Research on Design and Effect of Flipped Classroom Instruction Model

Wendi Duan

{wddspace@163.com }

School of Education, TianJin University,TianJin, China

Abstract. Entering the information age, the technological support and concepts of education are constantly being updated, and the process of education informatization and modernization is accelerating. The reform of educational curriculum also requires that attention be paid to changes in learning methods in education and teaching, and students' initiative should be unleashed. The emergence of flipped classrooms not only conforms to the process of social informatization, but also contributes to the realization of students' subjectivity, which is conducive to achieving students' personalized and comprehensive development.This study is based on the theoretical foundation of flipped classroom, combined with the theoretical model of flipped classroom teaching design based on SPOC mode. Taking "Fundamentals of Photography" as an example, after the implementation of the course, questionnaires and interviews are used to investigate the learning effectiveness of students. Summarize the advantages and disadvantages of the SPOC based flipped classroom teaching model, reflect on it, and provide an overall summary and outlook on the content and issues of this article.

Keywords: Flipped Classroom; Instruction Mode; SPOC.

1 Introduction

Higher education in the information society must develop to the online learning, blended learning and collaborative learning. The flipped classroom is an important progress in higher education technology in recent years [1].Teachers should enhance the ability to apply information technology, and timely update teaching concepts and methods, so as to improve teaching effectiveness [2]. Scholars have actively explored the flipped classroom education model. In China, the teaching reforms carried out by Chongqing Jukui Middle School and Shenzhen Nanshan Experimental School are well-known in relevant practice. After introducing the flipped instruction, Chongqing Jukui Middle School summarized the "three-four-five-six" model. Shenzhen Nanshan Experimental School used information technology integration strategies to implement new curriculum reforms, and carried out a lot of localization exploration.

Traditional classroom teaching has significant advantages, such as the leading role of teachers, which can efficiently impart human scientific and cultural knowledge. However, with the progress of the times, education should also undergo changes to adapt to the development of society. At the same time, the implementation of the new curriculum reform allows us to pay more attention to the development of students' personality and their comprehensive quality. In this case, the flipped classroom provides new ideas for carrying out new curriculum reforms and

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breaking the limitations of traditional teaching methods. Its important role is reflected in the fact that it reconstructs the instruction process. Students watch short and concise videos made by teachers in advance before class, which can cultivate independent learning ability; Q&A and group learning in class cultivate the ability of teacher-student interaction and student-student cooperation; after-class instruction management platform and mobile devices can provide students with multiple learning paths, and cultivate students' information collection ability[3].These are conducive to the all-round development of students.

2 Research methods

This study used the Hybrid research methods.The author conduct empirical research in the implementation of the "Fundamentals of Photography" course. After the implementation of the course, the author used questionnaire survey to understand learners' cognition of traditional classrooms and flipped classroom, the effects of instruction, and relevant suggestions and opinions about flipped classroom teaching model. At the same time, the interview method is used to deeply understand the learners' views and attitudes towards the flipped classroom and the teaching mode.

SPOC stands for Small Private Online Course (Small Restricted Online Course). The emergence of SPOC is closely related to MOOC. SPOC sets conditions for student enrollment in relation to MOOCs, and is a school-based curriculum that is primarily conducted on campus rather than on a large scale online course.

The ADDIE curriculum design model divides the teaching process into five links, namely A (Analysis), D (Design), D (Development), I (Implementation), E (Evaluation). Combining the principle of SPOC and based on the ADDIE model, scholar has constructed a teaching design model for flipped classrooms [4], as shown in Figure 1.

The model divides the flipped classroom teaching process into three stages (before, during and after class) and two dimensions (teachers and students). Before class, the teacher publishes the course and tutorial video to the SPOC platform, where the students learn, complete the corresponding tests and submit. The teachers check the students' quizzes from the platform and collect the questions shown by the students. In the class, the teacher first organizes the communication, then explains the difficult points, answers the students' questions, so that the students can deeply understand the knowledge and apply it to other problem situations. Or if the students have a good grasp of the konwledge, the teacher can organize them to report, summarize and comment. After class, students use the SPOC platform to review, and teachers give feedback on the questions raised by students, evaluate their academic performance, and summarize the course. This paper uses the course "Fundamentals of Photography" to conduct research among sophomore students in a university in Tianjin. The results are as follows:

