



# Research and Practice on the Teaching Method of “PAD Classroom” Under the Blended Model

Li Wen<sup>(✉)</sup>, Jian Pan, Yuting Zhao, Shasha Xu, and Jingna Cui

College of Information and Communication, National University of Defense Technology,  
Wuhan 430030, Hubei, China  
9466342@qq.com

**Abstract.** The reform of the teaching mode in the basic stage of the information and communication major has achieved certain results, but there is still insufficient depth and breadth of the integration of theory and practice in the teaching group training. The “PAD classroom” teaching method introduces the link of internalization and absorption, and in terms of time, it can be bisection in this class or even the next class, leaving enough time for students to think and absorb. The “PAD classroom” teaching method effectively avoids the shortcomings of the traditional lecture-style and discussion-style teaching modes, so as to effectively improve the students’ learning ability and interest in learning. At the same time, it can also provide useful reference for other courses to implement “PAD classroom” teaching, and has important and practical significance for exploring and improving the innovative training route of non-commissioned officers.

**Keywords:** Job demand · Reform and innovation · PAD classroom · Integration of theory and practice · Evaluation mechanism

## 1 Introduction

At present, China’s higher education has achieved a leap from elite education to mass education. The traditional teaching model cannot meet the current needs of higher education, and new teaching models and teaching methods are urgently needed. Based on the above needs, various new educational ideas and concepts have sprung up in recent years, such as micro-lectures, MOOCs, SPOCs, rain classrooms, flipped classrooms, case teaching methods, diversified teaching methods, etc. The teaching method of “PAD classroom” is a new teaching model developed on the basis of cooperative learning. The research on the teaching method of “divided classroom” began in the spring of 2014. Zhang Xuexin, a Ph.D. of Princeton University and a professor of psychology at Fudan University, proposed a new teaching model of “PAD classroom”, which has a profound concept, is concise and easy to use, changes passive learning into active learning, significantly improves test scores, and comprehensively cultivates core literacy. “PAD classroom” is a class model proposed by Zhang Xuexin, a professor of psychology at Fudan University, in which half of the class time is devoted to teaching and the other half to student discussion. [1] The core idea of the “PAD classroom” teaching method is that

teachers teach only half of the classroom time, and students conduct interactive learning in the form of discussions for the other half of the classroom time. The traditional discussion-based teaching is usually carried out in the classroom immediately after the teacher's lecture. The disadvantage is that there is no time for the students to internalize and absorb, which will inevitably lead to low participation of the students in the classroom, the discussion is superficial, and the expected effect cannot be obtained. The "PAD classroom" teaching method introduces the link of internalization and absorption, and in terms of time, it can be bisection in this class or even the next class, leaving enough time for students to think and absorb. The "PAD classroom" teaching method effectively avoids the defects of the traditional lecture-style and discussion-style teaching modes, effectively improves the students' learning ability and interest in learning, and resolves the phenomenon and predicament of unclear learning objectives and lack of interest in learning in classroom teaching.

## **2 Analysis of the Current Situation of Courses in the Basic Stage of Information and Communication Majors**

At this stage, the courses of the basic stage of the information and communication major are mainly the training mode integrating theory and practice. Through the continuous deepening of teaching reform, although good results have been achieved, the new situation has put forward new requirements for the needs of information and communication positions, bringing about new challenges. However, there are still many deficiencies in the current training model of the information and communication professional basic ability stage, which is mainly manifested in that the professional basic ability cannot well meet the needs of the army post. Starting from the academic structure and mastery of basic knowledge of non-commissioned officers vocational and technical education students, combined with questionnaires, discussions and other methods, it is necessary to understand the students' learning status, interests and needs, and suggestions for course improvement. Through visits to understand the learning needs of the follow-up professional courses, it is also necessary to fully understand the current situation and requirements of the current course teaching, so as to be targeted. Through the form of relevant professional department and army research, there is a must to study the needs of the students in the vocational and technical education of the information and communication non-commissioned officers, integrate and optimize the existing teaching content, such as the basic professional knowledge required by the information and communication non-commissioned officer vocational and technical education students in the basic circuit, analog circuit, digital circuit and digital communication principle, inspect the content of professional basic ability training in the vocational and technical education of information and communication non-commissioned officers at the same time, and increase the relevant teaching content of applied skills training according to the needs, such as basic knowledge of electric engineering, digital communication principles, sensors, microcontroller applications, etc. The group training method is guided by the actual job requirements of the army, and changes from planning guidance to demand traction, but there are still problems such as not being closely connected with the actual needs of the army, and the students' learning motivation is not strong and their interest in learning

