



# Exploration and Practice of Blended Teaching Based on "PAD+BOPPPS"

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**Abstract.** Aviation Maintenance Management is a core compulsory course for aviation maintenance majors. In response to the prominent problems in course teaching, the "PAD + BOPPPS" hybrid teaching mode is proposed by combining the advantages of PAD and BOPPPS teaching modes. Taking the "Aviation Maintenance Information Management" topic as an example for teaching design and practice, it effectively solves students' fear of difficulties in learning, improves their enthusiasm, initiative, and classroom participation, realizes the rapid transformation of learned knowledge, accelerates the generation of abilities, and provides useful reference and inspiration for the effective development of hybrid teaching.

**Keywords:** PAD; BOPPPS; Blended learning.

## 1 Introduction

The aviation maintenance management course is a core compulsory course in the job positions of aviation maintenance majors (in all directions). The teaching objective of the course is to systematically master the basic theory of aviation maintenance, possess the ability to apply aviation maintenance theory, and develop certain aviation maintenance management skills; The teaching target of the course is sophomore students in vocational and technical education, who have the characteristics of "multiple types of training majors, weak job foundation, and large differences in learning needs". Through previous teaching practices, it has been found that there are three prominent problems in curriculum teaching: firstly, the teaching content has multiple knowledge points and a wide range of coverage, which leads to students' fear of difficulties in learning. Secondly, students have weak initiative and enthusiasm in learning, and their participation in classroom teaching activities is low. The third issue is the difficulty in transforming and applying knowledge, slow generation of abilities, and insufficient exercise of higher-order thinking. In response to the above issues, in order to better improve the quality of course teaching, following the educational philosophy of "learning centered, problem driven, ability oriented, and continuous improvement", we have explored and practiced a blended learning reform based on "PAD+BOPPPS" by deeply integrating modern information technology with course teaching.

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L. Chang et al. (eds.), *Proceedings of the 2024 8th International Seminar on Education, Management and Social Sciences (ISEMSS 2024)*, Advances in Social Science, Education and Humanities Research 867, [https://doi.org/10.2991/978-2-38476-297-2\\_5](https://doi.org/10.2991/978-2-38476-297-2_5)

## 2 Overview of PAD Teaching Mode

The PAD is a student-centered teaching model originating from China, proposed by Professor Zhang Xuexin of Fudan University in 2014. Its core concept is to flexibly divide classroom time into two parts, with one part dedicated to teaching content to teachers and the other part used to organize interactive learning in the form of discussions among students. Due to the fact that the PAD includes three time processes: presentation, assimilation, and discussion, it is also referred to as the "PAD classroom". (As shown in Figure 1).

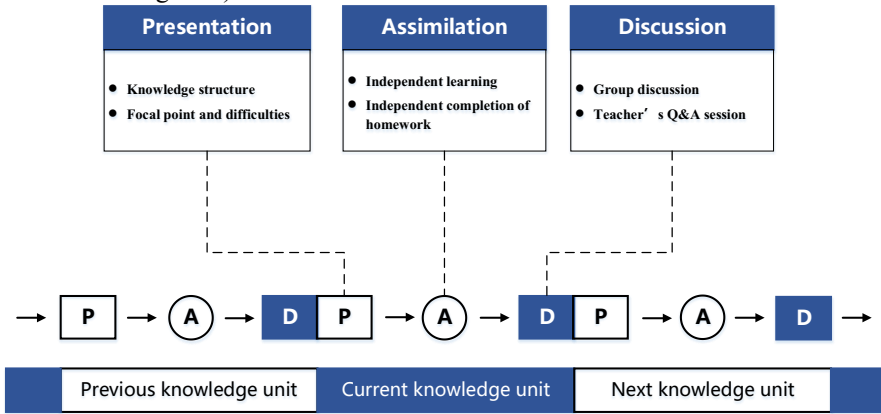


Fig. 1. Basic process of PAD

The PAD emphasizes flexible allocation of time based on the nature of the course, teaching content, textbooks, student characteristics, etc; In terms of operation mode, it can be divided into three types: in class split, inter class split, and mixed split (in class + inter class split); Emphasize process evaluation in assessment methods and pay attention to students' different learning needs; In organizational implementation, it is usually divided into four teaching stages: teaching, independent learning, peer discussion, and teacher-student dialogue<sup>[1]</sup>.

