



Exploration of the Application of Information Teaching Equipment Based on BOPPPS Model

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Abstract. On the base of analyzing the functions of information teaching equipment, according to the four aspects of BOPPPS model, the “BOPPPS-information teaching equipment model” is established, and the corresponding teaching design and implementation plan is put forward. The model integrates the advantages of information teaching equipment in structural principle visualization, interactive operation simulation, diversified classroom activities, and integration of learning and training process into the teaching model, which is in line with the learning and thinking habits of beginners. According to the actual model, the teaching scheme of fuel supply system is designed for the reference of teaching staff. Finally, the development of information teaching equipment is discussed.

Keywords: BOPPPS model · information equipment · teaching of automobile maintenance

1 Introduction

With the development of professional and technical education, the theoretical system of higher vocational education is constantly improved and updated, and all kinds of information teaching methods with hardware and software as the carrier are more and more used in the teaching process [2]. Although these information-based teaching methods improve the efficiency of professional and technical teaching in higher vocational colleges, they also greatly increase the complexity of teaching implementation. How to improve the efficiency of the structural principles of basic parts, how to increase the proficiency of operational skills, how to expand the depth and breadth of the principle of knowledge, these teaching problems still need appropriate teaching methods to support.

Based on the teaching mode of BOPPPS model, combined with the advantages of information teaching equipment, and based on the professional teaching of automobile maintenance, this paper explores and establishes the “BOPPPS–information teaching equipment model”. On the one hand, this method carries out teaching activities according to the teaching idea of BOPPPS model to give full play to the efficiency of learning; on the other hand, the advantages of information teaching equipment are integrated into teaching activities to stimulate students’ learning initiative, which can greatly improve the learning efficiency.

2 BOPPPS Model

BOPPPS The model was founded and implemented by British Columbia Institute of Technology in Canada [1]. It consists of six teaching links: Bridge in, objective, pre-test, participatory learning, post-test and summary. It is a teaching model that improves teaching efficiency, reduces the difficulty of learning and solves teaching problems. BOPPPS from the implementation of teaching process, the model follows the cyclical process of “teaching objectives teaching behavior learning activities teaching evaluation teaching objectives”, so that teachers can effectively organize course teaching and obtain the feedback of course learning effect. In addition, from the perspective of teaching objectives and professional training objectives, BOPPPS model helps students to develop innovative ability of summarizing, analysis, exploration, reflection, and encourage students to learn new knowledge easily and easily, actively participate in teaching activities and master basic operation skills, so that students can deeply understand and master the theoretical knowledge. According to the application of the BOPPPS model in the teaching process, the following four criteria are summarized, as shown in Fig. 1.

1. The content of the Bridge-in part is clear and intuitive, and the overall framework of the teaching content is constructed. The learning of professional courses first needs to learn the basic framework of professional knowledge, and then to enrich the knowledge and skills around the basic framework, which is the basis of in-depth learning. Therefore, in the introduction part, let the students initially construct the knowledge context, and clarify the core concepts in an outline.

2. The participatory learning part is the advancement of the imported part of the learned content and the main part of the learning process, which should reflect the teaching concept of “student-oriented”. That is, in the process of teaching implementation, students’ learning initiative should be highlighted, students’ enthusiasm should be stimulated in appropriate ways, and students should be encouraged and guided to learn in the form of self-study and discussion, so as to avoid the inefficient learning situation of indoctrination teaching.

3. The summary part should review the learned content, and generate a review plan according to the easy to mix part in the learning process. In the content and way, it is not

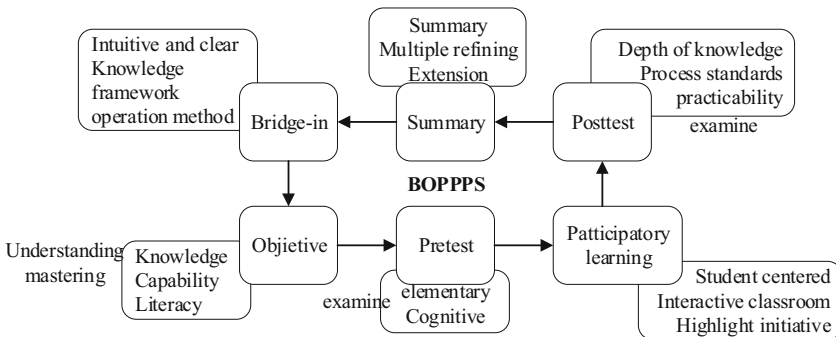


Fig. 1. BOPPPS Model

appropriate to repeat the content learned in the last stage, and do a good job of distinction in the level, to avoid learning and review process is similar to too high.

