

Research and Exploration of Blended Learning Based on Flipped Classroom and PAD Class

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Abstract: This paper combines two teaching methods – flipped classroom and PAD class – and applies it to the teaching reform of the Construction Project Management course. Passive learning has been replaced by autonomous learning, the dominant position of students in classroom learning is highlighted, and students are liberated from the traditional passive acceptance-type learning. This improves the effectiveness of teacher-student interaction and student mutual aid, enhances students' enthusiasm to participate in the classroom, and ultimately improves the effect of classroom teaching as well as realizes the personalized development of students.

Keywords: Flipped classroom; PAD class; Construction Project Management; Blended teaching

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1. Introduction

Flipped classroom shifts the traditional focus on teachers' "teaching" to students' "learning," improves students' independent learning ability and innovative thinking ability, as well as highlights the status of students ^[1]. However, this teaching method has certain problems, including insufficient teaching time, which does not give full play to the value of teachers, and the short period for internalization and absorption during classes. PAD (Presentation-Assimilation-Discussion) class is a new teaching reform proposed by Xuexin Zhang, a professor of psychology from Fudan University. The activities of a classroom are divided into three elements: presentation, assimilation, and discussion, thus referred to as PAD in short ^[2]. In line with the theoretical characteristics and knowledge points of Construction Project Management, the advantages of divided classroom are absorbed and utilized in the classroom of Construction Project Management on the basis of the teaching reform of flipped classroom by combining flipped classroom with PAD class to improve the teaching effect and realize the personalized development of students.

The Duifene teaching platform (<https://www.duifene.com/>) is the official teaching platform of the PAD class, which is tailor-made for Chinese teachers. It is free for both, teachers and students to use. The platform is simple, attractive, and practical. In that way, technology can truly serve teaching and will be deemed suitable for various modes of teaching. Currently more than 3,000 schools comprising of 2.8 million teachers and students are in the platform. The platform has 20 modules, such as class and students, curriculum resources, assignments, attendance, grouping, discussion forum, online exercises, classroom questioning, questionnaire survey, vote, barrage discussion, and live interaction. It has various functions, including examinations, attendance, assignments, and questions, which meet the needs of teachers and students in teaching and learning.

Through the organic integration of the Duifene teaching platform and flipped classroom, an appropriate online and offline hybrid teaching mode is condensed [3], as shown in **Figure 1**.

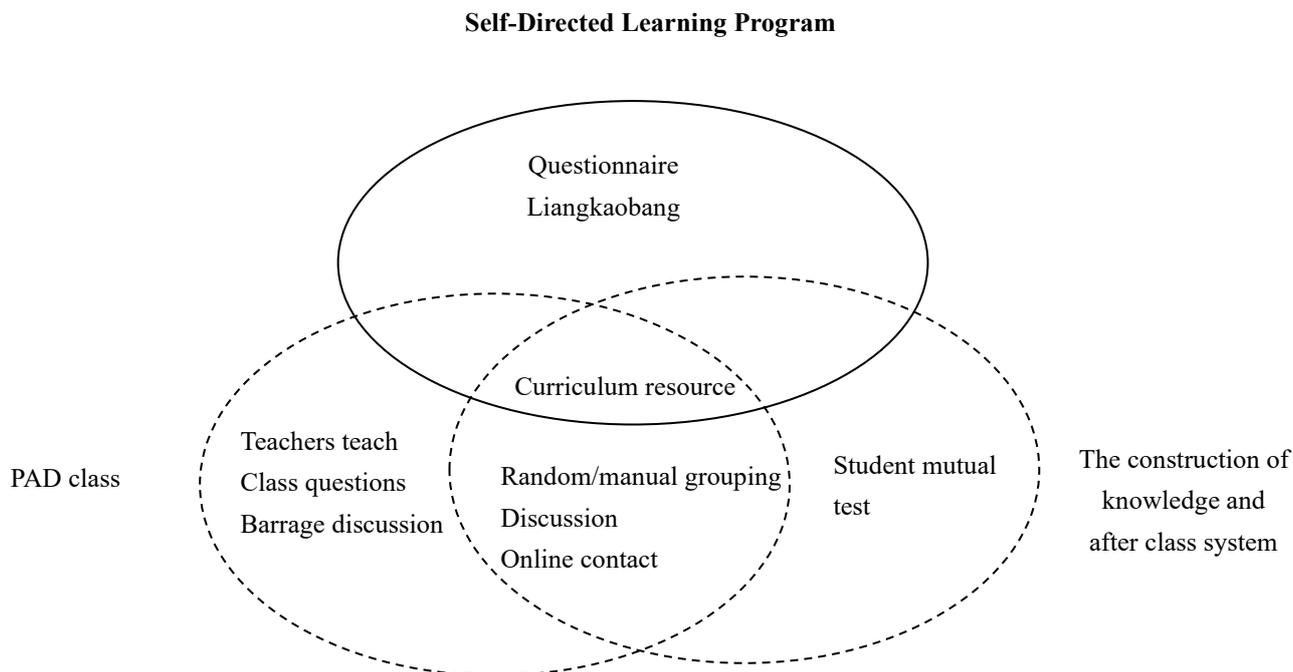


Figure 1. The online and offline hybrid teaching mode from the organic combination of the Duifene teaching platform and flipped classroom

