

Research on Work Process-Oriented Hybrid Teaching Method based on OBE Concept

-- Taking "PHP Programming" as an Example

Zilai Liu, Qiqian Li

College of Computer Science, Guangdong University of Science and Technology, Dongguan Guangdong, 523000, China

Abstract: This paper takes the "PHP Programming" course as an example to explore the application of work process-oriented hybrid teaching methods based on the OBE concept. Through the analysis of students' knowledge foundation, learning interest, and career planning, a teaching plan with actual projects as the main thread is designed, covering task objectives, data collection, plan formulation, implementation, communication improvement, and achievement display. The teaching content is organized around three projects, adopting a hybrid teaching method that combines online and offline teaching. Online, video explanations and learning materials are provided, while offline, practical guidance and interactive discussions are conducted. The evaluation system includes process evaluation and final examination, focusing on students' practical abilities and learning process. Practice has shown that this teaching model effectively improves students' practical abilities and professional quality, stimulates learning interest, and provides new ideas and practical paths for the teaching reform of computer professional courses.

Keywords: OBE Concept; Work Process Orientation; Hybrid Teaching.

1. Introduction

With the rapid advancement of information technology, computer programming has become one of the indispensable core technologies in modern society. From early machine languages to today's high-level programming languages, computer programming has not only driven the vigorous development of fields such as software engineering, artificial intelligence, and big data but has also profoundly influenced the digital transformation of various industries. PHP is a scripting language widely used in Web development, has become an important skill for computer science students due to its simplicity, ease of learning, and high flexibility. "PHP Programming" is one of the important courses in computer science, mainly cultivating students' ability to master the basic syntax of the PHP language, programming methods, and practical skills in Web development. This course not only provides students with the foundation to enter the Web development field but also lays a solid foundation for subsequent advanced programming courses and project practice.

Despite the important position of the "PHP Programming" course in computer science, the existing teaching model still has some problems that restrict the improvement of teaching effectiveness. First, the traditional teaching model is mostly teacher-led, with students passively accepting knowledge, lacking opportunities for active participation and practice, and making it difficult to cultivate students' autonomous learning ability and innovative thinking. Second, the teaching content is disconnected from actual work needs, lacking the introduction of real project cases, resulting in students' inability to quickly adapt to work positions after graduation. In addition, the teaching evaluation method is single, mainly based on the final examination results, neglecting the evaluation of students' practical abilities and learning process. The existence of these problems makes teaching reform urgent.

In recent years, the field of education has continuously

explored innovative teaching models to meet the learning needs of the digital age. The hybrid teaching method, which integrates traditional classroom teaching with online learning resources, has gradually become a hot spot in educational reform. It combines the interactivity of face-to-face teaching with the flexibility of online learning, which can meet the learning needs of different students and improve teaching effectiveness. Against this background, many scholars and educators have begun to pay attention to the application of hybrid teaching methods in computer programming courses. For example, Zhu Yingfang and others[1], based on the "PHP Programming" course, proposed a curriculum ideological and political teaching reform and practice based on the OBE concept and hybrid teaching. This plan is based on the OBE concept, analyzes the talent training program, combines the ideological and political goals, and combs the ideological and political content of each unit from the learning content to achieve curriculum content reconstruction, which helps students better understand professional knowledge.

At the same time, the teaching concept of work process orientation has also received widespread attention in vocational education. Zhang Zhikai[2] studied the concept of work process orientation and proposed research on the hybrid teaching design of work process-oriented courses, aiming to provide a hybrid teaching design framework for vocational college teachers. Li Na and others[3], based on "Java Programming", proposed to change the traditional educational concept, take the work process as the orientation to guide curriculum development, and enable students to enhance learning effects and cultivate talents needed by society in the process of learning course knowledge. These studies provide useful references for the teaching reform of the "PHP Programming" course.

