

Research on the Comprehensive Application of PAD Classroom and Blended Online and Offline Teaching Method in Basic Courses of Communication Majors

Li Wen¹ Yuting Zhao² Jingna Cui³ Luya Zhang⁴

^{1,2,3,4} School of Information and Communication, National University of Defense Technology, Wuhan, Hubei, China

ABSTRACT

Based on an in-depth analysis of "PAD classroom" and blended online and offline teaching methods, this article proposes a teaching approach that integrates "PAD classroom" and blended online and offline teaching methods, and designs the specific process of the comprehensive application of "PAD classroom" and blended online and offline teaching methods. Taking the basic amplification circuit in "Fundamentals of Analog Electronic Technology" as an example, the specific application of this teaching method is introduced, and the course teaching ideas are provided. The specific implementation process is introduced from three aspects: teacher classroom teaching, student learning outside of class, and classroom discussion and communication.

Keywords: PAD classroom, Blended online and offline teaching, Professional basis, Teaching mode.

1. INTRODUCTION

With the continuous deepening of social informatization, the demand for information and communication professionals in various fields of society is increasing. The role of colleges and universities as the main battlefield for cultivating applied and technical skilled talents in the field of information and communication is becoming increasingly prominent. The problem of dull classroom atmosphere and poor teaching effectiveness in basic courses of communication majors is common in various colleges and universities due to their strong theoretical nature and abstract knowledge. To effectively improve the quality of talent cultivation, it is necessary to closely follow the practical demand of society for the continuous improvement of talent learning ability, and focus on reforming classroom teaching.

The PAD classroom [1] teaching method, as a new teaching method that emphasizes effective interaction between students and teachers, and focuses on cultivating students of self-study and analyzing and solving problems outside of class, has received widespread attention from university teachers. Liu Liman applied PAD classroom in

digital image processing courses, [2] Wu Tongcheng applied PAD classroom in sensor course teaching, [3] and in addition, PAD classroom has also been applied in college English [4], advanced mathematics [5], and high frequency electronic circuit courses [6] and so on. The blended online and offline teaching method combines the advantages of online and offline teaching resources, allowing students to learn at different times and places, providing more opportunities for independent learning, and has also been unanimously recognized by university teachers. The applied courses mainly include diagnostic experimental teaching [7], college Chinese [8], information literacy education [9], and so on. Through practice, it has been proven that the organic integration of PAD classroom and blended online and offline teaching can achieve better teaching results through innovative application in the basic courses of communication majors.

2. ANALYSIS AND COMPREHENSIVE APPLICATION DESIGN OF PAD CLASSROOM AND BLENDED ONLINE AND OFFLINE TEACHING METHODS

PAD classroom is a new model of classroom teaching reform based on psychological principles. The purpose is to promote students' learning enthusiasm and achieve their comprehensive and healthy development. The key innovation of PAD classroom teaching and blended online and offline teaching method lies in staggered teaching and discussion time, allowing students to become the true masters of the classroom. This "PAD" can be reflected not only in class, but also outside of class, and flexible and diverse "PAD" can be carried out. Through PAD classroom teaching method, the participation of communication major basic courses students in the classroom can be improved, and the learning enthusiasm of students can be stimulated. Integrating PAD classroom teaching with online and offline teaching to design teaching content and organize teaching from multiple dimensions can effectively improve student learning outcomes.

2.1 PAD Classroom Teaching Method

"PAD classroom" is a new teaching model that has been proven to be suitable for Chinese classrooms. This teaching method was proposed by Professor Zhang Xuexin of Fudan University in 2014, aiming to solve the shortcomings of traditional teaching methods such as "cramming", and fully mobilize students' enthusiasm. The core concept is to divide classroom time into two parts, leaving half of the time for teachers to give lectures and deploy student discussion content, and the other half for students to discuss. Students achieve the goal of active learning through active thinking and interactive discussions. According to chronological order, the teaching process can be divided into three stages, namely presentation, assimilation, and discussion. Therefore, a divided classroom can also be referred to as a PAD classroom.

The advantages of using "PAD classroom" in professional basic courses are very obvious. This teaching method fully mobilizes students' enthusiasm and effectively cultivates their ability to learn independently and explore, analyze, and solve problems. In the classroom, the teachers only teach the key and difficult points, and do not cover every knowledge point comprehensively. Instead, they

provide students with more time and space for independent exploration, inspiring them to actively learn; During the extracurricular learning phase, students learn independently, adopt a proactive learning attitude to understand relevant knowledge points, and actively analyze and solve some learning difficulties; During classroom discussions, students will generate many related ideas, generate novel and unique insights, raise deeper questions, and have a greater sense of gain. This is truly exploratory and independent learning. Therefore, "PAD classroom" teaching can fully mobilize learning initiative and enthusiasm, solve problems such as low participation of students in basic communication courses, dull classroom atmosphere, and difficulty in understanding abstract concepts.

