

Practical Research on College PAD Teaching Mode

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Keywords: PAD class, teaching mode, teaching reform, practice effect

Abstract: This paper carries out a practical research on PAD class mode in colleges and universities, introduces the method and advantages of PAD class teaching mode, and then applies it in C language teaching. Firstly, this paper analyzes the existing problems in C language teaching. Secondly, design C language teaching PAD class. Finally, the students majoring in computer science in the university were selected as the experimental subjects, and a conclusion was drawn after 16 weeks of teaching comparison between the experimental group and the control group. Both in academic performance and other aspects have shown the advantages of PAD class, which can provide teaching reform ideas for colleges and universities.

1. Introduction

Under the wave of education reform with quality-oriented education and lifelong education as the background, a variety of new classroom teaching modes, such as flipped classroom, seminar-style teaching and MOOC, have been introduced into the teaching mode reform of Chinese colleges and universities. However, due to the conflict and opposition between the traditional education mode and the new teaching model, the new teaching mode is not ideal in China's education reform. Therefore, exploring the method of integrating the new teaching mode with the traditional teaching mode is the focus of the educators. PAD CLASS is a teaching model reform method proposed based on the current situation of education in China. Studying its practical effect in classroom education has great practical significance in the application of the teaching mode.

2. PAD class introduction

Presentation-Assimilation-Discussion, PAD is a reform plan for classroom teaching model proposed by Professor Zhang Xuexin from Fudan University. He divided classroom education into three basic modules: a teaching module, homework module and discussion module. Each module is relatively independent and connected with each other to complete the whole process of tandem classroom teaching. The teaching module sets out the framework of the teaching content, and focuses on the analysis and illustration of the key points and difficulties in the teaching content. The homework module combines online and offline teaching resources to make personalized learning arrangements according to students' mastery of knowledge, so that each student can continuously improve their understanding of knowledge and complete the homework assigned by the teacher. Discussion module conducts group discussion and cooperative learning according to the problems encountered by students in the learning process, so as to form an interactive learning atmosphere between teachers and students and between students and improve students' subjective initiative in learning.

3. PAD class advantages

China's traditional teacher-centered teaching model has been followed for thousands of years, and teachers' teaching thoughts and students' learning consciousness have formed a deep-rooted mode. If we directly introduce western teaching methods, such as flipped classroom, MOOC education and seminar-style teaching into China, both teachers and students will find it difficult to

adapt in a short time, and problems of disordered teaching and learning methods will arise instead. PAD class first explains the overall framework of the learning content by the teacher in the traditional classroom teaching mode through the teaching module, so that the students can understand the overall situation of the learning content, and point out the key points and difficulties in the learning content, thus attracting the attention of the students. Secondly, combining the Internet mode and mobile learning mode of modern education to give students the way of personalized learning, teachers make personalized learning plans in groups after understanding the knowledge level of students, and assign the corresponding periodic homework. Students can gradually improve their academic performance through independent learning to ensure that every student "does not fall behind". Finally, with the support of the network, stagger the time of classroom teaching and students' discussion, which can not only enrich the content of classroom teaching, but also promote students' personalized absorption of after class discussion. The application of PAD class can be combined with the characteristics of the course content and teaching arrangement to carry out changes in classroom grading and weekly grading, etc., so as to be able to more flexibly apply the teaching mode of classroom grading and enable students to better receive and master knowledge.

4. College PAD class teaching mode practice

This research takes the teaching practice of the C language, a compulsory course for science and engineering computer major in colleges and universities as the object. As a basic programming language for computer majors, C language plays a very important role in students' mastering of computer programming ability.

4.1 Problems in C language teaching.

C language course is a basic course of computer software design combining theory and practice. Many schools teach it as an introductory course for students to program. However, as students are first exposed to programming, they often feel that the programming language is more difficult after a period of learning, and then lose their interest in learning C language. It is difficult for them to fully understand the ideas and methods of language programming. Due to boring C language teaching content, lack of innovation, more theoretical knowledge than practice, unable to effectively guide students, lack of initiative in learning, single assessment form cannot accurately assess the level of C language proficiency of students.

4.2 Dull teaching content and lack of innovation.

At present, the teaching materials of C language adopted by colleges and universities are based on the language theory and introduce the C language course from simple too deep by programming method one by one. Although the content design of the textbook is practical for beginners, due to the monotonous content of the textbook, what students master is only limited to the case content, which is not innovative and deviates from the social need at the same time.

4.3 More theoretical knowledge than practice.

In terms of class hour arrangement, C language is divided into 64 class hours, of which 62.5% are theoretical class hours and 37.5% are practical class hours. C language has a lot of theoretical knowledge. Although it occupies 2/3 of the basic class hours, it still cannot meet the time requirement of theoretical explanation. As a result, teachers tend to compress and simplify the curriculum in some links, while students are weak in autonomous ability and difficult to digest and understand the knowledge content. In addition, students practice on the computer also has the problem of obsolete cases, the lack of innovation, students can not only write new procedures, but also lack of understanding of the case procedures.

4.4 Lack of learning initiative.

C language is a high-level computer programming language, to master it completely requires a

lot of hard work. However, at present, most students can only complete the homework under the supervision of the teacher, and they directly rely on the teacher to help solve problems, lacking the awareness and ability to think independently and have taken the initiative to solve problems.

4.5 Single assessment form.

The evaluation of C language students' academic performance is mainly based on the mid-term and end-stage written tests. Test scores account for 70 percent of the total, while computer-based tests account for 30 percent. Therefore, before the exam, students tend to memorize the exam answers by means of concentrated memory, but fail to truly evaluate the students' ability to master the C language.

