Study on the Teaching Mode Based on OBE-BOPPPS – Taking Computer Application Fundamentals as an Example

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Abstract: The implementation of flipped classroom can help students achieve the goal of deep learning, and the BOPPPS model which is rising in recent years provides a basic framework for the implementation of flipped classroom. Through the analysis of the concept of flipped classroom and the feasibility of constructing the flipped classroom teaching mode of computer application foundation, this paper summarizes the methods of constructing the flipped classroom teaching of Computer Application Fundamentals, hoping to provide reference for the flipped classroom teaching in higher vocational colleges. Teaching practice shows that the OBE-BOPPPS teaching mode is helpful to solve the problems in the teaching process, improve the teaching quality of university teachers, improve the learning effect of students, and promote the teaching reform of basic computer courses.

1. Introduction

Flipped classroom is a new and effective teaching method, which reconstructs the learning process. The implementation of flipped classroom is helpful for students to achieve the goal of deep learning, and BOPPPS model which is rising in recent years provides a basic framework for the implementation of flipped classroom. In higher vocational education, the course of Computer Application Fundamentals plays an extremely important role. It is the only computer course in the public basic course stipulated in the curriculum syllabus of higher vocational colleges, as well as an introductory course for the cultivation of students' information quality, which has a far-reaching impact on the quality of personnel training. Through the analysis of the concept of flipped classroom and the feasibility of constructing the flipped classroom teaching mode of computer application foundation, this paper summarizes the methods of constructing the flipped classroom teaching of Computer Application Fundamentals, hoping to provide reference for the flipped classroom teaching in higher vocational colleges.

Based on the concept of OBE education and BOPPPS model framework, this paper takes the course of Computer Application Fundamentals as an example to design the flipped classroom and carry out teaching practice. The purpose of teaching practice is to make teachers know more about the learning situation, timely feedback and timely adjustment, so as to make teachers pay more attention to students' understanding and internalization of knowledge, so as to maximize classroom efficiency.

2. OBE and BOPPPS Teaching Philosophy

2.1 OBE

The application of information technology represented by the Internet has brought great changes to the teaching and learning methods of higher education, and various education and teaching methods have been explored at home and abroad. Among them, the outcomes-based education (OBE) educational...
concept has been widely valued and applied in the global engineering education reform. OBE education concept was born in 1994, and its embryonic form began in the field of basic education in the United States and Australia, that is, the education concept based on goals, needs or results. The OBE education concept clearly defines that the goal of teaching design and teaching implementation is the final learning achievement of students through the education process, that is, what are the learning outcomes that students want to achieve? Why let students achieve such learning results? How to effectively help students achieve these learning outcomes?

In 2016, China became a full member of the "Washington Agreement", which indicates that the internationalization process of China's engineering education has been widely recognized internationally. At the same time, OBE concept has been widely concerned and discussed in China's engineering education reform. It has been applied in the teaching reform, teaching plan making, assessment and evaluation reform of related professional courses, which is in line with the requirements of application-oriented talents training. According to the characteristics of civil aviation colleges and universities, close to the actual needs, promote the curriculum construction to the application-oriented and operational type, and effectively enhance the role of curriculum construction in improving the quality of personnel training.

2.2 BOPPPS
BOPPPS teaching mode was created by the Canadian instructional skills workshop (ISW), which has been introduced and adopted by more than 33 countries and implemented in more than 100 universities and training institutions around the world. BOPPPS teaching mode divides the teaching process into six stages: bridge-in, objective, pre-assessment, participatory learning, post-assessment and summary.

(1) Bridge-in
The purpose of the bridge-in stage is to arouse students' interest in the teaching content to be learned. The strategies include: asking questions or cases related to the teaching topic; telling a story related to the topic; providing an attractive introduction or unusual facts, etc. It should be noted that the introduction point must have a strong logical relationship with the teaching knowledge points and teaching objectives when designing the introduction part.

(2) Objective
The goal of classroom teaching refers to the expected effect of teaching activities. The goal should be set from the three perspective of cognition, emotion and skills. Before teaching new knowledge, teachers should clearly convey the teaching objectives to students, such as the key knowledge of the course, learning value, and the ability to acquire, so that students can clearly understand the use of learning.

(3) Pre-assessment
Through the pre-assessment stage, teachers can understand students' interest and ability, and then adjust the progress and depth of the content. For students, they can express their needs for review or clarification through the pre-assessment. Quizzes, formal exams, homework, informal questions, and even discussions and brainstorming can all achieve the purpose of the pre-assessment.

(4) Participatory learning
Participatory learning is to allow students to participate in the process of knowledge building, the brain and hands are involved at the same time. Participatory learning can be divided into individual participation and team participation. Carrying out participatory learning activities puts forward higher requirements for teachers' knowledge reserve, explanation skills and on-the-spot control ability.