### 2.1 Presentation

Presentation is the first time process and teaching element in the implementation of PAD. It is to guide students to master the knowledge framework, key and difficult points through the method of "intensive lectures+blank spaces". The "precision lecture" emphasizes guidance and framework, which is based on a highly concentrated and precise grasp of subject knowledge, telling students what to learn, why to learn, and how to learn; 'Blank space' refers to the practice of leaving detailed knowledge and less difficult content for students to learn and explore on their own, based on their learning situation, course difficulty, progress, and environment, in order to stimulate their interest in learning<sup>[2]</sup>.

## 2.2 Assimilation

Assimilation is the second time process in the implementation of PAD, which involves internalizing knowledge into personal experience through the combination of learning and thinking, and achieving it through the second teaching process —— "independent learning". The "independent learning" stage can be divided into two sub stages: "independent learning" and "independent homework". Among them, "independent learning" is the premise and foundation of "independent homework", and "independent homework" is a further supplement, deepening, consolidation, and improvement of the "independent learning" stage. It is a means of testing the effectiveness of independent learning<sup>[3]</sup>.

## 2.3 Discussion

Discussion is the third time process in the implementation of PAD, which involves communication within groups, between groups, and throughout the class to enhance the effectiveness of interactive learning. It mainly corresponds to "peer discussion" in the teaching process and plays an important role in bridging the gap. It directly affects the absorption of lectures, externalization of independent learning, and the effectiveness of teacher-student dialogue, and directly affects the final teaching effect. It has a very important position<sup>[4]</sup>.

## 3 Overview of BOPPPS Teaching Mode

BOPPPS is a closed-loop teaching model proposed by the Canadian Teaching Skills Development Workshop that emphasizes teaching interaction and reflection. With the goal of achieving teaching objectives and gradually improving student learning outcomes as the main line, the classroom teaching process is divided into six interconnected teaching stages with the function of "starting, transferring, and integrating" (as shown in Figure 2). Its characteristics are student-centered, highlighting teaching interaction and all-round development of students<sup>[5]</sup>.

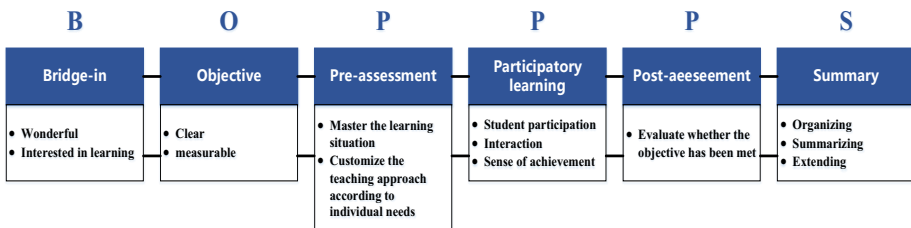


Fig. 2. Basic process of BOPPPS

### **3.1 Bridge-in**

By using methods such as questioning, games, and questioning to attract students' attention, guiding them to organically connect their existing foundation with the learning content, stimulating their learning motivation, and enabling them to smoothly enter the core content teaching stage.

### **3.2 Objective**

By clarifying and emphasizing the key knowledge and learning value of the course, students can grasp the direction of learning, grasp the main line of the course, and establish learning goals.

### **3.3 Pre-assessment**

By using methods such as questioning, answering questions, and testing, we help students consolidate what they have learned, assist teachers in understanding students' knowledge base and their level of understanding of classroom teaching content, and flexibly adjust the proportion of time for expanding classroom teaching content based on teaching objectives and student status. This promotes teachers to improve their teaching methods in a timely manner, teach students according to their aptitude, and lays the foundation for effectively achieving classroom teaching objectives.

### **3.4 Participatory Learning**

By designing a series of flexible and diverse teaching activities, flexibly utilizing diverse teaching media and resources, students can fully participate and deeply immerse themselves in classroom teaching, achieve established learning goals, and transform from passive knowledge receivers to active participants in teaching.

### **3.5 Post-assessment**

By designing assessment methods such as questionnaire testing, questioning, specific situational analysis, on-site presentations, and discussions and debates, we help students consolidate their learning content, test the effectiveness of course teaching design, and evaluate the effectiveness of teaching outcomes.

