Application of BOPPPS Teaching Model Combined With "Task driven" in Electronic Technology Experiment Teaching

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Abstract. On the basis of combining task driven and BOPPPS teaching modes, this article explores the application of task driven and BOPPPS modes in experimental teaching of electronic technology courses. Through practical application cases. In response to the shortcomings of traditional classroom teaching, methods and processes of experimental teaching are provided. Enable students to quickly integrate into the teaching environment of active action, and comprehensively improve the quality of talent cultivation.

Keywords: Task driven; BOPPPS; 555 timer; Electronic Technology Course.

1 INTRODUCTION

Electronic technology course was compulsory basic course for students majoring in electronics. They played a role in connecting the past and the future in the talent training program and provided necessary electronic technology knowledge and basic skills for the learning of subsequent professional courses, aiming to strengthen students' professional basic literacy and improve students' post holding ability.

This kind of course showed three characteristics in training. First, it had a wide range of disciplines, including electronic science, computer science and technology and modern electronic production technology. Second, it involved many categories, including circuit foundation, electrical technology, analog electronic technology and digital electronic technology. Third, the course content was abstract, theoretical, practical and obvious engineering and technical characteristics.

In recent years, in terms of curriculum teaching reform, we had mainly explored and practiced from multiple dimensions such as teaching content, teaching mode and teaching methods. The teaching of electronic technology had initially formed a layered teaching mode, which integrates module and theory, and the teaching effect had been significantly improved.

P. Batista et al. (eds.), *Proceedings of the 2024 International Conference on Humanities, Arts, Education and Social Development (HAESD 2024)*, Advances in Social Science, Education and Humanities Research 892,
https://doi.org/10.2991/978-2-38476-344-3_15

However, further research results showed that there were still several problems in the teaching process: such as the dislocation of the relationship between teachers and students. Teachers were the main body of teaching. Students were in a state of passive acceptance of knowledge and lost their main position in learning. Teaching and training objectives lag behind. Focusing on the mastery of theoretical knowledge, the teaching effect was mainly evaluated according to the course examination results. Students did not have a deep feeling of how to use their knowledge to solve practical problems, the connection between knowledge was not in place, they lacked the overall grasp of the engineering system and the ability of practical innovation, they did not fully "land" their knowledge and skills, and the existing teaching model still had shortcomings.

Explored the application of BOPPPS mode combined with task driven approach in experimental teaching of electronic technology courses. Strive to address the shortcomings of traditional classroom teaching and enable students to quickly enter a deeply engaged and active teaching environment. At the same time, helping teachers obtain timely teaching feedback, standardizing the classroom teaching process, achieving the growth of teaching and learning, and comprehensively improving the quality of talent cultivation.

2 BOPPPS TEACHING MODEL COMBINED WITH TASK DRIVEN TEACHING MODEL

2.1 BOPPPS Teaching Model

BOPPPS teaching model originated in 1978. It was a student-centered teaching model based on Constructivism and communicative approach in British Columbia, Canada [1]. Because it had the characteristics of effective teaching - efficient and effective, it was soon introduced by colleges and universities in North America such as Canada and the United States. Now it has been widely used in more than 30 countries and regions around the world.

BOPPPS model divided the teaching process of knowledge points into six stages [2]. Bridge in–attracting students' attention and enhancing learning motivation. Objective –let students know the learning objectives of the course, specify what should be understood, thought, judged or operated before the end of this class, and to what extent. Pre- assessment– understands students' mastery of basic knowledge, and provided resource choices for participatory learning. Participatory learning - let students participate in teaching in multiple directions, so as to master knowledge and place themselves in a teaching environment of deep participation and active action. Post-assessment – knew whether students had mastered relevant knowledge and skills through this course. Summary - summarize the knowledge points and provide an opportunity for students and teachers to reflect together. The core of BOPPPS was: emphasizing students' all-round participation; Get students' feedback in time.

2.2 Task Driven Mode

The task driven teaching model is based on constructivist learning theory, learner centered, emphasizing the need for the learning process to be combined with learning tasks, and stimulating and maintaining learner interest and motivation through completing tasks[3]. This model advocates that students are active constructors of information, believing that teaching is not the transmission of knowledge, but the processing and transformation of knowledge [4-5]. Teachers play the roles of guides, helpers, and facilitators, creating the most authentic environment for students and providing opportunities for communication, dialogue, and cooperation.

2.3 BOPPPS Teaching Model Combined with Task Driven

At present, these two teaching modes have been widely applied, with many successful cases in primary, secondary, and university settings. The introduction of these two teaching modes into the electronic technology experimental classroom has achieved significant results. The pre evaluation and post evaluation of BOPPPS teaching are respectively used to evaluate the current knowledge structure of students and determine whether they have achieved effective teaching objectives [6]. This is a beneficial feedback for teaching. Participatory learning emphasizes student participation and also emphasizes the engineering nature of experiments.

Therefore, tasks are assigned during the introduction learning stage, tasks are assigned, analyzed, and completed during the participatory learning stage, and teaching is evaluated during the summary stage. Teaching according to the above teaching process fully embodies the unity of learning and doing, knowledge and action, and improves students' engineering abilities. Therefore, combining the two, learning from each other, fully utilizing the advantages of the mode, integrating task driven teaching into the BOPPPS mode, and conducting task driven teaching in the BOPPPS teaching mode.

3 BOPPPS TEACHING PLAN COMBINED WITH TASK DRIVEN

A lecture in electronic technology and application was selected as an example for teaching design. The content was to design the alarm circuit with 555 timer and medium scale sequential logic circuits constitute counters. The basic teaching process adopted the introduction of BOPPPS, including six links, bridge-in, objective, pre-assessment, participatory learning, post-assessment, summary. A complete closed-loop classroom teaching was organized. At the same time, the implementation of participatory learning was combined with the teaching process of task driven, make classroom teaching more experimental and engineering, and integrate learning and doing.