However, there are still relatively few studies on the hybrid teaching reform of the "PHP Programming" course at present, especially systematic research combining work process orientation with hybrid teaching. Therefore, this study takes the "PHP Programming" course as an example to explore the

application of work process-oriented hybrid teaching methods, aiming to solve the existing problems in the existing teaching model, improve students' practical abilities and professional quality, and provide new ideas and practical paths for the teaching reform of computer professional courses.

2. Basic Concepts

2.1. OBE Concept

OBE (Outcome-Based Education)[4] is a teaching concept oriented by student learning outcomes. It emphasizes designing curriculum goals, teaching content, and evaluation methods from the expected learning outcomes to ensure that students can achieve the expected learning effects. The core ideas of OBE include:

Backward design: Design the curriculum system and teaching process from the learning outcomes that students ultimately need to achieve.

Student-centered: Focus on the learning process and actual ability cultivation of students, rather than purely knowledge transmission.

Continuous improvement: Continuously optimize teaching content and methods through feedback and evaluation in the teaching process.

In the implementation of the OBE concept, "three keys" are emphasized: backward design, student-centered, and continuous improvement. This concept not only focuses on students' learning outcomes but also helps students better adapt to future career needs through diversified teaching methods and evaluation systems.

2.2. Work Process Orientation

Work process orientation[5] is a teaching concept based on the actual work process, emphasizing the integration of tasks, skills, and knowledge in the vocational work process into curriculum design and teaching. Its core is to let students simulate real work scenarios in the learning process, master knowledge and skills through completing actual work tasks, and cultivate professional abilities. This teaching model places students in a real work environment, and through practice, cooperation, and reflection, it cultivates students' professional abilities and problem-solving abilities.

2.3. Hybrid Teaching

Hybrid teaching[6] is a teaching model that combines

traditional face-to-face teaching with online teaching. It integrates online and offline teaching resources to give full play to the advantages of both and improve teaching effectiveness. The core of hybrid teaching is to use online platforms to provide rich learning resources and flexible learning methods, while strengthening teacher-student interaction and practical guidance through face-to-face teaching. This model breaks the limitations of time and space, enabling students to learn at any time and place, and teachers can use modern information technology to provide diversified teaching resources and design more flexible teaching processes.

The implementation of hybrid teaching usually relies on a variety of online teaching platforms, such as MOOC, Tencent Classroom, Chaoxing Learning Pass, etc. These platforms not only support online live broadcast, recorded broadcast and other teaching functions, but also provide panoramic data collection to help teachers better understand students' learning situation, so as to optimize teaching effectiveness. This course uses Chaoxing Learning Pass as the online platform for teaching assistance.

3. Student Situation Analysis

Before carrying out teaching reform, it is very important to analyze the students' situation. By investigating students' knowledge foundation, learning interest, learning habits and career planning, we can better understand students' needs and characteristics, and thus provide a basis for teaching design.

3.1. Knowledge Foundation and Learning Interest

Taking the "PHP Programming" course as an example, the course is aimed at the 19th grade Internet of Things undergraduate major, including 19 Internet of Things undergraduate classes 1-3 and 19 Internet of Things innovation class 1, a total of 4 classes, with a total of 149 people. Students in this major usually have certain computer basic knowledge and programming language learning experience before learning "PHP Programming". First, the students' programming foundation was investigated to understand their programming foundation and language learning experience. The specific survey results are shown in Figure 1 below.

