

Case teaching mode reform of software engineering course based on PBL

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Abstract: There are many theoretical contents in software engineering course, and it has very strong practicality. At present, the course is mainly taught in class, which has some problems, such as dull classroom atmosphere and students' passive acceptance. Based on the concept of Problem-Based learning method (PBL), the case teaching method is introduced into software engineering course for teaching design, and a goal-oriented whole process assessment system based on software project practice is established, which improves students' participation and initiative. At the same time, according to the knowledge base of different majors, build a hierarchical software engineering course knowledge system, and realize the effective combination of offline teaching and online shared resources to meet the needs of students at different levels. Practice has proved that the new teaching model can improve the teaching effect and enhance students' comprehensive practical ability.

1. Introduction

Software engineering course is a main compulsory course for computer majors. This course can enable students to initially have the engineering thought of software, learn to take the life cycle of software as the main line, master the basic principles, methods and technologies of modern software analysis, design, development, maintenance and management, and lay a solid theoretical foundation for the research and development of complex software projects[1-2].

Software engineering course is a comprehensive course with many theoretical contents, involving software development methods, processes, environments, management, economics, metrics and other multi-disciplinary contents [3-4]. The content is abstract and difficult. The systematic and comprehensive characteristics of software engineering course determine that the practice of the course is very strong. Traditional teaching focuses on Teachers' teaching, students' listening and completing homework. However, because most of the students in school have not participated in the actual software project and lack practical experience, there are some problems, such as mechanical listening, superficial understanding of software engineering methods and principles, and it is difficult to apply what they have learned[5-6].

Problem-based learning method (PBL) [7] teaching method originated from medical education in the 1950s. It is a problem-oriented teaching method. Under the guidance of teachers, "student-

centered and problem-based". Through the form of group discussion, students collect data independently around problems, find and solve problems. PBL teaching mode is introduced into the teaching of software engineering. Through the design of cases, the teaching content is decomposed into a series of problems to be solved. Through the process of students' group learning, discussion and solving case problems, and teachers' summary and evaluation, students are guided to understand and master the principles and methods of software engineering. This is beneficial to change passive learning into active learning, and it is beneficial to cultivate students' independent thinking ability and autonomous learning ability. At the same time, team members work together to achieve goals, which helps to cultivate students' teamwork ability.

2. Objectives of Course Teaching Reform

Combined with the characteristics of software engineering course itself and the relationship between course groups, the objectives of software engineering teaching reform are as follows:

1) Consolidate the basic knowledge. Let students master the basic knowledge and basic concepts necessary for software engineering, establish the ideological system of software engineering, and lay a good foundation for subsequent courses.

2) Highlight practicality. While consolidating the basic knowledge, the main goal is to cultivate high-quality applied technical and skilled talents. The course teaching should highlight the applicability and practicality.

3) Improve the interaction between teaching and learning. At present, most classroom teaching is a one-way "teaching" process, while students' "learning" is basically in a passive state. Teaching reform should improve classroom teaching methods and improve the interaction between teaching and learning.

4) Cultivate students' engineering ability. Software engineering is an engineering discipline that guides the development and maintenance of computer software. Teaching reform should cultivate students' engineering literacy and teamwork spirit.

3. Practice of Course Teaching Reform

3.1. Combing the Knowledge Points of Software Engineering, a Hierarchical Knowledge System of Software Engineering Course for different majors is established

The theoretical content of software engineering course is numerous and covers a wide range. Different computer majors have different learning foundations, and there is a large gap between the basic courses that have been completed. For example, the software engineering major has a very good foundation including software environment, object-oriented analysis and design and so on. But the majors of network security and information security only has the basic foundation of high-level language programming from the perspective of program development. So based on the professional characteristics and requirements, this paper combs the software engineering knowledge system, and establishes a hierarchical knowledge system for different majors. For the majors of network security and information security, the contents of object-oriented analysis and design are weakened, the content focuses on structural analysis and design, so that students can deeply master the core content of software engineering. On this basis, they can acquire and master advanced knowledge according to independent learning of professional shared learning resources.

3.2. Carefully Design the Course Teaching Cases and Construct the PBL Case Teaching mode of Software Engineering Course

Aiming at the knowledge system of software engineering course, the course teaching cases are designed. The cases include two types: one is the teaching cases for raising problems, and analyzing and solving problems; the other is the practical cases for students to consolidate their knowledge and practical knowledge. The course teaching process based on PBL case teaching mode is shown in Figure 1.