(5) Post-assessment
The purpose of the post-assessment is to understand the student’s learning effectiveness. Teachers need to use different evaluation methods for different courses. The forms of post-assessment include multiple choice questions, short answer questions, practice analysis of specific situations, filling in checklists and attitude scales, etc.

(6) Summary
In the summary stage, teachers should help students summarize the content of the class, integrate the learning points, and predict the content of the next class. Teachers can directly review the content by teaching, or through feedback.

The core of the BOPPPS teaching model is to take students as the centre, pay attention to the development needs of students, emphasize students' full participation in learning, and obtain timely feedback information. In the BOPPPS teaching model, participatory learning is the core part of the whole model. In the course teaching of Computer Application Fundamentals, teachers should use the BOPPPS model to promote the teaching process based on project examples, and let students can participate effectively, so that improve teaching quality.

3. Flipped Classroom Teaching Model Based on OBE-BOPPPS

Under the flipped classroom teaching model, the teacher-led model is transformed into a student-led model. The teaching content and presentation methods in traditional classrooms need to be redesigned, and it is necessary to think about how to organize pre-class activities, classroom teaching, after-class evaluation, etc. The core of the BOPPPS model is to take students as the centre, pay attention to the development needs of students, and emphasize students' full participation in learning, which is consistent with the basic concept of flipped classroom. The basic framework provided by the BOPPPS model can help teachers re-examine the distribution of teaching content and determine which content will be transferred from the classroom to pre-class activities, and it can help teachers evaluate students' learning effects in a more appropriate way.

Generally speaking, according to the timing of teaching activities the flipped classroom can be designed into three stages: before class, during class, and after class. This paper takes the basic elements of the BOPPPS model as the design framework and combines the characteristics of the flipped classroom to design a corresponding teaching model, as shown in Figure 1.

![Figure 1. Flipped classroom teaching model based on BOPPPS framework](image)

3.1 Before Class

In the formulation of teaching goals, Bloom’s classification can be used to express the cognitive level of teaching. In the flipped classroom, the pre-class study is different from the pre-study of traditional teaching, which puts forward higher requirements for the level of knowledge transfer. This goal undoubtedly puts forward higher requirements for the teacher's task design before class. On the one hand, teachers need to consider how to design learning tasks that meet the ability of students; on the other hand, they also need to design measurable standards to capture students’ learning. When students learn independently, teachers should provide some assistance and guidance, and record the students' problems and doubts during the learning process, and provide timely feedback and support.
3.2 During Class
In a flipped classroom, teachers must first consider how to design an effective bridge-in, before an effective bridge-in can ensure that there is some form of connection between the student and the learning content. Such association can increase students’ investment and attention in pre-class learning and help students complete their learning tasks more efficiently. In the flipped classroom, the design of bridge-in can appear in many forms, such as games, problems, setting conflicts, etc. Teachers can set up contexts related to the teaching content, or find some connections from the students’ existing experience, or ask a question to arouse students' interest.

In addition, teachers can design tasks in advance based on the knowledge points involved in the teaching goals and the problems that students have generated in the early stage considers the following aspects:

a) The design of the task can reflect the requirements in the teaching objectives and reflect the inspection of knowledge points;
b) The task description is specific and clear, rather general description;
c) The designed task can attract students' attention;
d) Provide students with necessary support resources to complete the tasks.

Then, the teacher organizes students to carry out participatory learning activities around the pre-designed learning tasks, so as to deepen knowledge while exploring new knowledge. During group discussions, each group will discuss a certain topic. At this time, teachers need to grasp the direction and provide targeted and personalized guidance. Throughout the process, teachers and students maintain active and effective interaction, and guide students to cooperate and explore through communication and feedback to build and improve their own knowledge system. Through cooperative exploration in the group, each group sorts out and summarizes separately, and displays the gains in the group. After the report and exchange, the teacher concentrate on the difficult problems of each group and summarize the teaching goals to help students further consolidate their knowledge and form a holistic understanding of the course content.

3.3 After Class
Teachers can arrange the timing of the post-assessment according to the specific situation. It can be in the after-school stage or after the teaching activities in the class. Through the post-assessment, it helps to understand the development status of the students after the classroom learning, and test the students' learning effect through various forms such as questions, tests, competitions, etc. The content of the assessment should reflect the students' mastery of the teaching objectives, and consider how the students use knowledge to solve practical problems after learning or allow students to create an executable plan. In addition, in the after-class stage, teachers can also provide richer learning resources for students to further extend their learning.