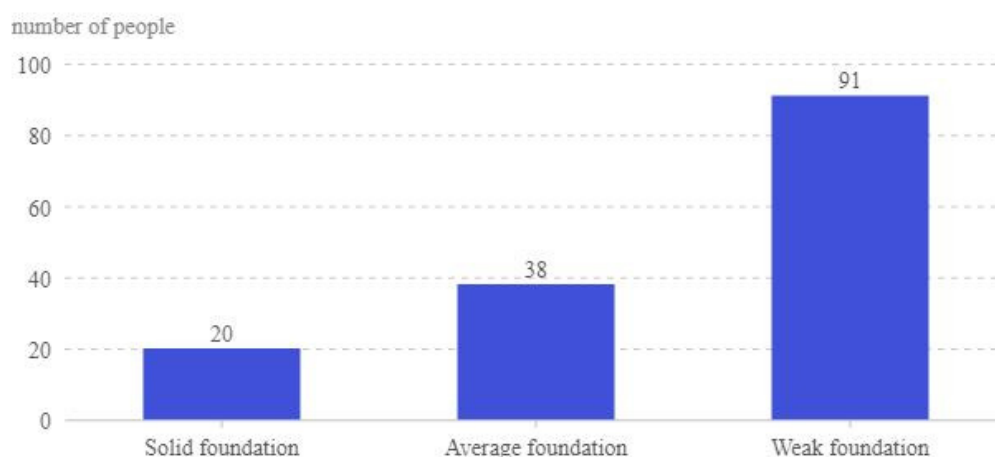


Fig 1. Survey Results of Knowledge Foundation of Internet of Things Professional Students

Through the analysis of the results, 13.4% of the students chose a solid foundation, 25.5% chose a general foundation, and 61.1% chose a weak foundation. This data shows that most students have relatively insufficient computer basic knowledge and programming language

application ability before entering the "PHP Programming" course.

Next, the students' learning interest was investigated to understand whether they have sufficient interest in the course. The specific results are shown in Figure 2 below.

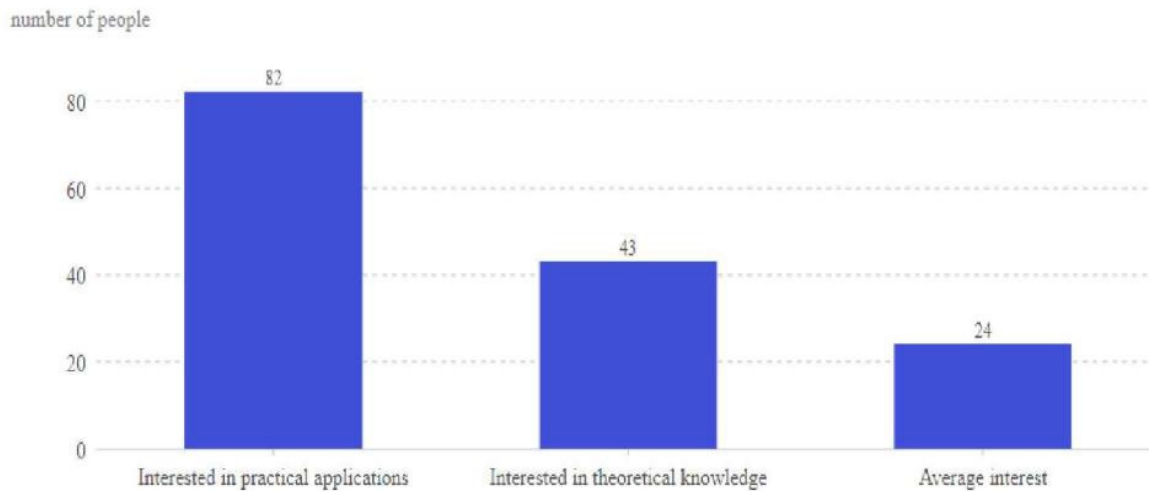


Fig 2. Survey Results of Learning Interest of Internet of Things Professional Students

Through the analysis of the results, 55% of the students chose to be interested in practical applications, 28.9% chose to be interested in theoretical knowledge, and 16.1% chose to be generally interested in the course. This data shows that most students show higher interest in the practical application aspect of the "PHP Programming" course, and they are more inclined to learn knowledge through practical operation and project development. Some students also show interest in theoretical knowledge, which indicates that theoretical teaching still has important value in the course. For students with general interest,

teachers need to introduce more real cases, practice projects and interactive teaching methods to stimulate their learning enthusiasm and improve their interest and participation in the course.

3.2. Career Planning

Finally, the students' career planning was investigated to understand whether they have clear learning goals and directions, and whether they have clear future career planning. The specific survey results are shown in Figure 3 below.

