

Research on Teaching Reform of Object-oriented Programming under OBE Concept

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Abstract. The course Object-oriented Programming is a professional basic course of computer-related majors. This paper analyzes the teaching pain points from the dimensions of students, teachers, teacher-student relationships, and talent cultivation. Combined with the strong practical characteristics of this course, the orientation of application-oriented undergraduate talent training in our school, and the need for professional talent training, it explores the ideas of teaching reform. It adopts diversified teaching methods, practices "stepped teaching design", establishes a "student knowledge management system", implements the connotation requirements of "people-oriented and four regressions", adheres to the principle of moral cultivation, naturally integrates curriculum ideology and politics into the classroom, and promotes the education of the whole staff, the whole process and the all-round way.

Keywords: Object-oriented programming; Teaching pain point; Teaching reform; Diversified teaching; Curriculum ideology and politics;

1 Analysis of "Pain Points" in Teaching

With the increasing demand for Java programmers, traditional teaching models can no longer meet the new needs of society and enterprises, and curriculum teaching urgently needs reform[1]. Therefore, through the analysis of the learning situation, in-depth analysis is conducted from the dimensions of students, teachers, teacher-student relationships, and talent cultivation, reflecting the "pain points" of teaching[0], as shown in Figure 1.

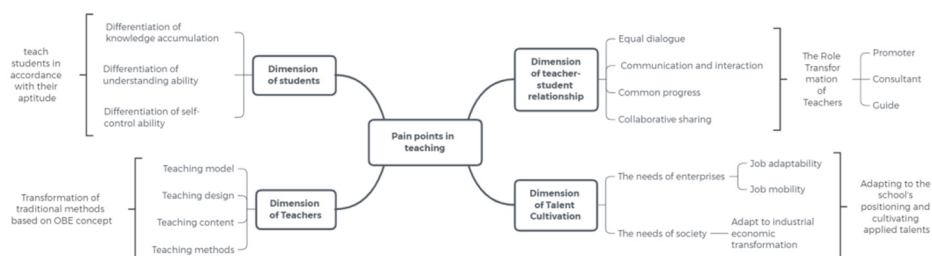


Fig. 1. Analysis of "pain points" in teaching

1.1 Difficulty in teaching differentiated students according to their aptitude

Through the analysis of students' learning situations, it was found that there are differences in knowledge accumulation, understanding ability, and self-control ability among students. It is difficult to provide targeted individualized teaching to students with different learning abilities and levels, resulting in the inability to maximize their learning outcomes. Therefore, how to teach students according to their aptitude is one of the problems encountered in the current course of object-oriented program foundation.

1.2 The transformation of traditional teaching models under the OBE concept is urgent

At the present stage, the traditional teaching model is gradually changing, and there is a certain breakthrough in the boring and rigid teaching idea of programming. Teachers urgently need to integrate the basic teaching idea of OBE into the teaching model, teaching content, teaching method, teaching design, and other aspects, so as to ensure the teaching purpose of cultivating new talents and enhancing students' ability to flexibly use the basic principles of programming[0].

1.3 The urgency of teacher role transformation under the new teacher-student relationship

Traditional Java course teaching often adopts the "infusing" teaching method, teachers mainly use multimedia supplemented by blackboard teaching, the class is often teacher-centered, and students are passive acquisition of knowledge. At the present stage, teachers need to change their identity, realize the "three changes" from "teaching as the center" to "learning as the center", from "knowledge teaching as the center" to "ability cultivation as the center", from "classroom learning as the center" to "various learning methods", adhere to the combination of work and learning, integration of knowledge and practice, and comprehensively improve the training quality of computer application-oriented undergraduate talents[0].

1.4 The mismatch between the demands of enterprises and society and the training mode of talents in colleges and universities

With more and more detailed job recruitment and more and more detailed technical requirements for posts, the teaching process must be in accordance with the needs of enterprises and social development, combined with the school positioning, the teaching process to cultivate students' ability to adapt to and transfer positions, to provide enterprises with high-level technical talents, to meet the recruitment needs of enterprises.

