

# Exploration of Teaching Reform in the Course of Python Programming Based on BOPPPS+Bloom

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**ABSTRACT:** *This article adopts the BOPPPS teaching model to create a relaxed and enjoyable atmosphere of self-directed inquiry learning, mobilize students' enthusiasm and participation in learning, improve their interest in learning, stimulate their innovative spirit, make students truly become the main body of the classroom, exert their subjective initiative, and improve their ability for self-directed learning. Meanwhile, with the help of Bloom's cognitive hierarchy model, the goal is to achieve high-level cognitive abilities such as deduction, comparison, and synthesis. Therefore, the goal is defined as three levels: memory, understanding, and application of knowledge, principles, and methods. Urge teachers to effectively organize classroom teaching, actively carry out research-based teaching, and promote the formation of the research-based teaching concept of "student-centered and teacher led".*

**Keywords:** *BOPPPS Teaching Method, Bloom Teaching Mode, Python Programming, Teaching Reform*

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## I. INTRODUCTION

The traditional teaching model, which mainly relies on unilateral teaching by teachers, can no longer keep up with the pace of social development. The times call for educational reform, and the teaching model that combines BOPPPS and Bloom has developed rapidly. The traditional teaching model of a single teacher has always been criticized, while the BOPPPS+Bloom teaching model advocates teacher guidance and student centeredness, emphasizing the initiative and enthusiasm of students in learning. Through the integration of various teaching forms such as group cooperation, various means are adopted to cultivate students' abilities in innovation, cooperation, and other aspects.

At the same time, the development of information technology also supports and promotes the transformation of education. The research on the construction of cybersecurity professional courses with innovative teaching models is proposed in this context. This is also the trend of professional era development and higher education reform. According to Bloom's cognitive hierarchy model, this course aims to develop high-level cognitive abilities such as deduction, comparison, and synthesis.

Therefore, the goal is defined as three levels: memory, understanding, and application of Verilog program knowledge, principles, and design.

## II. METHOD

(1) Design the teaching objectives and adjust the teaching content of this course based on the output of students' abilities.

The main task of this course is to equip students with the knowledge and methods related to Python programs for comparison and synthesis of deduction and solutions. The BOPPPS+Bloom teaching model fully leverages the advantages of information technology and can radiate to the construction of cybersecurity professional course groups, achieving the maximization of teaching effectiveness in this field. This is also the trend of professional era development and higher education reform. Taking the course "Python Programming" as an example, there are three corresponding course objectives. One is to enable students to master the basic knowledge of Python language programming design, enable them to understand the overall concept of Python language programming.

The second is that students should be able to use Python language to solve practical problems, cultivate their professional qualities in information awareness, digital concepts, and computer thinking by mastering the ability to use Python language syntax elements and programming patterns to write simple programs. There are the objectives of ideological and political education in the curriculum: integrating ideological and political education into the teaching process through classic cases in Python language. Combining the requirements of cultivating virtue and nurturing talents, instill in students the ideas of loving the Party and patriotism, as well as elements of positive guidance. In addition, based on the characteristics of cyberspace security, the teaching

content has been adjusted, retaining important parts such as data processing and scientific computing for cyberspace security, and simplifying the course hours.

(2) Using the BOPPPS teaching model, student-centered teaching is carried out in six stages: introduction, objectives, pre-test, participatory learning, post test, and summary.

Pay attention to three aspects in teaching: a. Introduce and concretize teaching objectives to facilitate students' understanding; b. Flexibly adjust teaching through pre - and post tests; c. The teaching method is mainly deductive, with the goal of all students actively participating in learning. In the import and target stages, teachers generally focus on establishing engineering scenarios and explaining learning objectives. During the pre-test process, interactive teaching activities are used to help teachers understand the level of understanding of students towards the pre-test knowledge. In participatory teaching, teachers can adjust the teaching by grasping the understanding of students, adding segments to help students perform, or using guided questioning to encourage students to deduce the program compilation process, and finally having students summarize. In the post test, guide students to answer by demonstrating classroom exercises. Leave a reminder for homework in the summary and review the first five stages.

(3) Provide multi-stage and comprehensive teaching evaluation feedback

During the pre class, in class, and post class stages, various evaluation methods such as questionnaires, assignments, interviews, and experiments are used, including offline and online methods.

(4) Introducing online teaching, utilizing information technology and existing excellent resources to supplement students' programming foundation

Due to limited offline class hours, students can supplement their mathematical foundation by recommending and watching excellent teaching videos and creating teaching videos. Some excellent teaching teams have teaching short films that are easy to understand and can explain a knowledge point very clearly; However, there are a large number of teaching videos that are difficult to find, so teachers should recommend them to students or edit them into a collection before recommending them.

### **III. RESULTS**

(1) Solved the problem of single teaching methods and means. Python Programming mainly teaches abstract concepts and principles, and course teaching often focuses on teachers teaching PPTs. Students passively absorb knowledge during the teaching process, unable to mobilize their learning enthusiasm and creativity, and thus unable to achieve ideal teaching results.

(2) Solved the problem of lack of cultivation of students' ability to discover and solve problems. In classroom teaching, teachers often pay attention to the rigor of teaching structure. For a certain problem, teachers often adopt a direct answer, which inevitably puts students in a passive state and leaves them no room for analysis and thinking. Over time, some students have lost the habit of asking questions and the habit of thinking about how to apply program statements to solve programming problems.

(3) Solving the problem of difficulty in mobilizing the initiative of teaching subjects. Python Programming is a compulsory course for the major and is a bridge course for the Electronic Information Engineering major. Most students have lost their enthusiasm for learning knowledge when they first entered school, and the phenomenon of learning only for credit is common. Therefore, if the teaching form lacks classroom interaction and the classroom does not have two-way and interesting characteristics, it is difficult to mobilize the initiative of students in learning.

### **IV. CONCLUSION**

This article designs teaching objectives that meet the requirements of the cyberspace security major, adjusts teaching content, and focuses on ability output to support the graduation requirements of the cyberspace security major. Based on the BOPPPS teaching model, classroom teaching design is carried out in six stages: introduction, objectives, pre-test, participatory learning, post test, and summary, with students as the center, promoting the transformation of classroom teaching into student learning activities. Based on the Bloom cognitive hierarchy model, describe the teaching objectives of the course, design classroom objectives with high order and challenge, and concretize them to facilitate student understanding. Through multi-stage and comprehensive teaching evaluation feedback, help teachers grasp the learning situation and help students consolidate their acquired abilities.

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