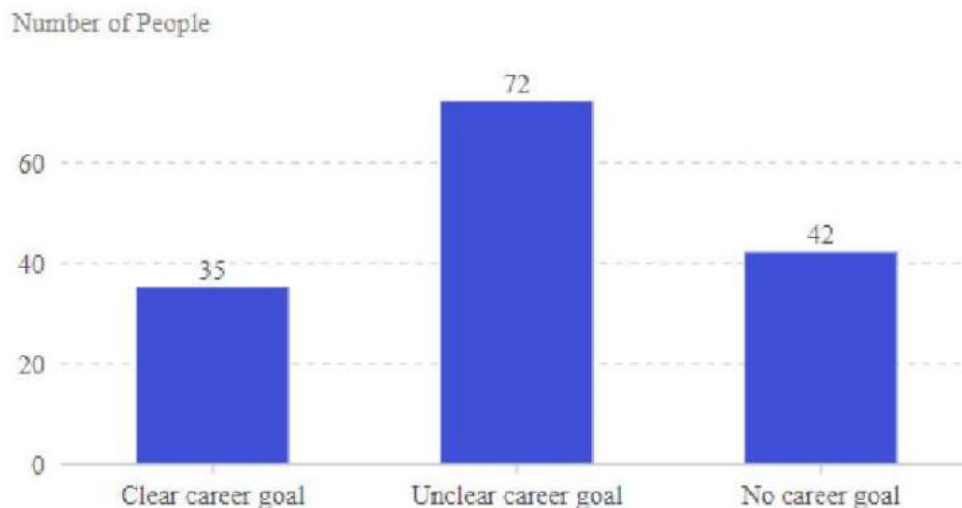


Fig 3. Survey Results of Career Planning of Internet of Things Professional Students

Upon analysis of the results, 23.5% of students indicated clear career goals, 48.3% reported vague career goals, and 28.2% had no career goals at all. These findings reveal significant disparities in career planning among students, with only about a quarter having a clear understanding and plan for

their career objectives. Moreover, a considerable number of students (28.2%) have not considered career planning, which may be attributed to insufficient emphasis on career planning or a lack of relevant guidance. This underscores the need for educators to enhance career planning education, assisting

students in clarifying their career goals and improving their awareness and capabilities in career planning.

4. A Work Process-Oriented Hybrid Teaching Plan Based on the OBE Concept

In light of the aforementioned analysis, taking the "PHP Programming" course as an example, a work process-oriented hybrid teaching plan based on the OBE Concept is proposed. this plan introduces real projects into the teaching process and revolves around six steps: task objectives, data collection, plan formulation, plan implementation, communication and improvement, and achievement display. The teaching process is integrated with projects, and the teaching evaluation system is strengthened through process evaluation to enhance students' comprehensive qualities.

4.1. Teaching Objectives

4.1.1. Knowledge Objectives

Master the core knowledge of PHP language, including basic syntax, functions, arrays, and object-oriented programming.

Be familiar with the basic operations of MySQL database, including addition, deletion, modification, and query.

Understand advanced technologies such as HTTP protocol, session technology, and file operations.

4.1.2. Ability Objectives

Be able to independently complete simple Web development projects, with the ability to debug code, solve problems, and collaborate in a team.

Be able to use PHP for dynamic website development, achieving user interaction and data management.

4.1.3. Quality Objectives

Cultivate students' ability for independent learning, innovative thinking, and professional quality.

Enhance students' awareness and ability in career planning, enabling them to adapt to the needs of the Web development industry.

4.2. Teaching Content

Project One: Online Examination System

The teaching content for the Online Examination System is shown in Table 1 below.