2 The Way to Solve the "Pain Points"

In view of the above teaching pain points, the teaching process builds a teaching model centered on student development, takes the orientation of school talent training and industry demand as the benchmark, combines theory with practice, combines online with offline, combines school education with enterprise internship, and cultivates students' knowledge, ability, quality, job matching degree and other abilities. Diversified teaching methods are carried out, "step-style teaching design" is practiced, a "student knowledge management system" is established, curriculum ideology and politics are naturally integrated into classroom teaching, professional

knowledge cases are taken as guidance, teaching ideas start from three processes: before class, during class and after class. It reflects the mixed teaching mode of online and offline, the differentiated step design, the deep integration of online and offline, and the establishment of a student knowledge management system to comprehensively improve the quality of education and teaching. The solution to the problem is shown in Figure 2.

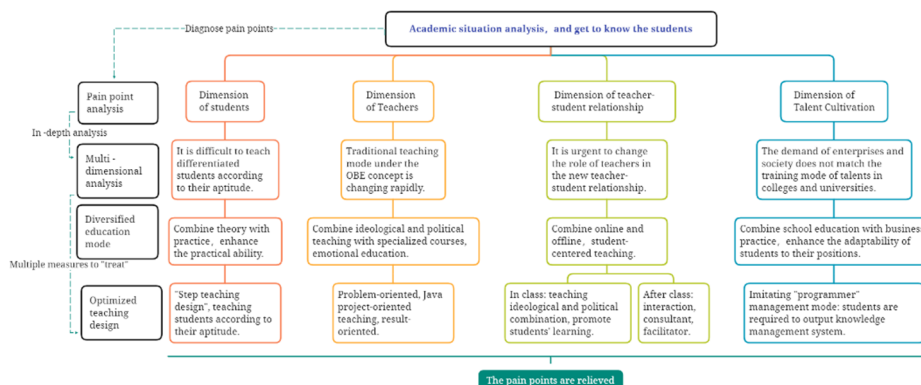


Fig. 2. The way to solve the "pain points"

3 The Practice of Teaching Reform

The course carries out innovative course teaching by innovating teaching methods, reconstructing teaching contents, reforming classroom organization, optimizing assessment methods, providing after-school services, "promoting teaching through competition, and teachers and students advancing together".

3.1 Innovative teaching methods

Adopt diversified teaching methods, based on learning situation analysis, to overcome the differences of students as the goal, improve students' learning interest.

Mixed online and offline teaching. Through hybrid teaching, a "flipped classroom" is carried out[0]. Online platform preview and review in advance, offline student-centered, class uses Java language and Eclipse integrated development environment to write programs to solve practical problems.

Be project-oriented. The project teaching method is adopted to strengthen the understanding of theoretical knowledge by using enterprise real task-driven, case practical operation and case solving, and cultivate students' necessary abilities in project analysis, design, coding, testing, and team cooperation.

Set up problem situations. With problems as the main line, the "problem inquiring teaching mode" is adopted, with students' initiative to acquire knowledge, innovative thinking and develop the ability as the goal, so that students can learn independently under the guidance of teachers, emphasizing students' active participation in learning activities, guiding and maintaining students' interest in learning by exploring problems, so that students have the initiative in learning.

"Stepped Instructional Design". According to the characteristics of different students, the difficult, medium, and easy levels of cases are set to realize the differentiated teaching according to students' learning ability, so that students at the same level can synchronously improve step by step so that students with the same foundation can keep up with the progress, and ensure that students can achieve better learning results.

Group discussion and cooperative learning. The teaching of relatively complex content (such as graphical interface programming, database programming, etc.) adopts the form of group discussion to exercise students' ability of analysis, problem-solving, teamwork, and communication.

Establish a student knowledge management system. Simulation software development company situation teaching requires students to be strict with themselves in the mode of employees, review their own mastery of content, training target management, knowledge management, and document control ability, so as to improve the comprehensive quality of students.

3.2 Reconstructing teaching content

Case selection. Make students feel the charm of Java technology by presenting interesting cases, fun games, excellent websites, or a management system that students are familiar with and have used. Adopt Java teaching reform strategy for enterprise demand to stimulate students' interest in learning Java. Through the Java market share, salary ranking, and growth space, coupled with excellent talent development experience. Through detailed data and vivid cases, students can realize the role of learning Java technology well for personal growth and development.

