

The Application of PDCA in the Quality Management of Classroom Teaching in "University Physics"

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Abstract:

In the study of the course "University Physics", the theoretical knowledge is strong, and the students' learning foundation is inconsistent. This paper introduces the PDCA cycle model into the teaching, which helps to find the problems existing in the classroom teaching, and gives the construction strategy to continuously improve teaching effect.

Keywords: PDCA cycle, Physics teaching, Teaching quality, Teaching management, Application.

I. INTRODUCTION

College Physics is a professional basic course that must be offered by engineering majors in our school. It is the basis for students to learn subsequent professional courses. It plays an irreplaceable role in cultivating students with correct values, exploration ability and innovative spirit. The basic concepts, theories and methods taught are an important part of the students' scientific literacy. Students need to have a certain calculus foundation for the study of this course, and students not only have a weak calculus foundation, but also have uneven physical foundations. This paper will introduce the Plan-Do-Check-Action (hereinafter referred to as PDCA) method into the quality management of college physics classroom teaching. It can gradually improve the teaching effect, improve the participation of students in learning and the quality of classroom teaching.

1.1 The Source of PDCA

PDCA is composed of the first letters of four English words. These four English words are Plan, Do, Check and Action. The meaning of each word is plan, execute, check and act. The research on it originated in the 20th century, In the 1920s, the famous statistician Walter Armand Shewhart's book "The Economic Control of Quality in Product Production" is considered to be the origin of the basic principles of quality, and he proposed in the book "Statistical Methods in Quality Control". The prototype of "planning-executing-checking" was developed. Later, Deming perfected the PDS cycle in the process of use, promotion, publicity and popularization, and developed it into

"planning-execution-checking-processing", which is now called PDCA. The model, which is a quality continuous improvement model, also known as the "Deming circle", was originally mainly used in quality management. Now not just limited to quality management, this tool can be used in project management, curriculum development, and even personal life.

Its basic meaning is: P is the abbreviation of Plan, which means plan, formulate project guidelines and goals, and clarify the plan to achieve the goal; D is the abbreviation of Do, which means execution, according to the plan of the activity, according to the established time node. Achieving the goal; C is the abbreviation of Check, In the process of execution, it is necessary to check according to the time node to ensure the progress and effect of the project, and timely raise and feedback the problems encountered in the inspection; A is the abbreviation of Action, which refers to Take action, deal with the problems reported in the inspection in a timely manner, summarize the successes and failures, affirm and promote their successes; and reflect on the failures to avoid repeating them in the future. The problems that have not been solved in this cycle are listed below, gradually improve and perfect in one round of PDCA cycle.

1.2 PDCA Characteristics

(1) The cycle is repeated. It does not mean that the end of the operation cycle of a cycle means that all the problems are solved, but only some problems in the project are solved at the end of the cycle, but there are still some other problems that have not been solved. Or new problems arise in the process of solving existing problems, and then enter the next PDCA cycle for improvement, and so on.

(2) The process is rigorous and the logic is clear. In the process of cyclic operation, step by step, and gradually improve the level in the process of solving problems.

(3) As a statistical tool, PDCA cycle applies scientific statistical concepts and processing methods, and is an effective tool to promote work, find problems and solve problems.

1.3 Review of related research

Most of the PDCA is used in the quality management of products, but some scholars have introduced the PDCA method into the related work of college teaching. So far, the use of PDCA method to study college teaching is still relatively small, and there are also useful PDCA cycles in the literature. The theory is used in college teaching management, curriculum teaching reform, and the application of curriculum teaching. For example, Zou Xia[1], etc. proposed a two-level and four-stage closed-loop cycle improvement teaching model based on the PDCA method to improve teaching quality, which can effectively improve the teaching effect; Li Ting[2] applied the PDCA cycle model to computer-based teaching. , through the repeated cycle of these four stages, so as to find and deal with problems in time, and finally achieve the purpose of improving the quality of teaching; Han Yi[3], Huang Wufei[4], He Lijia[5] and others introduced PDCA in the teaching process Circular management concept, constantly find problems, solve problems, and then improve the quality of teaching. Through the sorting and analysis of the literature, not many have introduced PDCA management concepts and methods in the research of college teaching, and it is seldom used to discuss and evaluate the teaching effect.