Table 1. Online Examination System

Learning Unit	Module	Teaching Content	Teaching Method
Module 1	Development Preparation	PHP development environment setup, server configuration, virtual host setup	Online video explanation, offline practical guidance
Module 2	PHP Programming	PHP syntax basics, data types, operators, flow control statements, functions and arrays	Online video explanation, offline classroom discussion
Module 3	Project Code Implementation	Designing question banks, online answering, computer grading, PHP error handling	Online project case analysis, offline group practice

Project Two: Content Management System

The teaching content for the Content Management System

is shown in Table 2 below.

Table 2. Content Management System

Learning Unit	Module	Teaching Content	Teaching Method
Module 1	Development Preparation	Requirement analysis, system architecture design, MySQL installation and configuration	Online video explanation, offline practical guidance
Module 2	Database Basics	MySQL data types, data table operations, single-table queries, multi-table queries	Online video explanation, offline classroom practice
Module 3	PHP Database Operations	MySQLi extension usage, prepared statements, data operations	Online project case analysis, offline group practice
Model 4	PHP Advanced Techniques	HTTP protocol, session technology, file operations, image processing	Online video explanation, offline classroom discussion
Model 5	Backend Function Implementation	Administrator login, column management, article management, pagination navigation	Online project case analysis, offline group practice
Module 6	Frontend Function Implementation	Article display, recording browsing history, responsive layout, password secure storage	Online video explanation, offline classroom practice

Project Three: BoXue Valley Cloud Classroom

The teaching content for the BoXue Valley Cloud Classroom is shown in Table 3 below.

Table 3. BoXue Valley Cloud Classroom

Learning Unit	Module	Teaching Content	Teaching Method
Module 1	Development Preparation	Requirement analysis, system module division, database design, Web security issue prevention	Online video explanation, offline practical guidance
Module 2	Object-Oriented Programming	Classes and objects, three major features of object-oriented programming, access modifiers, magic methods, autoloading, exception handling	Online video explanation, offline classroom discussion
Module 3	Advanced MySQL Database	Index usage, foreign key constraints, transaction processing	Online video explanation, offline classroom practice
Model 4	PDO Database Abstraction Layer	PDO database connection, prepared statements, error handling mechanism	Online video explanation, offline classroom discussion
Model 5	MVC Development Pattern	MVC concept, model-view-controller creation, framework implementation	Online video explanation, offline classroom discussion
Model 6	Backend Function Implementation	Column management, course management, video configuration, exercise configuration	Online project case analysis, offline group practice
Module 7	Frontend Function Implementation	Course list, member center, course display, course purchase, Ajax technology	Online video explanation, offline classroom practice

4.3. Teaching Methods and Means

1. Online Teaching:

Utilize the Chaoxing Learning Pass platform to publish course videos, learning materials, online tests, and discussion areas.

Students can engage in self-paced learning according to their own progress, and teachers monitor students' learning situations through the platform.

2. Offline Teaching:

Conduct project practice guidance, group discussions, code reviews, and other activities in the classroom.

Teachers address students' problems targetedly based on their online learning situations, enhancing teacher-student interaction.

3. Hybrid Teaching:

Online learning provides theoretical support for offline practice, and offline practice consolidates the outcomes of online learning.

The two complement each other to improve teaching effectiveness.

4.4. Teaching Evaluation System

Process Evaluation (60%): Completion of assignments on the online learning platform (20%). Online test scores (20%). Classroom participation (10%). Project practice performance (10%).

Final Exam Evaluation (40%): Conducted in a closed-book format to assess students' mastery of the PHP language.

5. Summary

This study takes the "PHP Programming" course as an example to explore the application of work process-oriented hybrid teaching methods based on the OBE concept. Through the design of teaching objectives, restructuring of teaching content, innovation in teaching methods and means, and the establishment of a diversified teaching evaluation system, it effectively solves the problems existing in the traditional

teaching model and improves students' practical abilities and professional quality. Practice has proved that this teaching model can better meet students' learning needs, stimulate their learning interest, and provide new ideas and practical paths for the teaching reform of computer professional courses. In the future, we will continue to optimize the teaching plan, further improve the teaching resources, and promote the in-depth development of teaching reform.

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