4. The pre-test part and the post-test part show a progressive relationship in the content, form and difficulty. The pre-test part mainly examines the students ‘mastery of the knowledge of the imported part, highlighting the investigation of the basic and cognitive content, and the post-test part mainly examines the students’ mastery of the knowledge learned in the process of participatory learning, and examines the depth and practicability of the knowledge learned.

3 Analysis of Information Based on Teaching Equipment

Information teaching equipment refers to the virtual simulation software or live training model platform, such as software and hardware development of information teaching tools, it can detailed image to show the internal structure principle of complex machinery, electronic equipment, and according to the appropriate process to guide students to learn and operation, has strong auxiliary teaching function, has been in the development and use of various professional teaching and training. Compared with the traditional teaching equipment, the information teaching equipment has obvious advantages and obvious gain to the teaching practice, as shown in Fig. 2.

3.1 Visualize the Principle of Complex Structure to Help Consolidate the Theoretical Knowledge Foundation

Information teaching equipment at the early stage of development, for the practice of high precision simulation modeling, using the function of software and hardware, in the form of dynamic, perspective shows the complex mechanical structure, will be hidden in the car mechanical shell internal structure clearly displayed in the form of animation, in the most intuitive way to let students understand the structure of the parts, working principle and connection basic content, quickly establish intuitive impression of parts.

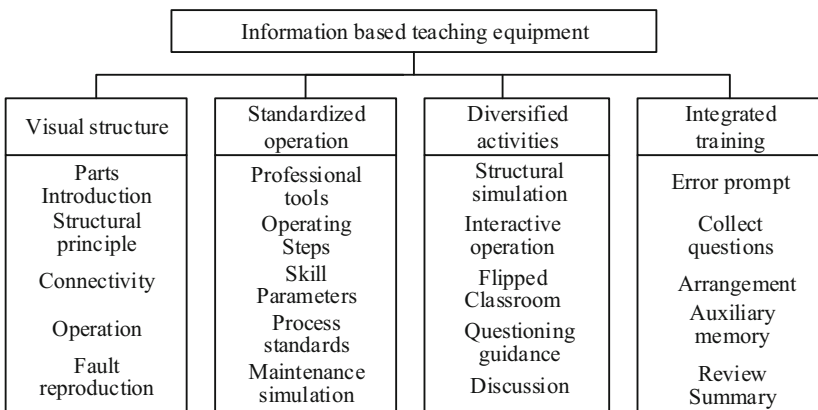


Fig. 2. Functions of information based on teaching equipment

3.2 Standardized and Simulated the Skill Operation Steps, and Developed the Skill Operation Process Standards

Information teaching equipment in the development and design, from the perspective of beginners, the auto parts disassembly maintenance, professional tools use standard steps, process standards and considerations simulation, for students in the process of simulation practice to prompt and correct, avoid beginners in learning skills for not familiar with the process standard and the bad habit of randomness, and conduct equipment repair practice, according to the guidance and prompt, adjust the operation steps, develop good operation habits.

3.3 Diversified Classroom Activities and Rich Knowledge Input Channels

For professional skills in the low teaching efficiency of the classroom, classroom is not active, in the information teaching equipment design interactive simulation, suitable for students and teachers in the classroom targeted demonstration, to flip classroom, discussion class “dominated by the students as the main body, the faculty” teaching activities, reduce or avoid theory course “full”, students understand absorb difficult phenomenon, deepen the understanding of the content depth, explore consciousness, make all kinds of classroom activities more rich.

3.4 Integrate the Learning and Training Process and Simplify the Review Process

Review and review after class is good study habits, which can effectively consolidate the content learned. The collection and memory function of the error and mixing knowledge points is integrated into the information teaching equipment, which can collect the mistakes in the process of teaching and training, sort out the knowledge points, summarize and sort out the problems, and generate a comprehensive review of the knowledge points.

4 BOPPPS Model – Application of Information-Teaching Equipment

Combined with the four aspects of BOPPPS model and the advantages and functions of information teaching equipment, the “BOPPPS model – teaching design and implementation plan of information teaching equipment” is established. Based on the teaching process of BOPPPS model, the program plans the knowledge structure, content level, classroom teaching method and summary review method of the learned content, and simulates the logical order of beginners and puts forward three criteria for the construction of “BOPPPS model information teaching equipment application model”.

1. Make use of the advantages of information teaching equipment in the visual appearance and structural principle of parts, design the imported teaching process, highlight the integration of theory and practice, break through the key and difficult points of structural teaching, and guide students to self-study. The virtual display of the automobile structure and connection relationship is suitable for students to understand the overall structure and subsystem parts of the automobile. The process is clear and intuitive

and effective, so it is suitable for the design of the content of the imported part. With the deepening of the learning process, the students through dynamic visual model, the shape, location and name of the corresponding parts, in the process of cognition of parts learning theoretical knowledge, only need simple guidance can quickly build based on the principle of structure knowledge framework, ready for the next stage of learning.