is not strong. In order to solve this problem, the “PAD classroom” teaching method is adopted to allow students to participate in teaching activities, so that students can become the real masters of the classroom, and cultivate students’ practical ability in their interests. In the teaching design, teachers should focus on cultivating students’ ability to analyze and solve problems, and cultivate and exercise students’ cooperation ability, communication ability and practical problem-solving ability through specific tasks, which is conducive to improving the students’ comprehensive ability to analyze and solve electronic technology problems, and is conducive to the comprehensive development of the students.

### **3 The Construction of the Teaching Model of PAD Classroom Teaching in the Basic Stage of the Course Teaching of Information and Communication Majors**

#### **3.1 Proposition of the Teaching Method of “PAD Classroom”**

In view of the main problems existing in the basic courses of information and communication non-commissioned officers’ vocational and technical education, combined with the characteristics of the students, teachers should understand the follow-up professional learning needs through research, organize and optimize the course content, and select some of the content to implement the “PAD classroom” teaching practice. The core concept of the PAD classroom teaching model is to combine teacher teaching and student discussion, allocating half of the class time to teachers for teaching and the other half to students for discussion, and staggering the discussion time so that students can have nearly a week after class to arrange their own learning, carry out personalized internalization and absorption, and strengthen process management during this period. The teaching model of “PAD classroom” divides teaching into three processes of time separation, namely presentation, assimilation and discussion, also known as PAD mode. [2] Through the organic integration of teaching and discussion, the teaching method of “PAD classroom” realizes the unity of opposites of “teaching method” and “learning method”, effectively enhances the students’ learning initiative, and the teaching effect is good. “PAD classroom” is an efficient classroom teaching method suitable for China’s national conditions. It organically combines the online and offline hybrid teaching mode with the “PAD classroom” teaching mode, and uses the information release and supervision methods of the online teaching platform to effectively complete the teaching. Then, teachers can introduce the “PAD classroom” into offline, and guide students to construct and internalize knowledge through teaching, absorption, and discussion; Borrowing the after-school tracking and testing functions of the online education platform, “PAD classroom” can also allow students to summarize knowledge points to achieve knowledge integration, big data analysis of test results, which helps teachers and students to complete teaching effect feedback, and adjust teaching content and methods in time to form a new model of blended teaching that is sustainable and optimized [3].

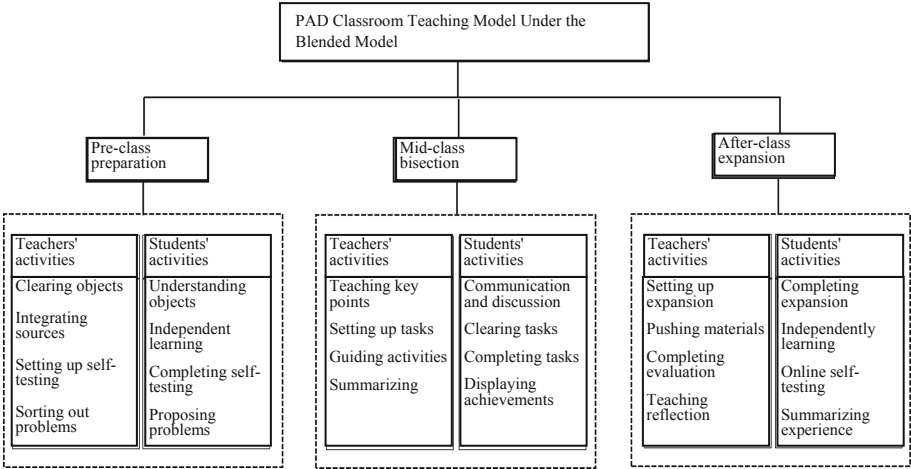
#### **3.2 Feasibility Analysis of the “PAD Classroom” Teaching Method**