II. THE SPECIFIC IMPLEMENTATION STEPS OF PDCA IN TEACHING

2.1 Planning phase

This stage is mainly to determine the goal of the work, the policy plan to achieve the goal, etc.[6]. To achieve this stage of the work is generally through the status quo investigation, analysis to determine the cause, confirm the main factors in the cause, and formulate a plan four steps. The first is to analyze the current situation, determine what problems exist, and find the most important problems; analyze the reasons for these existing problems, and decompose the main core influencing factors from these reasons; finally, formulate quality improvement measures according to the core influencing factors. measures and actions[7].

Combined with our teaching, our main work at this stage is to formulate teaching goals in each classroom teaching. The basis for formulating teaching objectives is mainly the talent training plan of each major. On the basis of fully understanding the talent training objectives, the curriculum, teaching calendar, teaching plan, electronic courseware, handouts and teaching design and other related teaching materials are formulated. The course "University Physics" is offered in 18 majors in our school, including electronic information engineering, electrical engineering and its automation, robotics engineering, automation, material forming and control engineering. There are two syllabuses, and the knowledge goals, ability goals and quality goals in each syllabus are different. The progress of the teaching calendar, lesson plans, electronic courseware, handouts and teaching design are all carried out according to the teaching unit (2 hours).

2.2 Design and implementation phases

This stage is mainly to implement the content stipulated in the previous stage, including design, implementation, feedback and improvement. Combined with our daily teaching, that is, in classroom teaching, we follow the syllabus and teaching calendar formulated in the previous stage, make teaching design according to students' learning conditions, write corresponding teaching plans, and adopt appropriate teaching methods in classroom teaching. The implementation of this stage needs to be completed by teachers and students together, and it is also an important link in determining the level of classroom teaching. At this stage, the level of teachers and students are both embodied.

2.3 The check phase

The work in this stage is mainly carried out during or after the implementation of the plan, by checking the specific situation to see whether the expected results or effects of the previous plan are met. Compare the inspected results with the expected goals, and get the gap between the two, and provide a reliable basis for the next improvement work. Combined with our teaching work, it is mainly to see whether the teaching objectives have been achieved, whether the teaching effect is obvious, and whether the teaching quality has been improved. Through comparison, we should reflect and modify our teaching plan, teaching design or

teaching process, so that the next implementation can be more perfect.

2.4 Processing phase

This stage is mainly based on the inspection results in the previous stage, and then take corresponding measures. Consolidate achievements, learn from successful experiences and incorporate them into the standards as much as possible, while remaining problems are transferred to the next PDCA cycle to solve, providing a basis for a new round of cycles. Combined with our teaching work, each teacher needs to reflect on the teaching of each class he teaches. The teaching reflection includes the teaching process, the setting of activities, the feedback of students, the reception of students, the use of teaching methods, and the content of teaching. For the problems that cannot be solved in the course or the emerging problems in this class, we should seek solutions in the new cycle and give improvement measures, so as to continuously improve the teaching quality of the classroom.