2. Use information teaching equipment to make interactive demonstration of working principle and operation simulation, design the teaching process of participatory learning, carry out activities such as discussion teaching or flipped classroom, and give full play to students' enthusiasm and inquiry. In order to highlight the students in the classroom and the teaching process, reduce the proportion in classroom teaching, teachers with information teaching equipment as auxiliary, starting from the component structure principle, layer by layer refinement, the learned content to guide in the form of questions, contrast, extension, let the students discuss spontaneously. Teachers grasp the pace of the classroom, timely summarize the knowledge content, can also take the opportunity to expand, so that the classroom teaching process to play a good effect.

3. Make use of information teaching equipment to collect, summarize and organize the contents of the functional design summary part, review the key and difficult points and easy error points in the learning process, and distinguish the three learning levels. Car engine structure teaching, for example, to the core of the learning process, important

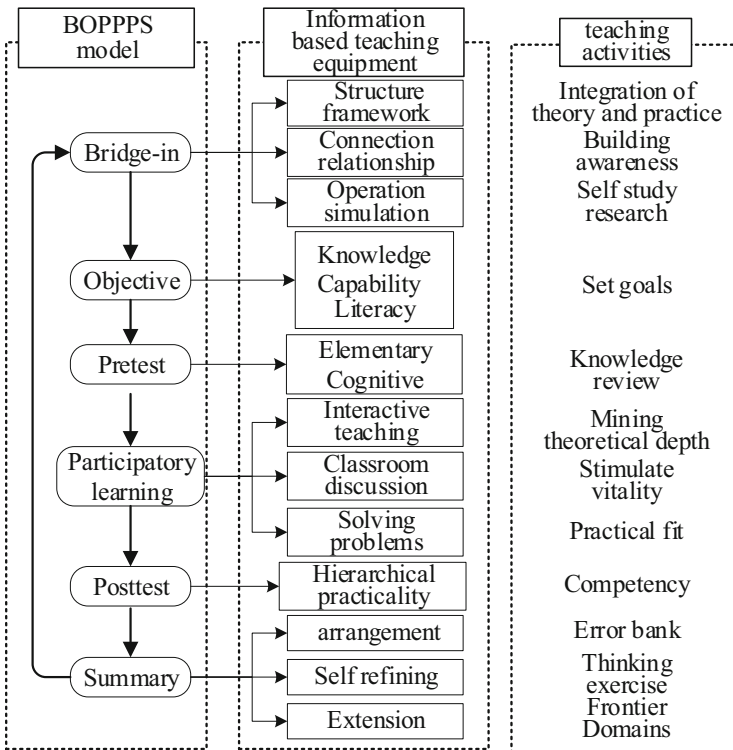


Fig. 3. BOPPPS - Informatization Teaching Equipment Model

parts to strengthen consolidate learning, with similar function or similar name easily confusing content for checking, and summary part is given priority to with induction and refining points, the teacher to guide students according to their own train of thought, to summarize and refine content, exercise summary ability and skills.

According to the above three commonly used criteria, the information teaching equipment model based on BOPPPS is constructed, as shown in Fig. 3.

5 Practical Application

In order to better show the teaching design and implementation plan of information teaching equipment based on BOPPPS model proposed in this paper, teaching design and implementation plan take the basis of the teaching of automobile repair as an example. As shown in Fig. 4.

In the introduction part, according to the structural characteristics of the engine fuel supply system, the teaching of two parts is mainly implemented. One is based on the fuel flow path of parts structure framework, including fuel tank, oil pump, high pressure oil pump and injector and fuel filter, fuel preheating device, pressure valve, fuel pipeline and other auxiliary structure, and according to the state of fuel, the parts into low pressure oil, high pressure oil and back oil road three levels. The other is based on the structural disassembly and repair operation, showing the internal structure and repair methods of the parts, including the decomposition and installation of the oil pump, the replacement of fuel filter, the addition and inspection of fuel oil, the fastening of oil