The teaching method of “PAD classroom” allows students to take the lead and make students become the real masters of the classroom. The teacher only teaches the key

points and difficulties, and does not need to cover every knowledge point. It is necessary to give students more time and space for independent discussion to inspire students' enthusiasm for active learning; in this way, in the process of classroom discussion, there will be many excellent ideas, novel and unique insights, and summaries of the knowledge learned, and the questions raised will be more in-depth, which will gain more affirmation and resolve the predicaments of unclear learning objectives and lack of interest in learning in classroom teaching. Therefore, it is completely feasible to introduce the "PAD classroom" teaching method into the basic stage course teaching of information and communication majors, to make up for the deficiencies of traditional teaching methods, and to fully stimulate students' learning enthusiasm and creativity, laying the foundation for cultivating talents with engineering practice ability and innovation ability.

### 3.3 Basic Ideas for the Construction of the "PAD Classroom" Teaching Model

Combining the characteristics of professional basic course knowledge, there is a necessity to sort out the teaching content of the course, and determine the content suitable for the "PAD classroom" teaching; teachers should carry out curriculum teaching design for each knowledge point, determine specific teaching methods (diversified) and implementation steps suitable for the implementation of "PAD classroom" of knowledge points; then, teachers need to compile lesson plans and carry out curriculum teaching practice. The specific measures of the teaching method of "PAD classroom" are as the following: the teaching method of "PAD classroom" mainly includes three links, pre-class preparation — in-class bisection — after-class expansion. Before class, through WeChat, DingTalk group, Cloud Classroom and other modern information technology online education and teaching platforms, teachers can assign homework for class students and guide them in the form of questions, so that students can start the mode of inspiring thinking and self-learning in "independent learning". Teachers can use the information release and supervision means of the online teaching platform to effectively complete pre-class activities such as preview. Compared with the traditional pre-class model, students can receive preview materials more quickly and communicate with each other in the online virtual learning community, so that offline independent preview can be transformed into online collective interactive preview. The classroom organization in the class mainly adopts the forms of students' mutual evaluation, group discussion, etc., on the one hand, it helps teachers to objectively evaluate students' knowledge; on the other hand, it helps students to improve their enthusiasm for collaborative learning and independent learning. In addition, insisting that the "summary of each chapter" part is carried out in the mode of flipped classroom, is conducive to organize and summarize the knowledge system independently and promote the internalization of knowledge. Courseware production is not limited to textbooks. Teachers can introduce rich application cases, classify them according to difficulty, and set up spaces for dynamically fine-tuning the supplementary content of teaching according to the acceptance of students in the classroom. [4] After class, teachers can arrange expansive homework involving application questions or multiple answers, and students need to discuss in groups, solve collectively, give solutions, and submit in groups, which can exercise students' teamwork ability. Teachers publish extended learning materials of knowledge points in each chapter in the learning community to encourage students to exchange learning experiences.



**Fig. 1.** PAD classroom teaching model under the blended model.

The teaching method of “PAD classroom” combines the online and offline mixed teaching mode with the “PAD classroom” teaching model, and guides students to construct and internalize knowledge through teaching, absorption and discussion; using the after-school tracking and testing functions of the online education platform, students can summarize knowledge points to achieve knowledge integration. Through data analysis, they can complete teaching effect feedback, and timely adjust the teaching content and methods according to the feedback to form a sustainable and optimized new model of blended teaching. The specific measures are shown in “Fig. 1”.