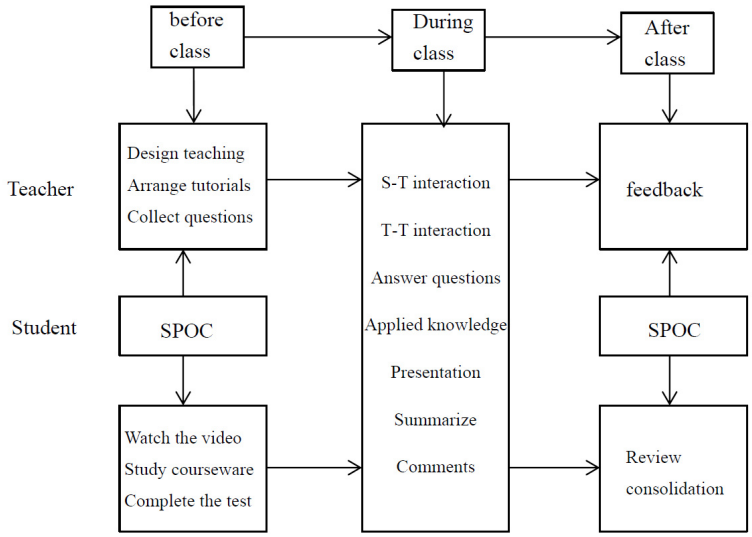

Fig. 1. Flipped classroom teaching model based on SPOC.

3 Results and Analysis

3.1 Analysis of the results of the questionnaire survey

The number of valid questionnaires collected for this study was 43. The reliability of the questionnaire was 0.963. The validity analysis result was: the KMO value was 0.799, which was greater than 0.6, which means that the data had validity. In addition, the variance interpretation rate values of the five factors were 43.317%, 12.309%, 8.801%, 8.703%, and 4.812%, respectively, and the cumulative variance interpretation rate after rotation was 77.942% >50%, which means that the amount of information of the research items can be effectively extracted.

The questionnaire is mainly divided into four dimensions to investigate students' learning: the cognition of the flipped classroom, the learning before class, the learning in class and the mastery after class.

3.1.1 Perception of the flipped classroom

In the survey, 75.6% of the students preferred and were willing to try the flipped classroom teaching mode. The reason is that flexible format of the flipped classroom teaching mode, students have more freedom to arrange their own learning process and strong participation in the classroom. However, some students prefer the traditional teaching method, they think that their foundation is poor and they are not adapted to this demanding learning method for students. Another reason is that they have just graduated from high school and entered college for a short time, and they are not used to this teaching mode for the time being.

The students think the flipped classroom teaching mode can improve students' enthusiasm and initiative. After learning before class, it will be more targeted to listen to and discuss in the

classroom, which improves students' participation in the classroom and the entire course. The disadvantage is that the requirements for students have become higher, especially the awareness and ability of independent learning, and the problems encountered in the process of learning the course cannot be effectively solved.

3.1.2 Learning before class

The questionnaire showed that 58.5% of the students chose the problems encountered before class is learning awareness, 46.3% of the students chose learning ability, as shown in Figure2.

