

Can Blended Teaching Based on SPOC Improve Teaching Effectiveness?

Jingjing Zhao

Changchun University of Finance and Economics

Changchun, China

93443583@qq.com

Abstract—The blended teaching based on Small Private Online Course (SPOC) is a teaching method which combines the traditional "face-to-face" classroom teaching with the private online courses of our school and achieves the teaching objectives through the blended teaching offline and online. In order to explore the teaching effect of blended teaching, this study chooses "investment" course as an example to carry out blended teaching practice, and constructs a "three-stage" blended teaching mode of "front-end analysis", "teaching implementation" and "curriculum evaluation". After a complete teaching practice, the obtained data is analyzed, the results show that the blended teaching method has a good effect in improving students' written test scores, especially in improving students' ability of applied analysis and innovation; online learning has a positive effect on improving students' ability of applied analysis and innovation.

Keywords—Blended teaching, Flip classroom, Investment

I. INTRODUCTION

With the rapid development of Internet and mobile technology, especially the advent of the "Internet plus" era, the traditional "face-to-face" classroom teaching method can no longer meet the needs of modern teaching, and curriculum teaching needs to be reformed. As early as 2010, top universities in the United States began to set up online learning platforms to provide MOOC (massive open online courses). Although MOOC resources are abundant, teachers can not choose teaching mode according to their own teaching objectives and curriculum content. In addition, the curriculum management mode is single and lacks real-time supervision of learning process behavior. [1] [2] In view of the shortcomings of MOOC, Professor Fox of the University of California, Berkeley, proposed the concept of SPOC (Small Private Online Course) in 2013. Compared with MOOC, SPOC can be understood as "small-scale private online courses". [3]

SPOC curriculum takes full advantage of the characteristics of "school-based resources". With the help of Internet platform, it builds online courses suitable for our school and provides teaching resources for students. At the same time, teachers can also use platform intelligent learning behavior management and accurate big data analysis to supervise the learning situation of each student in an all-round way. Individualized interactive counseling, optimization of "teaching" and "learning" bilateral activities, to ensure the smooth progress of effective teaching.

The author believes that the blended teaching based on SPOC is a teaching method that combines the traditional "face-to-face" classroom teaching with the private online courses of

our school, and achieves the teaching objectives through the blended teaching offline and online. blended teaching retains the unity and systematicness of classroom teaching, and integrates the non-linearity and pluralism of online teaching. It provides a new idea of continuity and innovation for the current classroom teaching reform. This paper explores the construction and implementation of the blended teaching mode of "Investment" based on SPOC platform, and tries to answer the following important questions by comparing the teaching effects of experimental research courses. The question is whether the blended teaching based on SPOC can improve the teaching effect of "investment" study.

II. LITERATURE REVIEW

In recent years, domestic and foreign scholars have carried out a lot of research on the theoretical analysis framework and practical effects of blended teaching, and achieved certain results. Scholars generally optimistic about the research and application prospects of blended teaching.

A. Research on the Framework of Blended Teaching Analysis

Scholars mainly propose three blended teaching analysis frameworks.

The first is the "three-dimensionality" analysis framework. The three dimensions include preparation, design and implementation, and influence. The preparation refers to the conditional preparation for the blended teaching, including the preparation of the organization, the preparation of the teacher, and the preparation of the student. The preparation of each object includes the Blended Teaching attitude and ability preparation. Design and implementation reflect the practical application level of blended teaching. This dimension includes four elements: the strategy, model, theoretical framework and support of blended teaching. The influence reflects the effectiveness of blended teaching. The research focus of this dimension includes: the evaluation of blended teaching (framework, methods and tools) and the effects, satisfaction and influencing factors of blended teaching. This framework is suitable for the analysis of the practice and research of hybrid teaching.[4]

The second is ADDIE analysis framework. ADDIE represents analysis, design, development, implementation and evaluation. The analysis stage refers to the analysis of a series of teaching-related issues at the beginning of curriculum design, including teaching objectives, tasks, audiences, conditions, performance and so on. Design stage refers to the specific process of designing teaching activities. In the development stage, the corresponding development should be carried out

according to the curriculum framework, objectives and tasks completed in the earlier stage. In the implementation stage, teaching should be carried out according to the preconditions of design and development. In the evaluation stage, we should evaluate the teaching implementation and learning effect [5].

The third is the “four links” analysis framework. The first step in blended teaching is to identify and define learning needs, and the second is to develop learning plans and evaluation strategies based on learner characteristics. The third step is to analyze the blended learning environment and design and develop a hybrid curriculum. The fourth step is to execute the plan, track the process and measure the results.