### **3.6 Summary**

Lead students to condense and summarize the course content, integrate knowledge and skill points, and help students establish a structured and systematic logical thinking system for the curriculum; By assigning homework after class, students can deepen their understanding and mastery of key and difficult knowledge, and by arranging preview content, new teaching expectations can be proposed for the next class teaching process<sup>[6]</sup>.

### 4 Design of Blended Learning Based on "PAD + BOPPPS"

The BOPPPS teaching model has clear teaching objectives and emphasizes participatory learning for students, but in the face of individual differences among students, it cannot guarantee that every student can actively participate; The PAD teaching mode provides students with personalized learning opportunities by separating teaching and discussion. However, due to the fact that teachers usually only explain key and difficult points during the teaching stage, they cannot cover the needs of all students. In order to effectively solve this problem, the PAD teaching strategy is introduced into the "participatory learning" of the BOPPPS mode. (As shown in Figure 3).

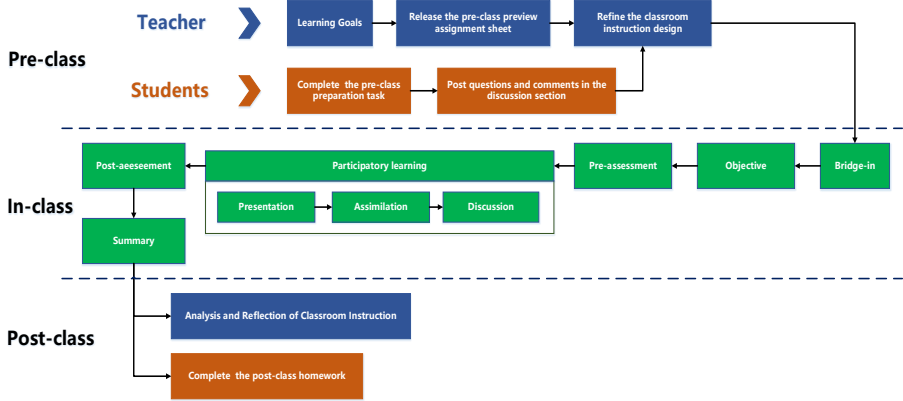


Fig. 3. Basic Process of "PAD + BOPPPS"

Before class, by posting pre-class preview tasks, students can organize the relationships between various knowledge points, complete the learning of basic knowledge and theories, identify difficult problems in learning, and further improve classroom teaching design based on this.

In class, the form of PAD is adopted to organize students to carry out participatory teaching activities, with "Presentation - Assimilation - Discussion" as the core of the learning process. While enhancing students' sense of participation, teaching is more in line with their personalized needs, forming a new teaching model that includes all aspects of classroom teaching. The overall organizational ecology of "teaching and learning" focuses on the effectiveness of teaching, providing positive reflection for the improvement and optimization of blended learning<sup>[7]</sup>.

After class, relying on the network and information technology teaching software platform, organize students to complete homework, further consolidate the effectiveness of classroom teaching, and timely analyze and reflect on classroom teaching to continuously improve teaching quality.

## **5 Organization and Implementation of Blended Teaching Based on "PAD + BOPPPS"**

“Aviation Maintenance Information Management” is one of the nine specialized teaching modules in the “Aviation Maintenance Management” course. Taking this topic as an example, we will introduce the organization and implementation of the blended teaching of "PAD + BOPPPS".

### **5.1 Clear Learning Objectives**

The teaching content of the "Aviation Maintenance Information Management" topic is to correctly use computer information technology and tools to collect, organize, transmit, and use aviation maintenance information in the context of flight maintenance support, and to participate in and complete the process of aviation maintenance information management.

The knowledge objective is to clarify the content and requirements of aviation maintenance information, explain the process of aviation maintenance information management, describe the connotation and role of aviation maintenance information, and use statistical analysis methods for maintenance information; The ability goal is to develop good team communication and collaborative learning habits, to be able to reasonably choose and apply information statistical analysis methods for aviation maintenance information analysis in work, and to guide actual work implementation; The goal of ideological and political education is to make students feel the importance of unity and cooperation, and to strengthen their excellent work style and rigorous scientific spirit in the process.

### **5.2 Conduct a Learning Situation Analysis**

Through the study of the previous topics, students have gained an understanding of the knowledge system architecture of aviation maintenance management theory, mastered the relevant basic concepts and theories, familiarized themselves with the main content and organizational implementation procedures of flight maintenance support, aviation maintenance plan management, and aviation maintenance quality management work, as well as the main content, common methods, and implementation steps. During the learning process, they have been exposed to and used a large amount of aviation maintenance information data, laying a good foundation for the study, understanding, and mastery of the knowledge points in this chapter.

