
Blended Learning Design Based on Students-Centered Idea-A Case Study of Project Cost Management

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Abstract – The learning design is the key to the success of blending learning. The current blend teaching practice is simple mixing of online and offline learning, which based on information technology, the combination of classroom teaching and online learning. The study found that the “seeming mixing” of pure technology has become an important factor hindering the effect of blend teaching. Focusing on “student centered”, this paper takes the project cost management course of Zhejiang University of Finance and Economics as an example to conduct design research and effect analysis on blend learning design. The blend learning mode proposed in this paper has the characteristics of combining online and offline, connecting theory and practice, flipping interaction between teachers and students, and breaking the limitation of time and space, which can stimulate students’ interest in learning and improve their comprehensive ability.

Keywords – Blended Learning, Student-Centered, Project Cost Management, Teaching Design.

I. INTRODUCTION

The rapid development of information technology, as a catalyst for the reform of traditional teaching methods [1], has greatly increased the diversity of teaching and learning methods, and e-learning, online learning, mobile learning and so on have emerged. This kind of online teaching breaks away from the constraints of time and space, and provides a more convenient way for students to learn. With the development of MOOC and other platforms, the boundary between online teaching and traditional classroom teaching has become more and more blurred, showing a mixed and hybrid trend [2], and blended learning came into being.

The broadest definition of blend learning is “combination of online learning and face-to-face learning”. Early blended learning is a combination of two independent processes of face-to-face learning and online learning [3]. So far, blend learning is no longer a simple combination of the technology of traditional face-to-face learning and online learning, it has become a new learning paradigm. From the perspective of physical characteristics, blend learning is a “teaching situation based on mobile communication equipment, network learning environment and classroom discussion” [4], which about 30%~70% of the teaching content adopts online learning; From the perspective of teaching methods, blend learning is to create a truly highly participatory and personalized learning experience for students [5], and is a mixture of teaching and counseling methods in a “student-centered” learning environment [6]; From the perspective of the role of teachers and students, blend learning should not only give play to the leading role of teachers in guiding, enlightening and monitoring the teaching process, but also fully reflect the initiative, enthusiasm and creativity of students as the main body of the learning process [7]. In general, blend learning emphasizes the application of appropriate learning technologies at the right time to achieve the best learning objectives.

Blend learning has become the new normal of China's higher education. Blend learning has become a hot top-

-ic in research and practice in China. Taking China National Knowledge Internet (CNKI) as an example, there have been 8898 papers on “Blend learning” since 2005, including 2701 papers on blend learning mode, which reached a peak of 2021 in 2355. Almost every paper will propose a blend learning mode based on the practical application of a certain course or discipline. However, research has found that domestic college teachers have been carrying out blended teaching and learning in varying degrees, However, most teachers are implementing enhanced blended teaching and learning, while online learning is only play a role of assistance, supplement, and promote classroom face-to-face teaching and learning. In words, the traditional teaching mode and methods have not fundamentally changed [8]. The online and offline “seeming mixing” in the practice of blended learning has become an important factor hindering the presentation of the blended learning effect [9]. Therefore, how to move from “seeming mixing” to “meaning mixing” has become a proposition worthy of exploration.

Instructional design is a bridge between learning theory and educational practice, and is also the key to the success of blending learning. The main task of instructional design is to provide solutions to teaching problems and find solutions to teaching problems. Blending Learning is an improvement of learning concept, which will change the cognitive style of students and the teaching mode, teaching strategy and role of teachers. Therefore, the value orientation of mixed instructional design needs to be “student-centered”, from “knowledge centered” to “learning centered”, and oriented by students' interest development and ability cultivation [10]. This change needs to make full use of the complementary advantages of online teaching and classroom teaching to improve students' cognitive effect on the basis of analyzing students' needs, teaching content and actual teaching environment. Therefore, the essence of Blending Learning is to create a truly highly participatory and personalized learning experience for students, and realize the self construction and generation of personalized knowledge and creative knowledge [7].

II. COURSE DESCRIPTION

Reasonable and effective engineering cost control and cost management in engineering construction projects can create higher benefits for projects. Engineering cost management activities play an important role in local economic and social development. “Project Cost Management” is the core course of the specialty designated by the Teaching Steering Committee of the Engineering Management and Engineering Cost Specialty. “Project Cost Management” of Zhejiang University of Finance and Economics is a professional compulsory course with 48 class hours and 3 credits, which is offered in the second semester of sophomore year. “Engineering Investment and Cost Control” is the main training direction of the engineering management major of Zhejiang University of Finance and Economics, and “Engineering Cost Management” is the core course of this training direction, which is an early professional core course in the training program, playing an important role in connecting the past and the future. The course content includes the basic principles of price principle, project cost composition and pricing method, as well as the methods and measures for determining and controlling the project cost at each stage of project construction. It aims to cultivate application-oriented, compound, innovative and entrepreneurial project management talents with solid theoretical basis, engineering feelings and public spirit, and strong innovation and practice ability.