2.2 Blended Online and Offline Teaching Method

The blended online and offline teaching method combines the advantages of both online and offline, aiming to provide students with a more comprehensive and personalized learning experience. This teaching method can be achieved through online courses, online teaching platforms, remote education, and other means. This method allows students to learn according to their actual situation and arrangement at the corresponding time and place, and to develop learning plans based on their own actual situation and needs, so that students have more opportunities for self-directed learning during the learning process. The blended online and offline teaching will flexibly organize teaching and learning, which can be separated or combined. In online courses, teachers can teach remotely, and students can watch and learn through a web browser; In offline courses, teachers can give lectures in person, and students can participate in physical classes to interact and communicate with teachers and classmates.

There are many advantages to blended online and offline teaching methods, mainly including: flexibility, students can learn according to their own time and location, and arrange their learning plans more flexibly; Interactivity, students can participate in physical classrooms, interact and communicate with teachers and classmates, and enhance learning effectiveness; Personalization, teachers can develop personalized learning plans based on the actual situation and needs of students, and improve learning effectiveness; Resource sharing, teachers can share online resources, and students can also share offline resources to improve

learning outcomes. Through blended online and offline teaching, problems such as sharing teaching resources and tight classroom teaching time for basic communication courses can be effectively solved.

2.3 Integrated Application Design of PAD Classroom and Blended Online and Offline Teaching Method

Firstly, teachers should sort out the basic knowledge points of the communication major courses, use video recording methods to focus on teaching abstract knowledge points that are difficult to understand, and collect relevant supplementary pictures or audio and video materials. If necessary, they can create animated videos to help students understand the relevant knowledge points, comprehensively edit the relevant videos to form online courses, publish them on platforms such as Rain Classroom as online teaching resources, and select mature and excellent online course resources as online teaching resources.

Then, based on the characteristics of the basic courses in the field of communication, the teaching content is sorted out and suitable for "PAD classroom" teaching is selected; course teaching should be designed based on relevant knowledge points of teaching content, and specific teaching methods and implementation steps should be determined for implementing "split classroom"; course teaching plans and practice teaching should be developed according to the teaching plans. The teaching method of "PAD classroom" specifically includes three stages: teachers lecturing in class, students learning outside of class (online or self-study), and classroom discussions and exchanges. The teacher's classroom teaching mainly provides a systematic introduction to the teaching content and explains key knowledge points, and makes specific arrangements for the offline learning content and requirements of students. Extracurricular learning for students is the stage of internalization and absorption. Students mainly engage in self-learning through online courses or by consulting materials themselves. Through the self-learning process, they digest and absorb most of the knowledge points, and record any suspicious content. Classroom discussions and exchanges follow the "Liangkaobang" model, which not only gives students a sense of achievement, but also helps them solve doubts, achieving the goal of helping each other learn and promoting each other.

3. THE COMPREHENSIVE APPLICATION OF PAD CLASSROOM AND BLENDED ONLINE AND OFFLINE TEACHING METHOD IN THE TEACHING OF PROFESSIONAL BASIC COURSES

Taking the basic amplification circuit in the course of "Fundamentals of Analog Electronic Technology" as an example, this paper comprehensively applies the PAD classroom and blended online and offline teaching method, designs relevant teaching content and implementation processes, and explores and attempts in the actual teaching process. According to the teaching plan, the basic amplification circuit is allocated eight class hours and taught in four classes. The first class is taught using a PAD classroom and a blended online and offline teaching method. The basic knowledge of this class includes: the concept of basic amplification circuits, the composition of basic amplification circuits and the principles for constructing amplification circuits, the meaning of static and dynamic circuits, the process of amplifying a sine wave signal, saturation distortion and cutoff distortion, and the drawing method of DC and AC paths. Among them, the composition and principles of basic amplification circuits, the process of amplifying sine wave signals, and the drawing of DC and AC paths are the key contents of this lesson that students need to focus on mastering.