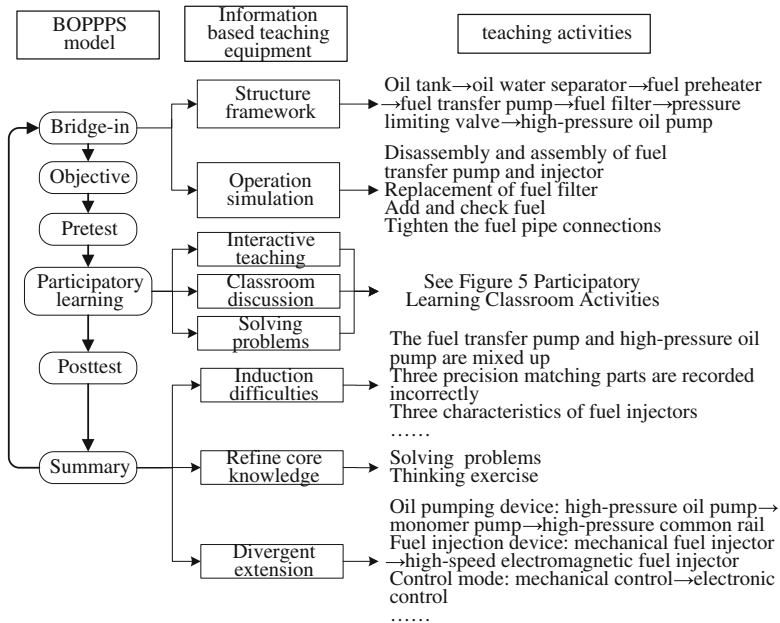


Fig. 4. Teaching Implementation Plan

pipe connections and other maintenance items. In the implementation process, with the information teaching equipment as the auxiliary, let the students watch and simulate the operation, the classroom only plays a supervisory role.

In the participatory learning part, the main task is to explore the working principle and structural performance of the fuel supply system, and to discover and solve learning problems. Interactive teaching is mainly conducted from three aspects, as shown in Fig. 5. One are to explore the working principle of each component, how to realize the function, and how to achieve the function; the performance parameters of the structure, the process standard of repair operation, and how to achieve it; and the third is to analyze the possible problems of the structure and the methods to solve the problems. For example, in the actual teaching process, on the basis of the fuel supply system, teachers guide the students to analyze the working principle of each structure, analyze the performance and limits of each structure in the way of examples and studies; demonstrate the replacement of fuel filter and performance test on the information teaching equipment, and guide the students to practice the standard operation steps and process standards; ask professional questions by asking questions, contacting the actual situation, setting the environment and how to handle it, the poor atomization and the insufficient oil pump. Guide students to discuss and communicate and explore solutions in the form of flipped classroom or discussion and communication.

In the summary part, the teaching is carried out in summarizing the key and difficult points and easy knowledge points in the study, refining the content learned, and expanding and extending in the professional field. Make full use of the collection and sorting function of information teaching equipment, collect the teaching difficulties in the first two teaching stages, such as the structure and working principle of high-pressure oil pump, the performance of fuel injector and other contents, and generate a review knowledge list. The teacher guides the students to review the teaching process, and lets the students extract the key points of knowledge according to the learning process, so as to exercise the students' ability of analysis and induction. For the core structure of the supply system, the performance of the high pressure oil pump and injectors is expanded, guiding students to understand the electronic fuel injection system, recognize the cutting-edge equipment and technologies such as single pump, high pressure common rail, and electromagnetic injectors, and expand from the aspects of technology and application.

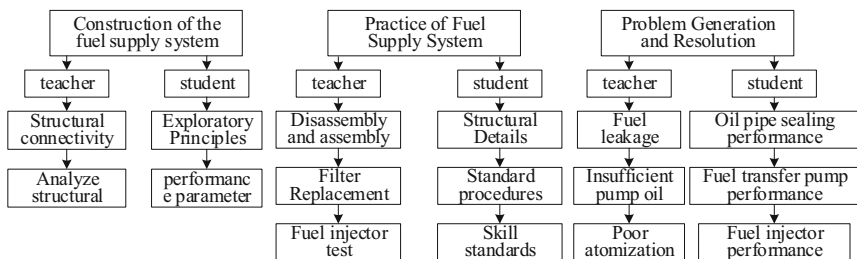


Fig. 5. Participatory Learning Classroom Activities

6 Conclusions

Information teaching equipment has greatly improved the teaching quality of a large number of mechanical, electrical and other majors, including automobile maintenance majors, and developed a new teaching method. It is not a weaker practical teaching tool than physical teaching. At present, there is still a broad space for development in the field of professional teaching. In terms of equipment function, it can enrich the professional teaching ability continuously, Develop more professional teaching modules such as vehicle repair, maintenance, circuit fault simulation, fault diagnosis and so on, Design after-class exercises, maintenance simulation, maintenance simulation and other close to the actual simulation practice functions; In the use of teaching equipment, Optimize the touch large screen, key and mouse, VR equipment and other operation modes, Make the operation even more practical, Continue to develop lightweight, desktop and other use functions, Make the teaching function expanded to the network, cloud desktop and other convenient operating platform; In terms of capability, Breaking down the barriers between institutions and majors, Promote the joint construction of information teaching equipment in the field of universities, Improve the efficiency of resource use, Promote the development progress of teaching equipment. Under the promotion of the national professional skills education reform, the information teaching equipment breaks through the barriers of professional knowledge and technology, make the professional skills teaching more adapt to the progress and development of modern technology, and vigorously improves the information teaching ability of professional skills.

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