**3.4 The Effect Evaluation and Feedback Adjustment of the Teaching Method of “PAD Classroom” in the Basic Stage Course of Information and Communication Majors**

Through the questionnaire survey, data analysis and feedback of the online teaching platform, teachers can understand the students’ learning situation, adjust the teaching content and methods in a timely manner, and make appropriate adjustments to the offline teaching content, implementation measures, and teaching design in a timely manner; and then, teachers can improve the evaluation method of course teaching, and comprehensively understand the teaching effect of “PAD classroom” through a variety of evaluation methods.

**4 The Innovation Point of Teaching Model of PAD Classroom Teaching**

**4.1 Reconstructing the Classroom Through Diversified Teaching Methods to Improve Students’ Learning Initiative and Learning Ability**

“PAD classroom” emphasizes teaching first and then learning. The teachers’ teaching sets the direction and saves effort for students to internalize and absorb. At the same

time, the PAD classroom emphasizes the interaction between students and students, and half of the class time is used for students' independent discussion. To stimulate students' enthusiasm for learning, students can choose how much to internalize and absorb theoretical knowledge and discuss issues according to their own needs for learning levels. "Experiential learning, project-based learning, flipped classroom teaching, gamified learning" and other teaching methods that students are interested in are applied to promote the application of new media such as micro-classes and MOOCs and online-new media-mobile learning technology, which can meet the needs of students for independent learning and personalized learning, avoid students' fatigue, and ensure students' learning effects [5].

#### **4.2 Improving the Cultivation of Students' Innovative Ability Through the PAD Classroom Teaching Method**

The principle of teacher's teaching is intensive and blank. The course only focuses on key and difficult content. After class, students understand the content of the teacher's teaching through books and documents, expand their knowledge, and prepare for discussion. The whole process focuses on cultivating students' self-learning ability. With the improvement of self-learning ability, students will enhance their learning ability and be more adaptable to job requirements. The 3 links, "Shining", "Quiz You", and "Help Me", in the homework, include the basic knowledge, typical military cases and supporting test questions. The process involves thinking critically and then finding answers to the problems. During class discussions, students communicate patiently, express their own ideas, listen to other people's expressions, increase teacher-student communication, student-student communication, and create a good learning atmosphere. Cooperation ability means collaboration to achieve goals. Group students help and learn from each other, brainstorm ideas, and jointly solve problems. Innovative experiments can arouse the enthusiasm of students and cultivate more and better innovative talents.

#### **4.3 Reshaping Teachers Through Flexible and Changeable Teaching Forms and Improving Their Comprehensive Teaching Ability**

Teachers are the organizers and guides of classroom teaching, as well as reformers of teaching practice activities. The use of the "PAD classroom" teaching mode and the simplified and high-quality classroom teaching content is a challenge to the comprehensive ability of teachers. For a long time, most of the theoretical teaching is lecture-based teaching, and students have almost no independent time to analyze and internalize the knowledge they have learned. In the "PAD classroom", a considerable proportion of the class time is given to the students, which requires teachers to simplify the teaching content and highlight the key points and difficulties. Teachers have a more internalized understanding of majors and related knowledge, and put forward higher requirements for teachers.

## **5 Several Problems Paying Attention to During the Implementation of the Teaching Mode of PAD Classroom Teaching**

### **5.1 Teaching Content**

According to the implementation plan of “PAD classroom”, the teaching content of the basic stage of the information and communication major is divided into several knowledge points. Each knowledge point is easy to implement a PAD classroom, and each knowledge point is closely linked to the syllabus, making the learning task goals more clear. In the whole learning process, it is necessary to design a teaching design that conforms to students’ learning ideas and interests, and organically integrate the ideological and political content of the course into the whole process of teaching.