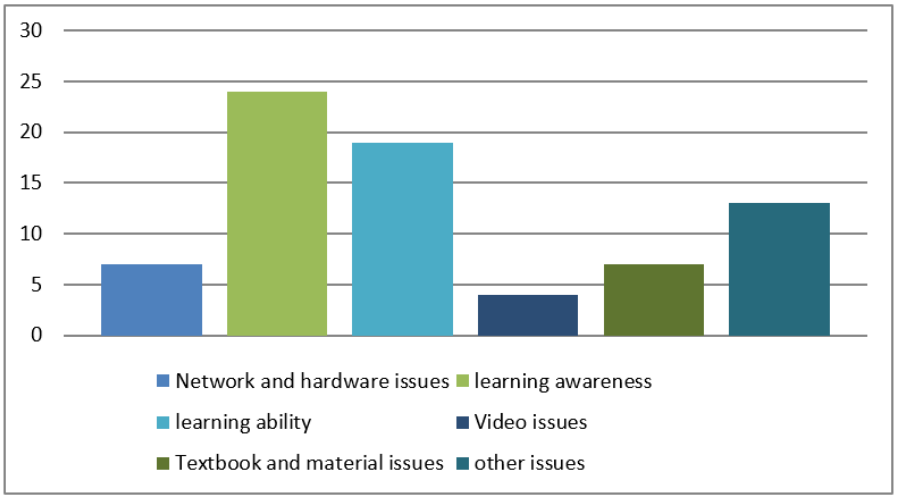

Fig. 2. The questionnaire shows the problems encountered by students during the pre-course learning stage.

Compared with the traditional classroom, the flipped classroom puts forward higher requirements for students' self-discipline and autonomy. But first-year college students often cannot adapt to the process of independent learning in time, and they will feel certain pressure when they study independently before class. Therefore, 46.3% of students can master 25%-50% of the pre-class learning content, and 39.1% of students can master 50%-75%. It can be seen that a considerable number of students are not fully adapted to this SPOC-based flipped classroom teaching mode.

3.1.3 Learning in class

Regarding the question of whether the learning in class can solve their own doubts, 43.9% of the students believe that they can solve part of it. 53.7% of the students think that it can basically be solved. I interviewed two of the students who held the view that only some of the doubts could be solved in class. After the interview, we learned that they believe that there are fewer interaction between teachers and students, and that the focus should be on problem solving in class.

At the same time, during group discussions in class, the main problems encountered by the students were the low enthusiasm of the group members and the inability to unify the group

differences, accounting for 36.6% and 29.2% respectively. Their solutions are mainly three: learning by themselves, cooperating together in the group, and finally asking the teacher for advice.

It can be seen that when meeting issues, the sutdent will carry out reasonable attribution, first starting from improving their own theoretical level and practical skills. Then they play the role of peers, learning and cooperation, and finally turning to teachers for help. Throughout the process, the main role of students has been played and their participation has been increased, but there is also the problem of insufficient teacher-student interaction.

3.1.4 Mastery after class

After class, 36.6% of students can master 25%-50% knowledge, 51.2% can master 50%-75%, and 9.8% of students can master 75%-100%, as shown in Figure 3.

We can see that about 61% of the students can master more than half after class, while 39% can master less than half, so the author interviewed two students with less than half mastery and concluded the reason. The reason is that "Fundamentals of Photography" is a very operational course, in the process of learning through books and videos before class, students can not have a very intuitive understanding of the content taught by the teacher and presented in the book. And due to the practical opportunities, students can not apply the theory well to practice. Therefore, this lack of theoretical mastery and practice has led to students not building a very solid and clear cognitive structure about the course "Fundamentals of Photography". Some students believe that knowledge in the classroom, such as aperture, shutter and ISO, is better to practice directly will be masterd better in practice.

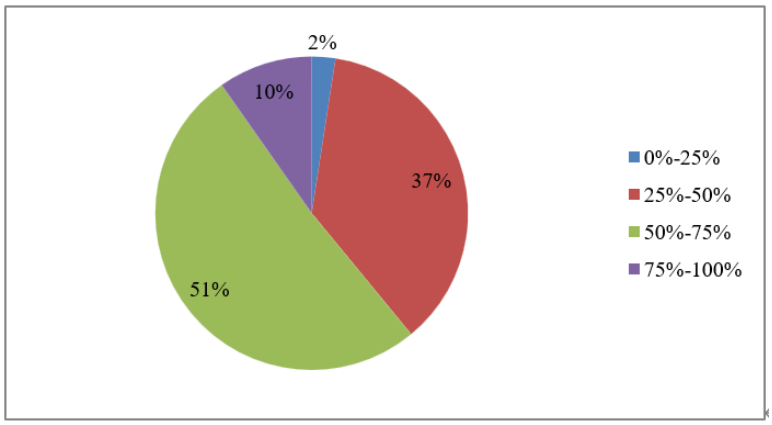

Fig. 3. Students' after-class mastery.