The undergraduate major in engineering management of Zhejiang University of Finance and Economics was formally recruited in 2003. In 2005, the course of “engineering cost management” was first offered to undergraduate students in engineering management. So far, there has been nearly 20 years of course opening

and teaching history. Through the teaching team's analysis of the course teaching arrangement, students' classroom participation, learning achievements, as well as student interviews (including graduates) and questionnaires, there are the following problems in course teaching and student training:

- There are many teaching contents, including engineering valuation principles, cost control methods, measures, etc., but the class hours are very limited;
- The curriculum teaching design focuses on “how teachers teach”, which is a kind of indoctrination teaching, with teachers as the leading role, and students' dominant position is not clear;
- In the teaching process, the initiative and enthusiasm of students' autonomous learning are low;
- Whether in the teaching process or teaching evaluation, students' feelings and learning performance in the learning process are ignored;
- The curriculum design aims at “knowledge points” and ignores the formation of students' abilities;

Curriculum teaching needs to shift from “teaching students knowledge” to “cultivating students' learning methods”. Teachers should stimulate students' enthusiasm and initiative in learning, make students happy and eager to learn, develop learning interests and habits, and make students benefit for life.

III. BLEND LEARNING DESIGN AND IMPLEMENTATION

A. Formalization Teaching Environment

As blended learning is a new teaching strategy based on the development of the network environment. Through the combination of traditional classroom teaching and online teaching, we can use the appropriate learning technology and learning style at the appropriate time to deliver the appropriate ability to the appropriate learners and achieve the optimal learning effect. In addition to the traditional physical classroom, blended learning also requires a virtual learning environment, which supports the content transmission of online learning through a computer-based standardized learning system, and promotes online communication between teachers and students. The virtual learning environment can mainly provide three aspects of support for blended learning, including providing students with information about all aspects of the curriculum, making up for students' deficiencies in classroom learning, and providing online learning resources for students to visit and browse. Supported by virtual learning environment, blended learning has three main characteristics: flexibility of learning resources, support for individual learning and improvement of teaching efficiency.

First, establish a network teaching platform supporting hybrid teaching, develop network teaching courseware, video and other network teaching resource databases, develop a network independent testing system and question bank for students to self test, open a network course forum, and answer questions online. Secondly, the supplementary teaching materials for classroom teaching shall be prepared to meet the needs of the mixed teaching mode, and the content of students' independent learning shall be strengthened: in classroom teaching, smart teaching tools, such as rain class, shall be used, and the combination of multiple media and multiple teaching methods shall be used. Through the above work, we have basically established an information-based teaching environment to support mixed teaching from the aspects of classroom teaching, network teaching platform, network teaching resources, etc. It ensures the smooth development of mixed teaching, as shown in fi-

Figure 1.

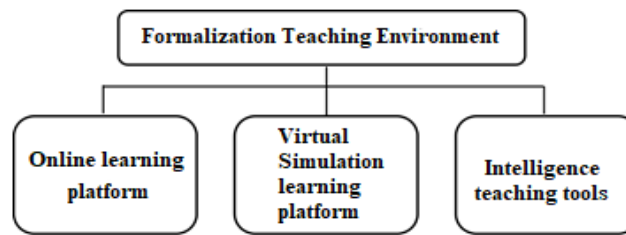


Figure 1 Formalization teaching environment of blend learning

B. Blend Learning Design

In the blend teaching of the "Project Cost Management" course, the teachers adopt different teaching designs according to the characteristics of teaching contents and teaching objectives of different chapters of the course.

a. Combination of Classroom Teaching and Online Learning

The online and offline blend teaching of "online+classroom" is established by using the network learning platform and intelligent teaching tools. This kind of online and offline blend teaching not only includes the combination of teachers' teaching in the classroom and online learning guidance in the classroom, but also the combination of classroom teaching and online learning after class. This kind of blend teaching takes place on the mixed basis of teaching resources and teaching environment. It can not only reflect the leading role of teachers, but also highlight the main position of students, so that students can actively explore learning and complete the meaning construction under the guidance and help of teachers.

Before class, students can independently learn short videos or courseware of course knowledge points through the online learning platform of the course. In the process of students' independent learning, teachers are more likely to help, guide and assist students in their learning; In the class, some time was used to explain knowledge points, help students learn how to build fragmented knowledge points into systematic knowledge, and case teaching, project teaching, situational teaching and other methods were used to help students further understand and apply knowledge; After class, students use the network self-test question bank system to conduct self-test and personalized learning according to the extended learning content provided. The online and offline blend learning design is shown in Table 1. Through online and offline mixing, we can extend the pre-class and post-class, provide more time for classroom discussion and exploratory learning, and improve students' interest and efficiency in classroom learning. At the same time, online recording provides recording data and convenience for process evaluation.

Table 1. Mixed design of classroom learning and online learning.