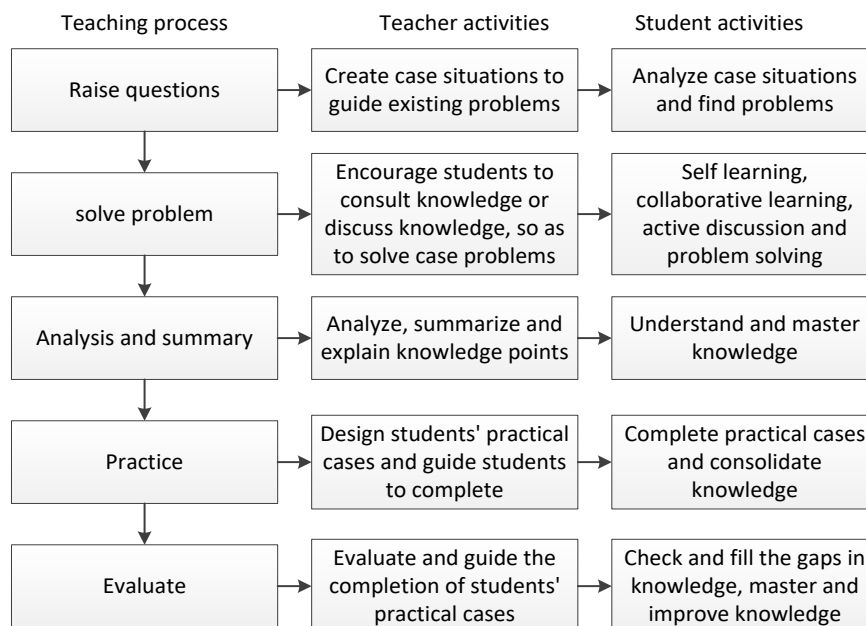


Figure 1: PBL case teaching process of software engineering course

At the beginning of teaching, students are grouped. The grouping follows the principle of "heterogeneity in the same group and homogeneity in different groups", and forms a curriculum group composed of 3-5 students with complementary advantages, so as to achieve good communication and cooperation in the group. In the teaching process, pay attention to the guidance and assessment of team members to complete their work independently and cooperatively.

3.3. Adopt Online and Offline Teaching Methods to Establish Diversified Shared Teaching Resources of Software Engineering

In order to better understand and master the software engineering knowledge system, make full use of the online learning platform, adopt online and offline diversified teaching methods, guide cases, summarize and teach knowledge points, and focus on offline interactive teaching between teachers and students, supplemented by online case discussion and interaction. While activating the classroom atmosphere, It is convenient to summarize and analyze the students' answers.

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3.4. Build a Goal Oriented Whole Process Assessment System Based on Software Project Practice

In PBL case teaching mode, it emphasizes "learning by doing" in teaching concept and requires students to understand the theoretical content in practice. During the course, students discuss the cases and then analyze and solve problems. At the same time, students are assigned different forms of homework, including personal homework and group homework. Personal homework is mainly for the practice of a single knowledge point. Group homework takes the case of software project as the main line, which exercises the students' ability to comprehensively run knowledge analysis and solve problems. All assignments are managed by information means with the help of teaching platform.

Relying on the reform of course teaching means and based on the teaching objectives of software engineering course, the course assessment abandons the traditional assessment method of taking the final score as the final score. During the course, based on each stage of the software life cycle, multiple assessment contents are set up in the form of case discussion, personal homework and group homework, so as to realize the whole course assessment system based on software project practice.

4. Conclusions

Software engineering course is a main course for computer majors, with more theoretical content and strong practicality. In view of the large gap in the knowledge base of students in different majors, a hierarchical software engineering curriculum knowledge system for different majors is established by combing the knowledge points of software engineering. Through the application of PBL teaching mode, reasonable cases and problems are set in each stage of teaching, which effectively improves students' learning participation and initiative. The effective combination of offline teaching and online shared resources meets the learning needs of students with different abilities. The goal oriented whole process assessment system based on software project practice enables students to apply what they have learned and cultivate students' comprehensive practical ability and teamwork ability.

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