College teachers use these analytical frameworks as a guide to actively carry out teaching practice. Bu Caili proposed the ADDIE-based micro-course teaching design model to provide reference and guidance for the design and development of high-quality micro-courses [6]. Wang Jiali carried out blended teaching practice under the guidance of the “four links” analysis framework and achieved certain practical effects [7]. The analysis process of the above three models is different, but the substantive content is basically the same. Therefore, when selecting the analysis framework, the teacher mainly combines the teacher's familiarity with the model and the choice of the curriculum and the model.

B. Research on the Effect of Blended Teaching

In order to understand the effect of blended teaching, scholars mainly conduct research through a combination of qualitative and quantitative methods through questionnaires, random interviews and controlled trials.

López-Pérez collected a large number of blended course cases from the University of Granada in Spain, and evaluated the practical effects of blended teaching from the two dimensions of objective learning outcomes and subjective cognition of learners. It is found that blended teaching has positive effects in reducing dropout rate and improving academic performance. At the same time, blended teaching enhances students' motivation, self-efficacy and improved learning satisfaction [8]. Wang Jiali analyzed data such as learning behaviors, learning outcomes, and questionnaires. The results show that a well-designed school-based blended curriculum can effectively improve the quality of teaching; students' online learning behaviors are positively correlated with academic performance; students' acceptance and satisfaction with blended courses Both are very high [9]. Wu Ning demonstrated the feasibility of using blended teaching in the large class teaching environment and the significant effect of blended teaching in promoting students' comprehensive ability improvement through the comparative analysis and random interviews [10]. Wang Jijun analyzed the teaching objectives, teaching content and learner characteristics based on the ADDIE model. The results show that the SPOC-based flip classroom teaching is effective [11].

Based on the above research results, this paper attempts to explore the construction and implementation of the “investment” blended teaching model based on SPOC, and use the comparative experiment to study the teaching effect of the course. The innovation of this paper is that according to the

three stages of “front-end analysis”, “teaching implementation” and “course evaluation”, the blended teaching is gradually carried out, and the “three-stage” blended teaching mode of “Investment” is proposed, which is the reform of investment teaching. Conduct active exploration.

III. RESEARCH METHODS

A. Teaching Platform

Chaoxing Panya platform is an online teaching platform developed by Chaoxing company. It covers the whole teaching process of curriculum construction, curriculum learning, learning community, learning analysis and curriculum management, and supports many teaching modes such as pure network teaching, blended mode teaching and network-assisted teaching.

B. Participants

In this study, the 2016 undergraduates majoring in investment in Changchun University of Finance and Economics were selected as the research object. Before the implementation of the teaching, the students were divided into two classes. The traditional teaching method and the blended teaching method were used to conduct comparative experiments. There are 83 students in the traditional teaching class and 85 students in the blended teaching class, all of whom were taught by the author himself. Students in the two classes were surveyed before the course was taught. The average scores of the courses in the previous semesters of the two classes were not much different.

C. Design of Teaching Process

This research combines the characteristics of the course “Investment”, and gradually develops the blended teaching according to the three stages of “front-end analysis”, “teaching implementation” and “curriculum evaluation”. It puts forward the “three-stage” blended teaching mode.

1) *Front-end analysis stage:* Before teaching, teachers make front-end analysis of teaching objects, teaching contents, teaching objectives and learning environment. Investment Science is a professional basic course for investment majors. There are nine chapters in the course. The main purpose of the course is to develop students' professional investment analysis, investment portfolio construction and risk management ability. Online courses mainly use Chaoxing Panya platform.

2) *Teaching implementation stage:* In view of the situation of pre-class analysis and around the training objectives, the whole teaching process is designed into three links: pre-class, in-class and after-class.

a) *Autonomous learning pre-class:* We refine and organize the teaching contents and shoot micro-lessons, each micro-lesson includes 5-15 minutes of video explanation. Before each lecture, teachers will upload the self-regulated learning task sheets and micro-courses, PPT courseware, test questions, and development materials to the learning platform. In addition, the teacher divides the students into groups, with about 8 members in each group, and elects the group leader, who is responsible for organizing and supervising the group members to complete their learning tasks. According to the

content of the task sheet, students can use the related resources on the network learning platform to carry out self-learning. The problems they encounter in the learning process can be discussed through the platform discussion area or QQ group or We chat group.