### **5.3 Pre-class Preparation Stage**

Based on students' learning foundation and job requirements, compare teaching objectives, select teaching resources, and develop a learning plan based on this. Publish it in the form of a pre-lesson task book through an information-based teaching platform online. Using information technology teaching platform software to analyze and judge

students' mastery of various knowledge points in this topic, based on students' pre-class test feedback and discussion forum comments, further clarify the key points of classroom teaching and carry out targeted teaching design.

#### **5.4 Classroom Implementation Stage**

Comment on the completion status of students' pre class preview tasks, and introduce the content of this lesson to address any difficult issues that may arise during the preview. Organize participatory teaching activities for students in the form of PAD - firstly, give detailed lectures on the key and difficult issues that students have provided feedback on during pre-class preview (such as the timing, content, and requirements for filling in aviation maintenance information cards, registration books, and resume books). Secondly, in the form of job simulation and implementation, utilizing a large amount of real data and cases of aviation maintenance information management, organizing students to conduct independent learning and case analysis, actively exploring and discovering answers to problems, and personally experiencing the application of learned knowledge in specific work. Finally, through discussions and exchanges within the group, between groups, and throughout the class, a deep understanding of the content and requirements of aviation maintenance information management is gained, and the methods and tools of aviation maintenance information management are mastered. Overcoming fear of difficulties, effective learning is achieved, knowledge is internalized, and one's management thinking and scientific logical thinking are fully exercised, forming a preliminary ability in aviation maintenance information management.

#### **5.5 After Class Stage**

Based on the network and information technology teaching software platform, organize students to complete homework after class, further consolidate classroom teaching effectiveness, and analyze and reflect on this classroom teaching activity while uploading new subject materials, continuously improve and enhance teaching quality.

### **6 Conclusion**

In exploring the time and application of the blended learning model of "PAD + BOPPPS", we deeply realize the importance of this innovative model in improving teaching quality and promoting students' active learning. The unique three-stage division of classroom teaching, internalization, and discussion not only stimulates students' learning initiative, but also promotes the deep processing and internalization of knowledge; The integration of BOPPPS model provides a clear framework for teaching, ensuring the systematicity and effectiveness of teaching activities. The organic combination of PAD and BOPPPS not only optimizes classroom time management and improves teaching efficiency, but also enhances communication and interaction between teachers, students, and students. While building a more open and inclusive

learning atmosphere, it also encourages personalized learning for students, allowing students with different learning styles and abilities to find their own suitable learning pace and path.

Looking ahead to the future, with the continuous advancement of educational technology and the continuous updating of educational concepts, the "PAD + BOPPPS" blended learning model is expected to play a greater role in the field of education. We expect to see more educators carry out innovative practice on this model, constantly explore effective teaching strategies suitable for different disciplines and different student groups, and jointly promote the vigorous development of education.

## Reference

1. Xue J.P.(2021) A review of the research on the PAD teaching mode. *Theory and Practice of Education*, 41: 56-60.
2. Ma L.Y. Zhang X.X.(2020) Characteristics of "Presentation" in the PAD Teaching Model. *Heilongjiang Education (Theory and Practice)*, 10: 75-76.
3. Ma L.Y., Zhang X.X.(2021) Research on the Operation Module of "Independent Learning" in PAD. *Jiangsu Science and Technology Information*. 1: 77-80.
4. Ma L.Y., Zhang X.X.(2021) Problems and Countermeasures in the Operation of "Peer Discussion" in PAD. *Teaching and Management*, 18: 93-95.
5. Dong G.W., Zhao G.Q., Guan Y.J., Wang J.(2020) Exploration of Effective Teaching Models Based on Classroom and BOPPPS Models. *Higher Engineering Education Research*, 5: 176-182.
6. Yin X.Y., Zou Q., Bai X.R., Xiao J.S., Cai C.T.(2023) Design of Virtual Simulation Experiment Teaching for Flight Principles Course in BOPPPS Mode. *Research and Exploration in Laboratory*, 42: 253-257.
7. Liu H.T.(2023) Analysis of the Effective Undergraduate Teaching Model Combining BOPPPS Model and Split Classroom. *Education Review*, 9: 127-134.

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