4.6 PAD class design of C language teaching.

In view of the existing problems in C language teaching, the practical innovation of teaching reform is carried out by combining the theory of PAD class teaching mode, which mainly includes: the establishment of PAD class teaching content and the design of teaching process.

4.7 Teaching content arrangement of C language PAD class.

C language has 16 weeks of 64 class hours. In the learning process, students need to elementary basic theoretical knowledge before they can operate the computer. With the idea of PAD class, the C language course is divided into three stages. The specific implementation plan is as follows:

In the first stage, classroom teaching of basic data types and program structure of C language was carried out in the first 4 weeks, and two computer operations were arranged to enable students to understand the general structure of C language programming and get familiar with the programming environment of C language.

In the second stage, interactive and discussion teaching with students as the main body and teachers as the auxiliary will be carried out in 8 weeks. According to the arrangement of C language teaching material, the teaching of order, selection, loop structure, function definition and call, parameter transfer and return value, array, structure, pointer is carried out. And through the computer operation of each unit for students to let students to absorb C language knowledge. Different students may have different knowledge levels of C language in the learning process, so they can make full use of the network platform to assign homework for students. We can make full use of the network platform to assign homework specifically for students, so that students can have some understanding through independent learning after class and gradually become interested in programming.

In the third stage, students' learning results are assessed in the last four weeks. Diverge students' thinking, establish a discussion platform between teachers and students, and between students, and pay attention to the activity of students' participation and interaction. The students further master the design idea of object-oriented programming, broaden the students' programming vision, and bring the students' classroom performance into the scope of assessment.

4.8 C language PAD class teaching process design.

C language focuses on the participation of students in experimental teaching. Through online and offline interactive learning model to improve students' learning initiative and enhance students' thinking and innovation ability. Starting from the introduction of knowledge by teachers, the teaching process sets up three processes, namely, teacher's summary, student's absorption and interactive discussion.

The teacher introduces to the student to divide the classroom teaching mode the concrete implementation content, and introduces the C language design thought and the overall structure layout. At the beginning of each course in the 4-week teaching, the teacher summarized the last class, and focused on the guidance of the teaching content of the class, so that students could gradually accept the new knowledge. For more complicated grammar rules for students to understand and absorb, through the task-driven approach to cultivate students' ability to think independently.

The purpose of the absorption part is to improve students' ability to actively complete C language programming. After completing a unit of teaching, the teacher assigns autonomous learning tasks and assignments to the students, and enables the students to discuss with each other in groups to complete the tasks assigned by the teacher. In case of problems that cannot be solved by students in the group, students can gradually understand the solution to the problems through discussion between groups or between teachers and students, and teachers can provide guidance and supervision.

During the interactive discussion, teachers can assign study groups according to the students' proficiency in C language programming. A group of students from the strong ability to master the weak in the three levels of students, the strong learning ability of students to lead the weak learning ability of students. It can alleviate the pressure of individual tutoring by teachers, and at the same time, teachers can inspect the learning process of each group of students and timely find problems in student programming. The teacher focuses on explaining the common problems, and evaluates the learning effect after each stage, as the result of students' classroom performance.

4.9 Analysis of practice results.

Next, 30 students from two classes of computer major of grade 2018 and 2017 in Changsha Medical University were randomly selected to form an experimental group and a control group. PAD class teaching mode was used in the experimental group, while the traditional teaching mode was still used in the control group. There was no significant difference between the two groups through statistical analysis of students' academic performance.

The teaching effect was evaluated after 16 weeks of C language teaching, and the statistical tool SPSS was used for statistical analysis and questionnaire survey. The test results are shown in Table 1:

Table 1. Test results

Group	Total(100)	Written exam(70 points)	Computer and usual results(30 points)
Experimental group	86.34±5.74**	58.67±4.79	27.67±0.95
Control group	74.26±6.24	53.72±5.72	20.54±0.52
T value	4.541	0.716	7.032
P value	<0.001	0.420	<0.01

From the perspective of test results, the experimental group's performance compared with the control group has a certain degree of improvement, especially on the computer and usually higher performance. The anonymous survey was conducted in the form of questionnaires. A total of 35 questionnaires were issued and 33 valid ones were collected, with the recovery rate of 100%. The questionnaire includes six aspects: students' interest in learning C language, learning initiative, learning efficiency, communication ability, cooperation ability and teaching satisfaction. The results of the yes/no survey are shown in Table 2:

Table 2. Survey results

Contents	Experimental group		Control group		T value	P value
	Y(%)	N(%)	Y(%)	N(%)		
Interest in learning	88.20	11.80	64.52	35.48	6.432	0.009
Learning initiative	82.53	17.47	54.42	45.58	6.234	0.007
learning efficiency	92.16	7.84	51.94	48.06	6.293	0.002
Communication skills	87.34	12.66	54.23	45.77	9.392	0.012
Ability of cooperate	89.24	10.76	57.13	42.87	4.295	0.032
Satisfaction	95.35	4.65	54.32	45.68	11.345	0.001

As can be seen from Table 2, the content of the questionnaire is $P < 0.05$, which is statistically

significant. The satisfaction of the experimental group is significantly higher than that of the control group. This indicates that students in this experiment have a high recognition for the adoption of the new PAD class teaching mode. Moreover, it has a good effect on improving students' learning interest, initiative, learning efficiency, communication ability and cooperation ability.

5. Summary

The results of the practical research in this paper show that compared with the traditional teaching mode, PAD CLASS teaching mode has improved students' academic performance, learning interest, learning initiative, learning efficiency, communication ability and cooperation ability. Students' satisfaction with teaching is also higher than that of traditional teaching mode, which proves the feasibility and superiority of teaching mode reform.

Acknowledgment

2018 Research Project on Teaching Reform of Ordinary Colleges and Universities in Hunan Province, Hunan Provincial Education Department Notice[2018]NO.436-807

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