b) Answering questions and solving puzzles in class: The steps of answering questions and answering puzzles in class are as follows: Firstly, the teacher reviews the students' pre-class learning situation by looking at their learning records, so as to urge and motivate the students to do well in pre-class learning. Then, the teacher teaches the common questions collected from the platform discussion area or QQ group or We chat group. Then, the teacher puts forward the discussion topic or issues the test questions. The students participate in the discussion or answer the questions in writing. The teacher directs the students individually or asks the groups to explain each other, so as to improve the enthusiasm of the students to participate in the classroom. Finally, the curriculum content is summarized.

c) Extended learning after class: After-class review includes two forms: after-class exercises review and online topic discussion. Students need to complete after-class exercises published on the platform. If students do not know a certain knowledge point, they can watch the video again, or leave a message to ask the teacher directly. Teachers answer questions regularly. At the same time, students need to participate in online communication, discussion and learning reflection. The content of reflection includes the feeling and harvest of listening, the sharing of homework and test experience, and the problems in the learning process.

3) Teaching evaluation stage: Blended teaching evaluation mainly includes procedural evaluation and summative evaluation. The procedural evaluation runs through the entire online learning process. It reflects the online learning results. On the one hand, using the platform's big data, including the number of clicks, the length of students' video viewing, the completion of homework and test questions, participation in discussion after class to analyze students' learning behavior. On the other hand, the performance of the team members was analyzed based on the self-assessment, mutual evaluation and teacher group evaluation of the members of the group. The summative evaluation is reflected in the written test results. The teacher examines the students' mastery and application of knowledge through written examinations, as shown in Table I.

IV. RESULTS

After a semester of blended teaching practice, in order to investigate the teaching effect, the written test scores of the two classes were analyzed. At the same time, the large data provided by the platform were used to analyze the learner's learning behavior.

A. The Written Test Scores of Blended Classes are Significantly Better than Traditional Classes

At the end of the semester, the traditional and blended classes use the same test papers to test. The full score of the

test papers is 100. the score of basic knowledge is 52%, the score of applied analysis is 30%, and the score of innovative ability is 18%. The content of the test papers is consistent with the teaching objectives.

After the examination, in order to compare the difference of written test scores between traditional and blended classes, We used STATISTICAL ANALYSIS SYSTEM (SAS) to perform two independent sample t-tests, and the test level is $\alpha = 0.05$. The statistical results show that the P value < 0.05 , indicating that the written test scores of blended classes are significantly better than those of traditional classes.

TABLE I. EVALUATION CRITERIA FOR BLENDED TEACHING OF INVESTMENT

Evaluation method	Indicator	Meaning	Weights	
Procedural evaluation	Number of clicks	Visits up to 100 are full marks, and the maximum score is 15 points.	0.2	0.5
	Completion of homework and test questions	All assignments and test tasks received by students are evenly distributed, and no tests are performed according to "zero" points.	0.2	
	Participation in discussion after class	If you have participated in each topic discussion, you will get full marks. There are five topics for discussion.	0.1	
	Length of students' video viewing	If the course video is all viewed, it will be perfect. Single video scores are evenly distributed, with a total score of 40.	0.3	
	Group performance	According to the self-evaluation, mutual evaluation and teacher's group evaluation of the members of the group	0.2	
Summative evaluation	Written examination results	Examine students' knowledge through written examinations	0.5	

TABLE II. ANALYSIS OF THE WRITTEN TEST RESULTS OF "INVESTMENT"

Class category	Written test score	basic knowledge	Applied analysis	innovative ability
Traditional class	72.6 ± 5.3	37 ± 2.4	18 ± 1.6	10 ± 2.1
blended teaching class	82.4 ± 6.2	38 ± 1.8	22 ± 2.1	15 ± 1.9
P	<0.05	>0.05	<0.05	<0.05

At the same time, we test the scores of basic knowledge, applied analysis and innovative ability in two classes with two independent samples t-tests, and the test level is $\alpha = 0.05$. Statistical results show that there is no significant difference in the scores of basic knowledge between traditional and blended classes ($P > 0.05$), which shows that the two teaching methods grasp the students. There is no significant difference in basic knowledge. The difference between applied analysis and innovation ability is significant ($P < 0.05$), which shows that the blended teaching method and traditional teaching method have better effect in improving students' ability of application analysis and innovation, as shown in Table II.

B. Online Learning Performance is Positively Correlated with Written Test Performance

Using the "statistics" function of Chaoxing Panya Platform, the author extracts the corresponding records of student learning behavior, including the student video viewing duration, the number of tasks completed, the participation in the discussion, the number of clicks etc. According to the evaluation criteria of blended teaching achievements mentioned above, the learner's online learning scores are calculated, and the online learning achievement of the students is derived by using Excel.

