will integrate into classroom ideology and politics, and guide students to establish a correct

outlook on life and world view . 5 minutes is used for class summary, which is conducted in the form of questions or group QA to ensure that the basic knowledge points, key points and difficulties in the teaching are thoroughly understood by students and to understand the extent of students' learning and mastery. In the last 5 10 minutes, the research progress is briefly introduced related to the content of this class, and finally the courseware and relevant references are left to students for review after class. The experimental class also has 2 class hours, namely 90 minutes each time, of which 30 minutes is for the interpretation of tissue sections, 50 minutes for students to observe independently and teachers to answer questions on the spot, and 10 minutes for knowledge summary and review.

1.3.2 The blended teaching group adopts the online and offline blended teaching mode of "online self-study before class, offline teacher tutoring in class, and online review and consolidation after class"

Abundant teaching resources are the guarantee of implementing innovative and efficient teaching mode. In recent years, with the penetration of the Internet in the field of education, we have constructed rich teaching resources for online courses by recording histology and embryology teaching videos and creating online course websites and putting them into actual teaching, which has played an outstanding teaching effect. We chose Wisdom Tree APP as the online teaching platform. Once the course was online, the platform provided a variety of convenient online communication methods, and a series of teaching-related functions such as student check-in, data recording, homework assignment, exams, etc. At the same time, we also set up course QQ groups and WeChat groups as supplementary forms of online teaching. In this way, it is convenient for students to communicate with each other more timely when problems arise in online learning. Meanwhile, teachers can assign and correct homework for students through the "homework" column in QQ groups. The two forms complement each other to provide a comprehensive platform for self-study and review, which solves the problem of the limitation of time and space in traditional teaching[10,11]. Online teaching relies on smart tree app and morphological virtual simulation teaching system as online teaching tools to carry out teaching design, resource sharing, homework assignment, group discussion, teacher-student communication, questionnaire survey and other teaching activities. Offline classes focus on effectiveness, adopt problem-based and heuristic teaching methods, and blend ideological and political content into the teaching process in a timely manner, integrating knowledge transfer and value shaping.

Before class, the teacher will send the "teaching schedule" to the students in advance, so that the students can preview according to the course arrangement and watch teaching courseware, videos, digital slices and other related learning materials. Teachers guide students to complete the established teaching tasks, and collect students' difficult problems through the online platform, so that they can answer questions uniformly in offline classes. For some chapters, we will set classroom discussion tasks, for which students prepare in groups in advance and make PPT for presentation in class.

Lecture, interaction and Q A in offline class. The content and time allocation in the class are basically consistent with traditional teaching, but because students preview online in advance and enter the classroom with problems, the interaction between teachers and

students will be stronger and students' participation in the classroom will be higher. In the part of group discussion, each group will have a student representative to report and explain, and then the whole class will ask questions freely; the reporter or the group members will answer the questions, discuss and exchange ideas with peers, and the teacher will review and summarize. Each group discussion will last about 10 minutes. The teacher will give the score according to the performance of each group. The basic score is 80 points, the reporter will add 5 points, and the student will add 5 points for each question or answer. The total score will not exceed 100 points and be part of the daily performance. Besides, group discussion will be held in the experimental class with a few slide observation tasks, and each discussion class will take about 50 minutes.

Online review and consolidation after class. Students are required to complete the corresponding learning nodes within the specified time through Wisdom Tree platform, and their learning is recorded in daily performance.

1.4 Evaluation of Teaching Effectiveness

1.4.1 Final experiment grades

At the end of the semester, the experimental examination of histology and embryology is conducted in the form of students' observation of slides with microscopes. Students observe the slides, write the name of the tissue, and write the basis for judgment. 20 points in total.

1.4.2 Overall end-of-term grades

The theory examination of histology and embryology at the end of the semester is conducted in the form of closed book. The paper score is 100 points and the examination time is 2 hours. The final overall grade consists of 15% of the mid-term theoretical exam, 10% of the mid-term experimental exam, 40% of the final theoretical exam (the scope of the exam is all theoretical teaching content, including introduction, four basic tissues, organ system, general theory of embryology, etc.), 20% of the final experimental exam (organ and system slices), and 15% of daily performance (including online course learning, case discussion and homework). The total score is 100 points, and a comprehensive score of 60 or above is qualified.

1.4.3 Students' feedback on teaching

Interviews were conducted in a planned way during classes to understand students' needs and evaluation of teaching.

1.5 Statistical methods

The data were statistically analyzed by SPSS 20.0 software. All data were expressed as mean \pm standard deviation ($\bar{x} \pm s$). Independent samples T test was used to compare the data between the two groups. When $p < 0.05$, it was considered that the difference was significant.