The teaching idea of the first lesson on basic amplification circuits is: the first is to use the most common amplification system around people to introduce the theme of this lesson, point out the key points of this lesson, and provide the concept and essence of amplification; The teachers provides a typical type of amplification circuit - explaining the basic composition of amplification circuits and the functions of each part. Thus, the main method used is classroom teaching, introducing the concept of basic amplifiers and explaining their composition, and then giving prompts. Due to the fact that amplification circuits work with both direct current and communication, research methods generally analyze them from two aspects, namely using the concepts of static and dynamic circuits for circuit analysis, When analyzing, it is necessary to grasp two points: static working points are a necessary condition for the normal operation of amplification circuits, and dynamic analysis using graphical methods will be more straightforward and easy to

understand. The specific analysis process requires students to self-study outside of class and discuss and exchange ideas in the next class.

3.1 Teacher's Classroom Teaching

The teacher's classroom teaching mainly adopts the PPT teaching method, and the teaching process focuses on establishing basic concepts for students. The emphasis is on explaining what signal amplification is, why amplification is necessary, common application scenario of signal amplification, and providing a detailed introduction to the basic components of amplification circuits, external and internal conditions that amplification needs to meet. Finally, when introducing the working principle of basic amplification circuits, it is suggested to use static and dynamic methods for separate analysis. It is also pointed out that signal amplification is for dynamic signals, and the amplification function must be analyzed and understood in dynamic situations. Therefore, it is necessary to perform dynamic small signal equivalence, and remind students to pay attention to learning relevant online course chapters outside of class, focusing on understanding static and dynamic analysis methods.

3.2 Extracurricular Learning for Students

Students mainly use a combination of online and textbook methods for self-study in their off class learning. The online course resources on the basics of analog electronic technology are very abundant, and commonly used resources include the first-class course "Fundamentals of Analog Electronic Technology" by Professor Du Xiangyu's team from the University of National Defense Technology, Professor Hua Chengying's team from Tsinghua University, and Associate Professor Liu Caixia's team from Hebei Normal University, MOOC platform for Chinese universities: National premium course on "Fundamentals of Analog Electronic Technology" by Professor Liu Jihong from Northeastern University, Professor Zhao Jinquan from Xi'an Jiaotong University, Professor Deng Tianping from Huazhong University of Science and Technology, and Professor Liu Ying from Beijing Jiaotong University. In addition, Bilibili platform resources are also very rich, mainly including "Fundamentals of Analog Electronic Technology" review courses released by LeZhi Teaching, Monkey Doctor Love Lecture, Bee Exam, etc.

Through textbook learning and combined with multiple online courses, students will have a clear understanding of the basic working principles of

amplification circuits. Through classroom questioning, most students have a deep understanding of static and dynamic analysis methods, but their mastery of equivalent analysis methods for amplification circuits is not deep enough, and they cannot understand the relevant assumptions of "virtual short" and "virtual break", and half of the students are not proficient in the relevant calculations and need to engage in in-depth learning during the classroom discussion stage.

3.3 Classroom Discussion and Communication

The classroom discussion stage is organized in the form of "Liangkaobang". Firstly, students are divided into several small groups of six people. Each member of the group presents two questions that they have mastered and are good at for internal testing. The most frequently asked questions are: What is the internal principle of the basic amplifier circuit device; what are the external conditions for amplifying signals in a basic amplification circuit; What is the signal waveform of each point in the common emitter amplifier circuit; What is "virtual short"; What is "virtual interruption" and so on. It should be noted that before classroom discussions, the teacher needs to provide the scope and focus of the discussion, and prompt students to discuss key issues to make full use of time. After group discussions, some individual student doubts can be resolved through mutual help among students.

After the group discussion, each group will sort out any unresolved issues or doubts within the group, which will be raised by the group leader in class. Group discussions and learning assistance can be carried out. For problems that students cannot solve, the teachers will provide detailed explanations. The teachers can also ask questions about relevant key issues to ensure that students can deeply understand and master them.

4. CONCLUSION

By comprehensively applying the "PAD classroom" and blended online and offline teaching methods, students' learning enthusiasm and participation have been greatly improved. Students have a clearer understanding of the concept, composition, and working principle of basic amplification circuits. Through the "Liangkaoban", students have also enhanced their confidence and learning interest, and developed their self-learning and problem-solving abilities, which has laid a

solid foundation for future career advancement through self-study and self-improvement. The integrated application of "PAD classroom" and blended online and offline teaching methods can also be applied in courses such as "Fundamentals of Digital Electronics Technology" and "Fundamentals of Circuits", which will further improve the teaching efficiency and quality of basic courses in the field of communication. It is worthy of in-depth research and strong promotion and use.

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