### **5.2 Teaching Methods**

Flexible use of various typical teaching methods, these methods have been popularized and applied when information technology is not yet mature, and have irreplaceable advantages under the realistic background of education in China. The traditional typical teaching method is basically finalized. It is necessary to explore the organic integration of modern information technology and the basic courses of information and communication majors, and to organically integrate the “PAD classroom” teaching method and other teaching methods according to the teaching content.

### **5.3 Classroom Organization**

Whether it is “learning first and then teaching” or “teaching first and then learning”, it is necessary to dynamically seek the best “mix and match” effect according to the actual conditions based on the characteristics of the course content. The order of “teaching” and “learning” in the classroom, and the main and auxiliary of “learning” and “teaching” have no rules to follow. The important thing is to adapt to the use of dynamic classrooms and typical teaching methods, and try to avoid the use of a single teaching method and method for the courses in the basic stage of information and communication majors. Special attention should be paid to the coherence and inheritance of the teaching content organization, so that students can go from “starting the class” to “ending the course” in one go [6].

### **5.4 Teacher and Student Activities**

In order to ensure the effectiveness of learning, in the design of various tasks before, during and after class, teachers should flexibly use the teaching methods and platforms commonly used in information-based teaching to strengthen the quality of teaching and students’ enthusiasm for learning. It is also necessary to pay attention to the informatization evaluation of the whole process of teaching and learning, timely feedback the doubts and difficulties existing in the teaching, and adjust the teaching content and organizational form in a timely manner according to the feedback.

## 6 Conclusion

Practical teaching has proved that the teaching design scheme of “PAD classroom” in the mixed model is student-centered, and realizes the whole process management from teaching to learning, from assignment to correction of homework, from classroom management to assessment, which can greatly improve the professional foundation of information and communication, improve the learning effect and students’ practical ability, and meet the requirements of ability-oriented education, having strong operability and certain generalizability. However, there are still many deficiencies that need to be further improved and perfected. Such as how to further improve the teaching design plan, how to use flexible and diversified teaching methods to stimulate students’ interest in learning, how to better mobilize students’ enthusiasm for learning, and how to further improve students’ learning ability and logical thinking ability, these are all necessary to further research and exploration.

**Authors’ Contributions.** Li Wen was responsible for the overall planning of the project, put forward the research ideas, designed the overall framework of the paper and wrote the paper. Jian Pan revised the paper; Yuting Zhao was responsible for data collection; Shasha Xu participated in the writing of the paper; Jingna Cui studied and collated literature.

## References

1. Fu Hong, Xu Tianbai, Analysis and Implementation Mechanism of the Role of Teachers and Students in PAD classroomroom [J]. Education Teaching Forum, 2020(53): 306-308. (in Chinese)
2. Yang Shuping, Wang Dewei, Zhang Lijie, The Teaching Mode of PAD classroom and Its Role Analysis between Teachers and Students [J]. Journal of Liaoning Normal University, 2015(9). (in Chinese)
3. Wu Wei, Research on the Teaching Mode and Effect of Blended Teaching Based on PAD classroom [J]. Modern Salt and Chemical Industry, 2021. 06: 159-160. (in Chinese)
4. Wang Mengju, Guo Ruibo, A Brief Analysis of the Mixed Class Teaching Mode for Computer Majors [J]. KE JI FENG, 2021. 08: 51-53. (in Chinese)
5. Tuo Junbo, Liang Qiang, Teaching Research on “Engineering Drawing” Based on Blended Teaching and Split Classroom [J]. Science and Technology & Innovation, 2021(14): 62-65. (in Chinese)
6. Huang Huiqiong, Research and Case Analysis of Blended Learning Practice Based on Flipped Classroom and PAD classroomroom [J]. The Chinese Journal of ICT in Education, 2021(14): 137-139. (in Chinese)



**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