2. Results

2.1 Comparison of the final grades between online and offline blended teaching group and traditional teaching group

As shown in Table 1, the students’ experimental scores and final evaluation scores in the online and offline blended teaching group are better than those in the traditional offline teaching group, although the differences are not significant ($P > 0.05$). The standard deviations are also smaller than those of the traditional teaching group, indicating that the dispersion of students’ grades in online and offline blended teaching is lower, and the grades of low-level students are also improving steadily, which reflects that blended teaching makes students’ learning participation higher, and rich online and offline resources can meet the learning needs of students at different levels.

Table 1 Comparison of the final experimental and comprehensive assessment scores of students in the two groups

Group	Number of people	Final experimental scores ($\bar{x} \pm s$)	Final comprehensive scores ($\bar{x} \pm s$)
Traditional teaching group	33	15.56±3.42	82.22±10.07
Online and offline hybrid teaching group	32	16.59±2.49	84.40±8.54
P-value		0.17	0.35

2.2 Teaching Feedback

Through planned interviews with students during classes, the results show that students are more satisfied and respectful with online and offline blended teaching mode. "Pre-learning in advance through the online course allows me to enter the class with questions, so I can focus more on the class and understand the questions more profoundly". "The courses on the online platform can be watched repeatedly, which deepens my understanding and consolidation of knowledge. Through the digital slicing library, I can observe the slices without the limitation of time and place, so that I can master the organizational structure more firmly". "I can practice offline in the experimental class, and deepen understanding and memory through online learning after class, which makes the learning effect double". "The review before the exam can be more efficient with the help of video courses". Most of the students’ evaluation of traditional teaching is that teachers have clear logic, perfect design and prominent focus, but the review resources after class and the channels to contact teachers for communication are very limited.

3. Discussion

From the comparison of students’ final experiment scores, final overall assessment scores and students’ feedback, we can see that the application of online and offline blended teaching mode in the teaching of histology and embryology has indeed achieved good learning effect, and also effectively solved some problems that exist in the traditional offline teaching, such as students’ passive learning, low classroom participation, insufficient teacher-student

interaction, and students' ability to analyze and solve problems is not effectively exercised, etc.

The application of online and offline blended teaching mode has firstly made the roles of teachers and students changed. Teachers have changed from leading teaching to guiding teaching, and students' learning has changed from passive to active. The independent component of learning has greatly increased, and students can better control their learning rhythm, which is consistent with the concept of student-centered education. Secondly, it has changed from imparting knowledge to a combination of ability development and comprehensive quality improvement-centered on imparting knowledge. Blended teaching pays more attention to interaction between teachers and students, and establishes a systematic learning environment where students can express and ask questions freely, and can arrange their learning without time and space constraints, so that they can be busy before and after class. Thirdly, the organic combination of PBL teaching and flipped classroom. PBL is a "problem-based" teaching method [12], and we introduce and integrate PBL into the flipped classroom teaching mode, set relevant problems based on clinical cases, students study in groups, analyze and solve problems, and send representatives to report and discuss together. The clinical case discussion can stimulate students' enthusiasm to explore problems, effectively give play to students' dominant position in the learning process, and enhance students' ability to analyze problems, solve problems and cooperate in teams. Fourthly, it has integrated ideology and politics into the classroom. The integration of ideological and political education in the classroom realizes the pluralistic unity of knowledge teaching, value shaping and ability training, and guides students to establish correct values, outlook on life and world view[13]. Fifthly, effective assistance for pre-examination review. In the traditional offline teaching class, students have limited resources to review after class, and the communication channel with teachers is not smooth, which seriously affects students' preparation mentality and review effect. In the online and offline blended teaching mode, students can review the teaching videos on the online platform, watch them repeatedly, and discuss online what they don't understand, making learning and review more efficient. Last but not least, transformation of the evaluation method. Changing from a single final examination to a comprehensive performance evaluation can better reflect students' problems in learning.

Each coin has two sides. The student-centered online and offline blended teaching model has played a positive role in the teaching of histology and embryology, but also posed more challenges to us. Blended teaching requires teachers to skillfully use network technology. Teachers should always update their educational ideas, establish the concept of lifelong learning[14,15], and strengthen the knowledge structure. More importantly, online and offline blended teaching increases the opportunities for students to ask questions, requires teachers to answer questions at any time, and increases teachers' workload, which expects teachers to pay more effort and enthusiasm.

In conclusion, the student-centered online and offline blended teaching mode can improve the teaching quality of histology and embryology and the comprehensive quality of students, promote the interaction between teachers and students, and improve teaching and learning, which is worthy of promotion.

Funded Project

Undergraduate teaching quality project and teaching perform project of Sun Yat-sen university in 2022 teaching affairs [2022] No. 91 Graduate education innovation plan project of Guangdong 2021, (Yue Jiao Yan Han [2021] No. 2); The first phase of Ministry of Education's supply and demand matching employment and education project, 20220104076 (Department of Higher Education Students Letter [2022] No. 7)

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