III. SUGGESTIONS ON USING PDCA CYCLE TO IMPROVE THE QUALITY OF CLASSROOM TEACHING

3.1 Clarify teaching objectives and update teaching content

In the planning stage, the main work is to determine the teaching objectives, develop the syllabus, improve the electronic teaching plan. Teaching activities are the main load to achieve teaching objectives. When setting up teaching activities, we should not only ensure the basic content, but also constantly inject new teaching content with the development of society and the progress of science and technology. Teaching materials should not be the only teaching content to attract students' interest in learning. Physics plays an important role in the development of modern science and technology, so the organization teaching content should be timely introduction of frontier information and the latest achievements in the development of this course, such as in the teaching link of law of conservation of momentum, the our country on July 23, 2020 in wenchang in hainan spaceport launch of jiu ge Mars missions for the first time in a probe into the teaching to ask in the launch of a marked the our country opens the tour of Mars, taken the first step in our planetary exploration [8]. By 2100 on February 5, 2021, Tien-Wen 1 has been in orbit for 197 days, with a flying distance of 465 million kilometers, about 184 million kilometers from Earth and 1.1 million kilometers from Mars. At present, the orbiter has carried out the docking orbit on Mars, and its equipment is in normal condition. It will operate on the docking orbit for about three months, and all seven payloads of the orbiter will be switched on and scientific exploration will begin. Through the introduction of knowledge of Tien Wen 1 probe, the teaching content can be enriched. At the same time, the theoretical knowledge learned can be combined with practical application, so as to enhance students' interest in learning and arouse students' sense of pride and patriotism. This is just a microcosm of a link of teaching activity design, is very tall to the requirement of the teacher, you first need to change ideas, teachers only before a textbook on teaching time is gone, along with the development of the information age, the teaching besides has the solid basic skills, also need to constantly improve their ability, including attention to the development of high-tech information outside, in the teaching to introduce in time, constantly added

sound to enrich the teaching process. Secondly, in the introduction of cases, it is necessary to take into account the characteristics of different majors of students and selectively update the teaching content to ensure the continuity and systematicness of classroom teaching content.

3.2 Adopt advanced teaching methods

In the implementation stage, it is mainly to ensure the effect of teaching, which depends largely on the implementation of teaching activities, including the processing of teaching content, the innovation of teaching methods and the transformation of students' learning methods. In order to improve the quality of classroom teaching, explore the "student-centered" classroom teaching, greatly mobilize the enthusiasm of students to participate in teaching, and try to use a blended teaching model. The teaching platforms used are: MOOC, Blue Moyun Class, Chaoxing Learning Pass, Rain Classroom, etc., the learning process is usually divided into three stages, namely pre-class preview, in-class discussion and post-class consolidation. Using the teaching platform, carefully design preview tasks and publish teaching materials such as videos, courseware and quizzes for pre-class preview to the platform, and at the same time issue preview notices to students to guide students to complete the pre-class preview; the teacher determines each lesson according to the students' pre-class preview test situation. There are many difficulties in the teaching of each class. In the class, it is mainly "student-oriented", and the teacher assumes the role of "director", using discussion and heuristic methods to achieve student-student interaction and teacher-student interaction, helping students to straighten out the knowledge structure and solve major difficulties. , so as to help students establish their own cognitive structure; in addition to assigning basic knowledge topics to consolidate after class, they also assign design and expandable knowledge to students, and gradually improve students' self-learning ability, access data and summarize ability.

3.3 Establish a scientific and reasonable evaluation system

In the inspection stage, it is mainly the evaluation of teaching quality. How to evaluate the quality of classroom teaching is a complex problem with multiple factors. In the face of the emerging new teaching models, the selection of evaluation indicators and evaluation content becomes the core of the evaluation system. The evaluation indicators should include teachers' teaching ability, Teaching content, teaching methods, students' responses, and secondary evaluation should also include qualitative evaluation and quantitative evaluation, and the main body of evaluation should also be diversified, including student evaluation, peer evaluation, expert evaluation, etc., which can reflect the teaching quality of the classroom more objectively and fairly.

3.4 Timely feedback summary, gradually improve the quality of teaching

In the action feedback stage, we mainly summarize and analyze the previous work, which is exactly the same as the teaching reflection we have after each class. According to their own teaching situation and students' feedback, teachers will summarize the more successful aspects of classroom teaching, and share this situation with everyone in teaching and research activities, so that other teachers can learn from them;

On the positive side, reflect on what areas need further improvement, avoid other teachers from encountering similar problems, and make improvements in the next PDCA cycle to promote the continuous improvement of classroom teaching quality.

IV. SUMMARY

The improvement of classroom teaching quality is a step-by-step process. By introducing PDCA cycle in each process of teaching, and implementing and improving each link round by round, it will help to continuously improve the quality of course teaching and promote the quality of classroom teaching. Continue to step up to new levels.

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