Therefore, in the recommendations to teachers, 26.8% of the students suggested that they should increase the opportunities for practice, and attach importance to the appreciation of works after practice. At the same time, many students believe that the interaction between teachers and students should be increased, which is conducive to problem solving. 9.7% of students feel that their foundation is poor, and teachers should slow down their progress and pay attention to the speed of teaching.

3.2 Analysis of the results of the interview survey

In this study, 7 students were selected from two classes to be interviewed, and the interview questions mainly included three aspects: the application and value of the flipped classroom teaching model, the difficulties encountered in learning, and suggestions for improving the curriculum and teachers.

For the application status of flipped classroom, some students do not understand it, some students think flipped classroom is a supplement to traditional mode and there is no unified and standard form. At the same time, some students feel that the acceptance of flipped classroom in China, especially in the parent group may be relatively low, because parents think that the use of electronic products will divert students' attention and reduce learning efficiency.

Students believe that the value of flipped classroom is that it gives them greater autonomy and stimulates their enthusiasm. Students can set their own pace and learn according to their own conditions, so that learning efficiency has been improved. Secondly, for the course of photography, the flipped classroom teaching mode can leave more time for practice.

As for the difficulties, some students believe that the understanding of the learning content will not be thorough, and it will be difficult to achieve the learning goals. Some students think that the requirements for students' autonomy and active learning ability in the flipped classroom have become higher But the students are not self-disciplined enough, so it may affect the teaching effect of the flipped classroom. At the same time, teachers to be able to master more professional knowledge in flipped classroom instruction model.

Through interviews, we learned that the difficulties encountered by students mainly appeared in the interaction between teachers and students. Several students believed that they encountered many problems in the process of independent learning, but these problems were not effectively solved. So they call more teaching interaction and problem-solving communication. The second is that their self-regulated ability does not meet the requirements and needs corresponding supervision.

Finally, for the flipped classroom teaching mode, the main suggestions made by the students are: teachers should reduce the teaching of theoretical knowledge, increase the opportunities for practice, and provide specific guidance in practice. At the same time, teachers should strengthen the supervision of students' learning. However, some students think that the teacher's requirements are too high, and their own time and study arrangements are under pressure. So teachers should appropriately reduce the requirements and consider the students' time allocation and learning situation. Therefore, the flipped classroom should have a suitable "flipping degree" [5] ,seting learning tasks and learning time scientifically and reasonably.

4 Conclusions

This study found that the flipped classroom teaching model is relatively new. Students generally believe that their ability to learn independently and collaboratively has been improved, their participation in the curriculum and classroom has been enhanced Students are more willing to learn.There are also some problems. First of all, the learning effect of the pre-class independent learning stage is not very satisfactory, and the biggest difficulty for students in this process is

the lack of independent learning awareness and ability, often when the teacher assigns homework, the number of visits to the platform will increase significantly. Moreover, some students do not carry out in-depth study of pre-class learning materials, but only complete task points.

Secondly, from the data of interviews and questionnaires, we can see that students believe that there is less interaction between teachers and students,. The course "Fundamentals of Photography" is very practical, coupled with various reasons such as learner characteristics, time conditions, hardware facilities, teaching arrangements, etc., many students cannot fully grasp the knowledge points well.

Last but not least, in the process of design and implementation of this study, there are some areas that need to be improved, as follows:

First of all, the target of this study is the students majoring in educational technology. Compared with other majors, they have a certain understanding of instructional design, information technology, flipped classroom, MOOC, SPOC, etc., which will promote the implementation of flipped classroom. Therefore, more research is needed on whether the flipped classroom teaching model is suitable for students in other majors.

Due to the limitations of manpower and material resources, the amount of data is not large enough, and it is necessary to analyze and verify the effect of the flipped classroom teaching mode in more practice. Due to time and space constraints, in-depth interviews do not select all students, resulting in a lack of comprehensive and in-depth understanding of all students.

The flipped classroom teaching model can create a good environment for independent thinking, exploration and cooperative learning. And then help students develop good learning styles and study habits. Accelerating the transformation of education models and learning styles is the key to keeping up with the times in educational reform[6], so flipped classroom teaching models can play an important role in future educational changes. However, in the design and implementation process, more exploration by front-line teachers and researchers is required.

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