Project-based teaching. The teaching content is project-based and centered on the typical project development process. Connect the isolated knowledge points in the book through the project, and gradually demonstrate the development steps of the project case until the final completion of the whole project. Teachers write programs in class, demonstrate, analyze, troubleshoot, derive, and debug the process, students and teachers synchronously program, and students master knowledge while improving the ability of project management, promote students to develop the ability of project management and project implementation based on improving technical ability.

Selection of teaching materials. In order to enable students to not only learn basic knowledge but also improve practical ability, this course is not limited to one textbook in the teaching process, but covers a wide range of subjects, forming a course learning resource package to support students' course learning. In combination with the university's talent training model and curriculum innovation application, the curriculum team will build and update the system of main teaching materials and curriculum resources package, and continue to build and update.

Excavation of ideological and political elements in the curriculum. By combining the teaching content, combining the characteristics of the course, thinking methods, and value concepts, the ideological and political elements of the course are deeply explored and organically integrated into the course teaching. The students are guided to have a deep understanding of the socialist core values by combining Java knowledge and consciously carrying forward the excellent traditional Chinese culture, revolutionary culture, and advanced socialist culture, so as to achieve the effect of cultivating things silently. Cultivate students' national pride, rigorous scientific attitude, courage to explore the scientific spirit, and innovation spirit.

3.3 Reform the teaching form

School-enterprise cooperation in education, student-centered teaching, inquisitive teaching + project-based practice, promoting the combination of theory and practice, and forming a closed loop before, during, and after class. The company dispatched the engineering team to form the double-qualified mixed teaching team, the remote guidance of the enterprise technical experts and the irregular exchange and discussion, the construction of an off-campus practice base, etc., from the talent training program design, curriculum innovation, and reform, etc. Through knowledge map construction, job information analysis, project task design, coaching guidance, inquiry discussion, knowledge text output, task and skill text analysis, project review text output, and other methods, encourage students to drive input with output, promote the industry, enterprise and post information understanding and extraction with global vision construction, result-oriented, task-based, etc. Based on knowledge management, I trained my project development and comprehensive application ability to adapt to the pace and requirements of enterprise work.

3.4 Optimize assessment methods

This course adopts a variety of course assessment methods combining process assessment and result assessment, which changes the situation of "the final decision" in the past and combines process assessment with result assessment. According to the characteristics of the curriculum to develop a process assessment scheme. The final examination is organized flexibly in the form of a "written examination + project report", and the students' comprehensive application ability of analyzing and solving problems is assessed in the form of written examination, defense, operation, theory, and operation. To achieve the purpose of highlighting the foundation, characteristics, application, and technology.

3.5 Providing after-school services

Intelligent teaching tools are adopted to communicate and answer questions online or offline, and teachers and students interact to reflect the change in teachers' roles. Establish a studio with a Java interest group as the unit, students participate independently, teachers guide and encourage students to develop small games, small programs or virtual projects, and other forms of division of labor and cooperation, experience the whole process of project development from demand demonstration, system design, model building, code writing, system testing and so on. Through regular communication between teachers, students, and students, sharing experiences, and summarizing experiences, students' practical ability and teamwork abilities are cultivated.

3.6 "Promoting Teaching through competition, teachers and students Advancing Together"

Course team teachers organize, encourage and guide students to participate in competitions to improve their employment advantages. On the one hand, exercises students' practical ability and teamwork spirit; On the other hand, it enables students to test and improve their knowledge at a higher level, enhances students' interest in learning Java technology, stimulates students' thirst for knowledge and enthusiasm for participating in teaching activities, and enhance students' self-confidence and sense of achievement, to achieve the purpose of "promoting teaching by competition, promoting learning by competition, and promoting teachers and students together".

4 Summary of Teaching Reform

This paper analyzes the teaching pain points in the teaching process, puts forward ideas to solve the problems, and organizes the teaching reform from the aspects of teaching methods, teaching content, assessment methods, etc. It is hoped that it can provide a reference for improving the classroom teaching reform of application-oriented undergraduate teaching, and it is also hoped that the research results can be extended to similar schools to provide curriculum reform ideas for similar courses.

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