TABLE III. CORRELATION ANALYSIS BETWEEN WRITTEN TEST SCORES AND LEARNING BEHAVIORS

	Length of video viewing	Completion of homework and test questions	Participation in discussion after class	Number of clicks	Group performance
Written test score	0.68	0.58	0.44	0.62	0.38

V. CONCLUSIONS

In the above research, we have constructed the "three-stage" blended teaching mode of "investment" with "front-end analysis", "teaching implementation" and "curriculum evaluation". After one semester's teaching practice, we have analyzed the written test results of the two classes and found that the written test results of the blended classes are significantly better than those of the traditional classes. Furthermore, through the analysis of the test questions, it is found that the blended teaching method has a good effect in improving the students' ability of application analysis and innovation. At the same time, using the big data of Chaoxing Panya Platform to analyze students' learning behavior, we found that online learning performance and written test scores are significantly positively correlated, that is, the higher the online learning performance, the higher the written test scores. In summary, it can be concluded that the blended teaching based on SPOC can effectively improve the teaching quality. This is the same view as scholars such as Wang Jiali, Wang Jijun, Wu Ning.

However, in the process of teaching implementation, we need to pay attention to the following issues. First, in the front-end analysis stage, teachers should design a reasonable task list according to the school's teaching outline and training objectives, which can transform the teaching objectives, teaching priorities, difficulties and other knowledge into the form of problems, which can be reflected in the task list. Business-driven, problem-oriented, stimulate students' interest in learning. In the process of video production, teachers can choose lecture, discussion, interview, classroom recording and other forms to make micro-courses. Video time is appropriate for 5-10 minutes. Secondly, in the stage of teaching implementation, teachers should attach importance to the organizational and managerial ability in class. Teachers should be good at using problems to promote discussion, or to discuss around problems. During the classroom, teachers should know "what to say - how to say - when to say - to whom - why to

We analyzed the correlation between online learning results and written test scores. The results showed that there was a significant positive correlation between online learning results and written test scores. That is, the higher the online learning results, the higher the written test scores.

At the same time, we analyze the correlation between written test scores and learning behavior scores. Table III shows that online learning scores have the greatest correlation with the length of video viewing and the number of clicks, followed by the completion of the test questions.

say". Finally, in the stage of teaching evaluation, teachers should make appropriate adjustments according to different courses and different teaching objects, refine the evaluation criteria, and explain them to students in detail before class, so as to ensure the effect of teaching implementation.

REFERENCES

- [1] Han Xibin, Ge Wenshuang, Zhou Qian etc, "A comparative study of MOOC platform and typical network teaching platform," China Electro-education Education, no. 1, pp. 61-68, 2014.
- [2] Yin Hedong, "Exploration of the blended Teaching Model Based on the Pan-Asian SPOC Platform in the Post-MOOC Period," Modern Educational Technology, no. 11, 2015.
- [3] Armando Fox, David Patterson, "Software Engineering Curriculum Technology Transfer: Lessons Learned from Ebooks, MOOCs, and SPOCs," SPLASH Education Symposium, 28 October 2013, Indianapolis, IN, USA.
- [4] Feng Xiaoying, Wang Ruixue and Wu Yijun, "A review of the research status of Hybrid Teaching at home and abroad - an analytical framework based on Hybrid Teaching," Journal of Distance Education, 2018(3).
- [5]]Wikipedia.ADDIEModel[DB/OL].http://en.wikipedia.org/wiki/ADDIE_model, 2013(9).
- [6] Bu Caili, "Research on the Application Mode of ADDIE Model in Micro-course Design," Teaching and Management, 2014(8).
- [7] Wang Jijun, "Research on the teaching model and its effect of SPOC-based flip classroom -- "Photography Foundation" as an example," Modern Distance Education, 2018(1).
- [8] López-Pérez, M.V., Pérez-López, M.C., &Rodríguez Ariza, L., "Blended Learning in Higher Education: Students' Perceptions and Their Relation to Outcomes," Computers & Education, vol. 56, no. 3, pp. 818-826, 2011.
- [9] Wang Jiali, "An Empirical Study on the Teaching Effect of School-based blended Courses Based on Network Teaching Platform," Research on Audiovisual Education, 2016(4).
- [10] Wu Ning, "Design and effect analysis of blended teaching based on SPOC in large class teaching environment," Teaching in China University, 2016(6).
- [11] Wang Jijun, "SPOC-based flipping classroom teaching mode and its effect-taking "photography foundation" as an example," Modern distance education, 2018(1).