4. Application Practice of OBE-BOPPPS Teaching Mode in the Course of Computer Application Foundation

4.1 Overall Idea
In view of the current teaching status and existing problems of basic computer courses in universities, based on the OBE teaching concept and oriented by meeting the needs of computer positions, this paper aims to reconstruct the course content design system of Computer Application Fundamentals. Facing practical application, this paper proposes to reform the Computer Application Fundamentals course with the OBE-BOPPPS teaching model, and complete the innovation from teaching concepts, teaching goals, teaching resources to teaching systems. Redesign every class of Computer Application Fundamentals course in a way that is easier to mobilize students’ enthusiasm and initiative, and teach the content of each module in a project way to stimulate the imagination and creativity of students in a subtle way. In addition, teachers can carry out various competitions such as multimedia production, smart car patrol,
web design, etc., so that the competition and the course can be organically combined, so that encourage students to form a rich interdisciplinary knowledge reserve and innovative literacy.

4.2 Practical Teaching Process
The classroom activities of Computer Application Fundamentals course based on OBE-BOPPPS are vivid. It subverts the traditional classroom model and guides the implementation of education from the aspects of integrated curriculum planning, learning construction, practice environment, teachers' ability, assessment and evaluation, forming a standardized and complete practical teaching system. At the same time, the school should provide maker space, maker environment and open source hardware and software construction. The Maker activities come from students' ideas and teachers' teaching design requirements, and carry out various competitions according to the course schedule.

The sub projects of basic computer application course are built with open source hardware and software. Teachers can introduce raspberry auxiliary practice link in the laboratory, so that students can immediately apply the computer knowledge learned in class, do it by themselves, innovate practice, and make efficient use of class time. Teachers should advocate inquiry teaching, encourage students to actively participate in, explore and discover, exchange and cooperate, highlight the construction of knowledge and the guidance of teaching methods, and change the traditional teaching mode. The practical teaching process of OBE-BOPPPS teaching mode is shown in Figure 2.

4.3 Project design and Implementation
With OBE teaching concept as the traction, BOPPPS teaching mode as the carrier, take use of the computer laboratory of audio-visual education centre to construct the project-based Computer Application Fundamentals course. Focusing on the cultivation of Computational Thinking and facing practical application, the teaching and learning method based on inquiry "learning by doing" aims to enable students to participate in learning based on activities, projects and problem solving, and provides a classroom experience of "learning by doing" by using 5Y learning platform. When students meet the real needs and meet the challenges of the real needs, they will gradually form the thinking habits of creation, design, construction, discovery, cooperation and problem-solving. Therefore, in the actual teaching, OBE-BOPPPS teaching mode should be adopted and project driven teaching design should be used.
4.4 Teaching Feedback and Improvement
Take the learning of the Word module as an example, the teaching feedback and improvement process based on OBE-BOPPPS teaching model is as follow:

a) Bridge-in: use the curriculum to import knowledge to start classroom teaching, to arouse students' attention and interest in learning, and stimulate students to think about how to use Word to make forms.

b) Objective: through multiple-choice questions to carry out the pre-assessment and post-assessment, to allow students think and learn in the process of participation.

c) Pre-assessment: in the flipped classroom, understand the solution and understanding level of students through the text and paragraph formatting of the previous module.

d) Participatory learning: through the promotion of subprojects, the student-centered participatory learning is highlighted by means of practical operation, discussion and exchange, evaluation and competition.

e) Pose-assessment: according to the key and difficult points of the teaching content, we should pay attention to the feedback process of students, design corresponding exercises step by step according to different levels, and assess and feedback whether the teaching objectives have been completed.

f) Summary: before the end of each sub project, teachers and students summarize the main learning content by mind mapping, and arrange knowledge preview for the follow-up projects.

5. Conclusion
OBE-BOPPPS teaching mode always takes students as the centre, pays attention to students' development needs, emphasizes students' all-round participation in learning, and obtains feedback information in time. Through the basic framework provided by OBE-BOPPPS model, we can re-examine the distribution of teaching content, grasp teaching links more reasonably, and evaluate students' learning effect in a more appropriate way.

Based on the ability and quality training objectives of computer application foundation course, relying on the talent training program, aiming at the problems existing in the teaching of computer basic course in Colleges and universities, this paper puts forward the core guiding ideology of "taking students as the centre". First of all, this paper analyzes the connotation of OBE education concept and BOPPS teaching mode. With the OBE concept, the post requirements are transformed into the ability training objectives of students at different levels, so as to guide the formulation of teaching objectives for each class and push back the practical teaching content.

The teaching design of this paper is based on the OBE-BOPPPS mode, closely linked to the teaching objectives, to achieve an operational flipped classroom teaching mode, pay attention to the whole learning process of students, and achieve a virtuous teaching cycle of timely feedback and timely adjustment.

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