Learning Design	Pre-Class	In-Class	Post-Class
Teaching resources	Short video of knowledge points	Multimedia courseware	Online homework and test
Learning environment	Internet platform	Physical classroom	Internet platform
Learning style	E-learning	Classroom learning	E-learning
Teacher role	Resource publishing and service	Classroom lecture	Online Q&A
Student role	Autonomous learning	cooperative learning	Personality learning

b. Combination of Practice and Virtual Simulation

The curriculum teaching team has successively established curriculum teaching and training bases with 5 well-known cost consulting enterprises in the Zhejiang province. Through the forms of “teachers and students in the school enter the base”, “base elites enter the classroom”, “training camp” and so on, we can achieve in-depth cooperation between schools and enterprises in various forms, such as curriculum practice, professional practice, research projects, and deepen the mechanism of school enterprise collaborative education. On the other hand, the teaching and research department has developed three virtual simulation experiment teaching projects, which combine classroom theoretical teaching and practical teaching organically by making use of the immersion, interaction, innovation and other characteristics of virtual simulation technology, so that students’ learning can be changed from passive acceptance to active experience, active practice and active innovation. Meanwhile, take “intelligent construction and management innovation” and other related competitions as the starting point, encourage students to participate in the competition, select excellent and interested students to carry out competition training, strengthen students’ professional skills and knowledge application ability, and achieve hierarchical and personalized talent training.

c. Combination of Individual Autonomy and Group Collaboration

Self learning here includes self learning such as personal reference, interview and survey, and online learning of students’ self searching, acquiring and processing information in the network; Collaborative learning refers to the group discussion, communication and cooperation under the traditional teaching environment, and the online theme communication and exploration activities based on the network. In the project cost management course, in order to give play to the students’ enthusiasm and initiative in learning and cultivate their cooperative spirit and ability, teachers guide students to carry out individual independent learning and cooperative learning among peers through assistance, guidance and organization. The specific design is shown in Table 2.

Table 2. Specific Regulations of Combination of individual autonomy and group collaboration.

Regulations	Individual Autonomous Learning	Collaborative Learning
Number of jobs	9	2
Form of jobs	Objective test	Theme Report and Presentation
Number of students	1	less than or equal 5
Who will grade	Teacher or online system	Teacher and students

d. Blending Between Teachers and Students

Focusing on the key issues of curriculum teaching, driven by problems, projects or scenarios, and introduced by events and cases, classroom discussions, group reports, debate contests and other forms are used to achieve interaction and interaction between teachers and students, deepen students’ understanding of knowledge, and consciously cultivate language expression, teamwork, thinking, innovation and other capabilities. In the course evaluation, teachers and students jointly evaluate and students evaluate each other. For example, in the group report results, the group results are composed of teachers’ evaluation (50%) and other group evaluation results (50%), and the individual results in the group are formed by the mutual evaluation of students within the group.

IV. RESULTS

A. Students' Satisfaction

In the 2020 and 2021 academic years, the above blend learning reform has been implemented. At the end of each semester, students are requested to give an evaluation of the course, including satisfaction indicators and textual comments. The data shows that the interest of students in learning has improved significantly. More than 85% of the students think their classroom participation has improved, more than 64% think their classroom learning efficiency has improved, more than 42% think their after-school learning efficiency has improved. Meanwhile, 81% think their learning time has increased, and 9% think their learning pressure has increased. More than 90% of the students think their autonomous learning ability is enhanced, more than 60% of the students think their collaboration ability is enhanced, more than 58% of the students think their innovation ability is enhanced, and more than 51% of the students think their expression ability is enhanced.

B. Student Performance and Ability

Through the comparison of the students' scores before and after the mixed teaching of the project cost management course, the students' final paper scores and the overall evaluation scores showed significant improvement under the same conditions of the difficulty and scoring standards of the test papers, and the pass rate and average score were significantly higher than those of the traditional teaching classes through the t-test in statistics. On the other hand, students in the class actively participated in various competitions such as “intelligent construction and management innovation”, “national college students' innovation and entrepreneurship project”, and won more than 20 awards, achieving the multi-level and personalized goal of talent training, and promoting the cultivation of learning and innovation thinking and practical ability.

V. CONCLUSION

Practice in Project Cost Management course shows that blended learning design based on students-centered idea has achieved better student satisfaction and better student performances. The learning attitude of students have changed from passive learning to active learning. In the future, we will focus more on the reform of course content and the design of Multi-blending to achieve better results.

- The combination of classroom learning and online learning can effectively expand the time and space boundaries of the physical classroom, and provide help for classroom teaching in the form of discussion and exploration;
- The cooperation between universities and enterprises in practical teaching can promote the combination of students' theoretical knowledge and skills, avoid the transfer of theory to theory, and stimulate students' interest in learning;
- Due to its own characteristics, virtual simulation teaching can be well combined with classroom learning and online learning, and is less affected by the prevention and control of COVID-19 epidemic.
- The combination of group learning and individual learning has greatly improved the students' ability to collaborate, but some students also feel that the pressure of learning has increased.

Blended learning is a mixture of various learning theories, learning methods, learning media, learning conten-

-ts, learning modes, student support services and learning environments. However, the focus of blended learning is not on what to mix, but on how and when to mix. The purpose is to mix the right elements at the right time to achieve the optimal learning effect and economic benefits.

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