This mode fully combines the advantages of PDA class and flipped classroom with the main functional modules of Duifene platform, which do not only provide sufficient online and internet course resources for flipped classroom, but also promote students' learning status offline through the sub-classroom. It is very convenient and feasible to adopt this combined teaching mode to carry out the teaching of Construction Project Management.

2. Application and implementation of PAD class and flipped classroom

In Chongqing Energy Vocational College, the Architectural Engineering Project Management course is offered to students majoring in Architectural Engineering Technology during their fourth semester. These students have completed professional courses related to architectural engineering construction organization and design, and they have certain basic knowledge and ability to learn independently. The combined teaching mode of flipped classroom with the teaching platform is discussed below.

2.1. Guidance before class

Prior to class, teachers will upload the teaching plans, micro-lessons, cases, curriculum tasks, and other materials into the teaching resource module through the teaching platform, design the curriculum related content demand questionnaire, and share the learning outline through WeChat to guide students in learning the key and difficult points of the course. Students can make full use of the course resources uploaded by their teachers, by first going through the teaching and internalizing the knowledge points, and then listing out the difficult points or questions that need to be answered by the teachers through Liangkaobang. In addition, difficult problems encountered in the learning process can be discussed in the discussion module on the teaching platform. Teachers can interact with the students online in real time, or these problems can

be discussed as key problems during class. Pre-class video learning, online test answers, online discussions, and other information are included in the usual performance assessment.

2.2. Teaching in class

The teacher will first introduce the basic concepts and theories of the lesson, focus on the key points and difficulties in the lesson, as well as explain the main problems found during pre-class learning. However, the teacher will not discuss all the teaching contents in order to leave some space for students' independent learning and practice after class. Thereafter, the teacher will urge the students to practice, guide and correct their mistakes, as well as encourage them to practice in groups and discuss the content taught during class. The students will then be required to complete repetitive exercises arranged by the teacher, and each group leader will put forward the problems encountered in the course learning and learning experience. Finally, the teacher will carry out a periodic test based on the teaching content of that lesson through online practice. From there, those students who did well will be rewarded, while those who did poorly will be encouraged. It is suggested that students should encourage, help, and promote each other in the form of cooperative learning through group collaboration to stimulate their learning motivation.

2.3. Extension learning after class

According to the results of the test, students will then use the course resources to study again in a targeted manner. After the teacher conducts online exercises again, the students will begin the mutual test; otherwise, one week after the class, the teacher will assign homework ("Liangkaobang"), recommend reference materials, and promote after-school expansion mainly in the students' self-learning link. "Liangkaobang" can be divided into three parts: summarizing the key points and difficulties of the previous lesson (referring to "liang"); asking questions about the difficult points found in the previous lesson (referring to "kao"); sorting out the remaining confusion based on the knowledge learned from the previous lesson and seeking help from classmates in the following lesson (referring to "bang").

Through the practice of this mode, teachers will be able to put an end to heavy lesson preparation, homework correction, and other work, but devote themselves to organizing the classroom and play a better role of being a guide; students will no longer be amused by the boring words found in textbooks or indoctrinated by the cramming style teaching method, but rather devote their energy into the interesting and "active learning" process, which can greatly improve their abilities in autonomous learning, knowledge and information acquisition, as well as in problem-solving. It is of great benefit to the improvement of the comprehensive quality of outstanding talents.

2.4. Class evaluation

The evaluation result is based on the comprehensive evaluation result, which is used to evaluate the teaching effect. The comprehensive score includes the usual score and the final theoretical score. Each item has a full score of 100 points. Comprehensive score = Usual score \times 50% + Final theory score \times 50%. The usual score includes the participation in modules, such as class attendance, homework, online exercises, and discussion forums on the Duifene platform. These items mainly test the comprehensive analysis and application ability of students.

3. Reflection on the teaching practice of the organic combination of Duifene teaching platform and flipped classroom

This online and offline hybrid teaching mode, which combines the Duifene platform and the flipped classroom, is still under the control of teachers. It is an interactive classroom where teachers fully delegate power to the classroom. Teachers are required to master the core knowledge of Construction Project

Management accurately and comprehensively. They are required to be more active and meticulous in classroom teaching, such as in the teaching design, in proposing more innovative teaching methods, and in providing rich course resources for students. Teachers are required to learn advanced educational ideas and theories, master modern teaching methods, constantly update teaching software, and effectively organize activities in each teaching stage.

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Disclosure statement

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