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Research on Electrotechnics Teaching Based on BOPPPS Teaching Mode

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Abstract

Electrotechnics has the characteristics of strong abstraction and comprehensiveness. In the current teaching, many teachers have the problems of single teaching method and insufficient design of teaching links, and students' enthusiasm for classroom participation are also weak. This is due to the unclear role of teachers in the teaching process and the lack of timely and effective feedback from students in the learning process. In this paper, BOPPPS teaching mode is applied to the teaching of electrotechnics. It follows the student-centered principle and is designed based on constructivist learning theory. This teaching method is highly implementable and interactive. If teachers apply this new teaching method, they can make the teaching of electrical engineering more diversified, and the number of students' participation becomes more. This paper also combines the electrical engineering course with the BOPPPS teaching mode to analyze the strategy in stages in order to improve the teaching quality of the course.

Keywords

BOPPPS teaching mode, electrotechnics, new teaching method, education and teaching, core literacy

1. Introduction

The BOPPPS teaching model was originally proposed by ISW (Canadian Teacher Skills Training Workshop) for teacher training operational skills, and was later cited in multiple fields (Huiqian, Gaomei & Yuan, 2022). It is a new student-centered teaching model that points to teaching objectives. It is named by the first letters of the six parts of the teaching link. These six links are: Bridge-in, Objective, Pre-assessment, Participatory Learning, Post-assessment and Summary. This teaching mode has the characteristics of strong logic and easy implementation, and it is not widely used in Chinese

teaching. The electrical engineering course is a theoretical basic course for students majoring in mechanical electronics. It is also a practical basic course for future employment. It plays a vital role in students' learning (Zhang, Tian, Goh et al., 2022). But the teaching effect of this course is not satisfactory. In this paper, BOPPPS teaching mode is introduced into the course of electrical engineering, in order to broaden the teaching channels of electrical engineering, enhance teaching efficiency, cultivate high-quality and high-quality electrical and electronic technology talents, and promote the modernization of education.

2. Analysis of the Current Situation of Electrotechnics Teaching

2.1 Teaching Characteristics

The electrotechnics course is a professional foundation course in the mechatronics major, which requires students to learn the basic theoretical knowledge and skills knowledge required by the industry (Jin, Zhang, & Su, 2022). By studying this course, students can improve their professional qualities and lay a solid foundation for studying other courses. This course has a very strong abstract and comprehensive characteristic.

2.1.1 Abstraction

There are many abstract and complex concepts involved in the electrical engineering course (Jin, Zhang, & Su, 2022), such as electricity. It also contains many unintuitive theories that students cannot directly access, such as electromagnetic induction, which brings a lot of difficulties to students' learning, which is also the difficulty in the teaching of electrical engineering.

2.1.2 Synthesis

The electrical engineering course covers many knowledge points, which is an important branch of physics. Students have been exposed to the knowledge of electrotechnics since junior high school. From basic circuit components to complex abstract logic circuits, each stage has its difficulties and characteristics. Students may encounter problems at all stages. Students' knowledge base is not the same, and their confusion points are not the same, which makes the teaching of electrotechnics more challenging (Zhang, Tian, Goh et al., 2022).

2.2 Existing Problems

2.2.1 Teachers

On the one hand, teachers' teaching methods are too single. Many teachers use the traditional teaching method to teach, and the teaching interaction is limited to the way of asking questions and discussing. When explaining some abstract problems, many teachers only use oral expressions to explain them in simple words. Many students are confused about this part of the content (Parker, 2020).

On the other hand, the teaching design is not sufficient (Tang & Djuric, 2021). This is mainly reflected in lesson preparation. In the process of preparing lessons, many teachers only look at the knowledge points in the book, but do not go deep into the difficulties and error-prone points. They also do not think about how to make students master. Lesson preparation is not sufficient, they can not do a good

job in class.

2.2.2 Students

On the one hand, the enthusiasm of students to participate in the classroom is relatively low (Tang & Djuric, 2021). Due to the abstract and complex characteristics of electrotechnics, many students think that the electrotechnics course is boring and the enthusiasm of classroom participation is relatively low. There are also many students who think that electrotechnics is difficult to learn, so the classroom atmosphere is not very active. In addition, the teacher's teaching method is single, which naturally does not raise students' interest in learning.

On the other hand, students' learning motivation is not high (Parker, 2020). Many students just study for the final exam results, and do not understand the importance of electrotechnics. Many students lack long-term learning goals and only focus on the current knowledge learning, but do not pay attention to the combination with life. This has caused the phenomenon of disconnection between theory and practice. Many students have difficulties in learning and are reluctant to ask teachers and classmates for advice. More and more problems lead to poor learning results. In the long run, they fall into a state of learned helplessness and have no interest in electrotechnics learning.

2.3 Cause Analysis

2.3.1 Teachers

Many teachers only tell knowledge to students, but ignore the cultivation of students' learning ability. The real meaningful learning should be completed by students, and students should grow their own knowledge context on the existing knowledge and experience. Pragmatism teaching method advocates to teach in practice, learn in practice, make progress in practice, and teachers should become the guide of students' learning (Chen, Tang, Chen et al., 2022).

2.3.2 Students

Students will inevitably have various problems in the learning process, and timely and effective feedback can help students understand the causes of errors and correct students' learning misunderstandings in time (Tang & Djuric, 2021). And many students in the face of fuzzy knowledge attitude is not positive, but not. This will cause obstacles to subsequent learning. In addition, the more students' problems accumulate, the more they will feel that the study of electrotechnics is more difficult, resulting in a vicious circle, which will affect the learning effect of students.