3.1 Bridge-in

Assign tasks and set up a place to store some confidential documents, as shown in Figure 1. To ensure the confidentiality of files and data, staff need to set up alarm devices to protect the security of files. Set a thin line for the thief. When the wire is broken, it will sound an alarm. When the wire is disconnected, the alarm signal is a periodic pulse signal that generates a buzzer to sound an alarm.

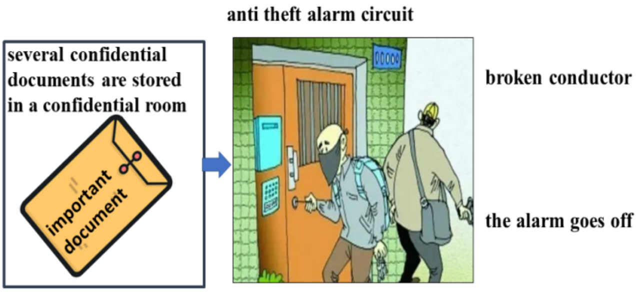

Fig. 1. Practical application of alarm circuit

3.2 Objective

On the basis of memorizing the logic function of 555 timer and understanding the functional circuit composed of 555 timer, learn to use 555 timer to realize the application circuit.

3.3 Pre-assessment

Question 1: The maintenance and reversal of Schmidt trigger were determined by________.

Question 2: As shown in Figure 2, the charge constant and discharge constant of the multi resonant oscillator composed of 555 timer were .

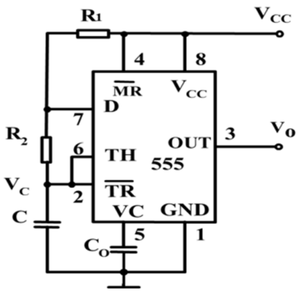

Fig. 2. Multivibrator

Question 3: 555 timer to form Schmitt trigger, as long as the low-level trigger end and high-level trigger end are connected together. (true or false)

Question 4: In the internal circuit of 555 timer, when the outputs of two internal comparators are at high level, the output state of the circuit is reversed. (true or false)

3.4 Participatory Learning

Analysis task. According to the requirements of the alarm circuit in the bridge-in stage and the feasibility of students' realization, the teacher issued the design requirements and completed it with 555 timer. The function was that when the copper wire was continuous, the corresponding alarm horn should be in a silent state and output a low level; otherwise, copper wire was being broken, it should output high-level or continuous pulse signal to continuously send out alarm. In this experiment, the copper wire was replaced by a switch.

Students conceived the experimental scheme, prepared technical device data, hardware circuit designed and production, debugging, product production and tested process to realize the engineering project.

The teacher should provide guidance, answered questions and explained questions, understand the students' mastery of knowledge and pointed of interest, timely adjusted the conception scheme and control the progress of task completion.

Complete the task. According to the knowledge learned, students initially formed the design scheme, drew the circuit diagram, finally determined the design scheme, replied to the scheme and simulate it, as shown in Figure 3.

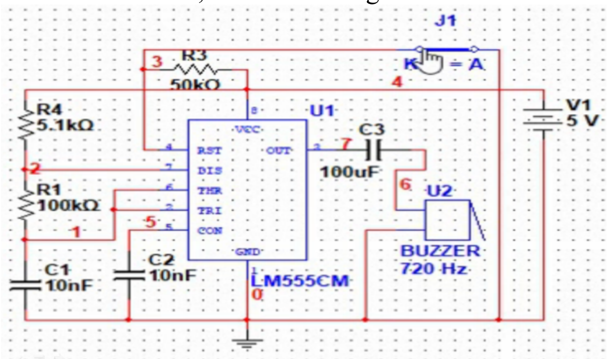

Fig. 3. Circuit simulation

According to the designed circuit diagram, students selected components, such as 555 timer, resistance, wire, switch, power supply, etc., and started layout and debugging. The teacher gave some simple guidance, which was mainly completed by students.

Students prepared for work report and demonstration. When the switch was closed, the circuit outputted low level. When the switch was disconnected, the buzzer made a sound and gave an alarm. Students would report the design idea, key technology, working principle, working process, existing problems and other contents of the project.

3.5 Post-Assessment

Question 1: In the multi resonant oscillator composed of 555 timer, by changing the and ____, the frequency of the output waveform can be changed.

Question 2: If you wanted 555 timer to form a multi resonant oscillator with adjustable output duty cycle, what changes need to be made on the basis of the original circuit?

3.6 Summary

Summary of evaluation of completed tasks. Use mind mapping to summarize the content of this lesson, and comment on the post-assessment and experimental results.

4 CONCLUSION

After two years of practice, the BOPPPS teaching model combined with task driven had been applied to the experimental teaching of electronic technology course. The classroom atmosphere was active and the interaction between teachers and students was good. Eventually students had a new understanding of learning. Students had exercised their abilities, increased their talents, cultivated innovate spirit and critical thinking, established engineering values lacking in traditional teaching, improved learning participation, those could better solved the problem of separation between theoretical and practical teaching, , and then created a relaxed, happy, autonomous learning and inquiry warm atmosphere. Teachers could effectively organize curriculum teaching and obtain feedback information, so as to better serve the classroom.

ACKNOWLEDGEMENT

2022 Education and Teaching Research Project of National University of Defense Technology "Research on the practical application of ‘virtual simulation task driven’ mode in electronic technology course teaching" (U2022021).

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