3. Analysis of BOPPPS Teaching Method

3.1 Design Principles

3.1.1 Student-centered Principle

The BOPPPS teaching mode is divided into six links, which are in line with the students' psychological logic and can achieve the purpose of effective teaching (Chen, Tang, Chen et al., 2022). Teachers can further divide these six links according to the length of class hours, and arrange different things in different time sections. They can constantly adjust the teaching plan according to the students' attention,

make the classroom vivid, improve the previous classroom teaching methods, enable students to participate in classroom learning, and improve the quality of teaching.

3.1.2 Constructivism Principles

BOPPPS teaching method follows the principle of constructivism and emphasizes students' understanding and mastery of knowledge (Andrew, Iouri, Margaret et al., 2019). In the process of teaching, teachers should not only teach students knowledge, but also cultivate students' learning methods and develop students' good learning habits. In the goal part, teachers should make students clear the importance of learning goals, and learn in a direction under the guidance of goals ; in the process of participatory learning, it is necessary to make it clear that only by hands-on participation and hard thinking can students improve their mastery of knowledge ; in the post-test stage, students can realize that timely review can not only improve the efficiency of problem solving, but also reduce the forgetting of knowledge. In the summary stage, the way of summarizing by teachers in traditional teaching is changed, and summarized by students themselves. In the step-by-step thinking and exploration, students improve their electrical engineering literacy, learn learning methods, and lay a good foundation for students' lifelong learning.

3.2 Advantages Analysis

3.2.1 Strong Enforceability

The framework of BOPPPS teaching mode is clear, and a class is divided into several links. Teachers can fill in the corresponding knowledge points and teaching activities in the corresponding teaching links (POONTHONG,YUJI, BOUNO et al., 2024). Whether it is a novice teacher or an experienced old teacher, it is easy to be competent. In the process of teaching, each link conforms to the psychological law of students, with strong interaction and high teaching efficiency.

3.2.2 Strong Interaction

The BOPPPPS teaching mode divides a class into multiple links. Different teaching methods and learning methods are adopted in different links. Teachers change from the role of inculcator to the role of a guide (Zhang, Yang, Wang et al., 2020). Teachers design the classroom, students experience the classroom, experience the fun of electrical learning in colorful classroom activities, improve students' interest in learning, and improve the quality of teaching.

4. The Course Design of Electrotechnics Based on BOPPPS Teaching Method

4.1 Teaching Objectives

4.1.1 Diversified Teaching Design

Through the BOPPPS teaching mode, it can effectively improve the single problem of teachers' teaching methods in the past classroom (Yang, You, Wu et al., 2019). In different links, targeted adjustments are made for different knowledge points, different time rhythms, and different reactions of students, which can enrich the classroom and diversify teaching.

4.1.2 Interactive Classroom Teaching

BOPPPS teaching mode emphasizes that students should be the masters of the classroom. That means students' sense of participation is very important (RosalesAsensio, Sierra, PérezMolina et al., 2021). If students can improve their sense of classroom participation in a variety of ways, they will have confidence in electrotechnics learning, have expectations for electrotechnics classroom, and their learning initiative will become higher.

4.2 Teaching Process

Based on BOPPPS teaching mode, this paper briefly introduces the improved electrical engineering classroom as follows :

4.2.1 Bridge-in

classroom introduction should be lively and interesting, and decryption should be combined with the knowledge points of this class to lock students' attention and improve students' interest in learning (Ma, Zeng, Wang et al., 2022).

4.2.2 Objective

After attracting students' interest, teachers give students a clear goal in time, so that students can learn in a targeted manner. When setting learning goals, we should not only set knowledge goals, but also set corresponding ability goals and value goals to improve students' subject thinking and subject literacy (Aboutanios, Sethu, Ambikairajah et al., 2021).

4.2.3 Pre-assessment

Through the pre-test related to the content of this class, teachers can clarify the students' mastery of the old knowledge points and check the omissions in time (Aboutanios, Sethu, Ambikairajah et al., 2021). After the pre-test, students can also recall the previous knowledge points in time, keep up with the pace of teaching in time, and promote students' learning efficiency.

4.2.4 Participatory Learning

This link emphasizes the need to increase students' sense of interaction and communication. Teachers should constantly throw one problem after another in the teaching process, and students are full of interest in electrotechnics in the process of constantly solving problems (Jin, Zhang, & Su, 2022).

4.2.5 Post-assessment

The test can also be open and can be used as a sublimation part in the classroom to inspire students to think. An excellent electrician teacher can further improve students' ability through tests (Tang & Djuric, 2021).

4.2.6 Summary

The summary link should be simple and effective. This is the last link of this class, to give students clear instructions, to systematize the knowledge learned (Parker & Roumell, 2020).

It should be noted that when teachers use this model, the six links are not immutable. Teachers can appropriately add or delete some links, and can also combine with other teaching methods to improve the quality of the classroom.

5. Summary

This paper mainly focuses on the application of BOPPPS teaching model in electrotechnics teaching. The following research can further expand the scope of research, apply BOPPPS teaching model to more science and engineering disciplines, enrich the theory of BOPPPS teaching model, and provide teachers with more effective teaching models.

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