Teaching Research and Innovative Practice on the Course "Software Engineering"

Yehong Han

Institute of Information Science and Engineering, Qilu Normal University, Jinan, China

email: sdzzhyh@163.com

Keywords: Software engineering; Teaching research; Course orientation; Case teaching; Task-driven teaching

Abstract: Software Engineering is a course that combines theory with practice. In view of the current situation of software engineering teaching, this paper combines the practical experience of software engineering teaching and scientific research over the years, puts forward the case teaching method in theoretical teaching, and adopts the task-driven method to reform the software engineering teaching in practice. Students learn from passive to active that greatly improve the teaching effectiveness. Some reform measures which include assessment methods of the curriculum and cooperation between school and university are proposed. The purpose of innovative practice is to train students to master relevant theories, methods and skills through the process of software engineering practice to experience the development of software projects.

1. Introduction

Software Engineering is a compulsory course for computer major and a core course of computer science and technology major. According to professional training objectives and job requirements, this course mainly cultivates students' abilities of mastering software engineering methods for software project development. Through theoretical teaching and graduation project design practice, students can master the general process of software project development and maintenance and the traditional methods and the latest methods of software development and use software engineering methods involved in the analysis of software projects, design, implementation and maintenance in order to lays a good foundation for further studying and practicing software engineering in the future. In addition, through the study of this course, students 'innovative awareness and professional awareness are raised. What's more, students' analytical skills, teamwork and cooperation spirit are enhanced in order to lay the theoretical and practical foundation for further study and employment. Because of teaching resources, the established training programs and many other factors, there are still a series of problems in the software engineering course teaching. According to the characteristics of software engineering courses, we have gradually adjusted and improved the teaching contents, teaching methods and practical teaching methods of software engineering courses in the teaching practice in recent years, and solved some problems existing in the teaching of software engineering courses.

2. Analysis of existing problems

Software engineering has the characteristics of timeliness, with rapid development, a large number of new theories, new methods and new technologies continue to appear. However, the update speed of existing software engineering course materials lags far behind the updating of their actual knowledge points, which are out of step with the development of the times. Software Engineering is a course that comes along with the emergence of a software crisis which includes engineering and practical application. Due to the ever-expanding software scale, frequent changes in the software environment and various manifestations of the software crisis, new methods and new technologies in software development are emerging, and the contents of the software

engineering curriculum are in a state of continuous improvement and development. However, the content of software engineering teaching materials is relatively lagging, and most of them are in the form of software development theory and design principles Rendered. Software development cases and other application content is less. In the process of teaching, subject to the content of teaching materials, teachers are accustomed to arrange teaching content from the software development theory and software design principles. Thus the supporting role of software development cases in teaching is ignored. Software development process includes software architecture design, database system design, application design, software system implementation and other links. Therefore, the software engineering teaching content also involves other than software engineering software courses. Subject to teaching resources and curriculum planning hours and other factors, software engineering teaching content is often lack of substantive links between related software courses, and the teaching content and time is relatively inadequate. In addition, students have few opportunities and experiences in developing software projects. Students feel that the contents of software engineering courses are difficult to understand, not practical enough. In response to the above questions, we inject new teaching content into the software engineering course and enhance practicality of the course through case teaching. We organize the practice teaching with the development team as a unit in order to enable students to improve and perfect the basic skills of software development, comprehensive analysis of the problem capacity, software system development experience, teamwork awareness training and so on.

3. Solutions and countermeasures

3.1 Assessment method

We innovative curriculum assessment methods through the graduation project assessment. Students' actual software development ability is improved through the perfect graduation design arrangement. Students will choose the actual project development process as a software engineering development case analysis. We use acceptance test to test students grasp the degree of software engineering and related theoretical knowledge of the course, as well as the practical application of the book knowledge in the actual software development capabilities. Adopting the project practice assessment method, the students shall independently declare the subject items and form the task group. The project team conducted feasibility study, requirement analysis and software outline design for the declared project. Task group submit the appropriate documents. Based on the division of labor, the detailed design, coding, module-level testing, and ultimately the integration test are completed. The final acceptance of the final examination completed graduation reply.

3.2 Course supporting construction

The purpose of curriculum construction is to establish a reasonable knowledge structure, focusing on the overall optimization of the curriculum and reflecting the teaching characteristics of the school. It is necessary to systematically reform the curriculum system, organize teaching contents, carry out innovation and practical teaching, reform teaching methods and means. When arranging the teaching content, we should consider the teaching links such as teaching, discussion, homework, experiment, practice, examination, and teaching material as a whole. We make full use of modern educational technology and teaching methods to form a three-dimensional teaching content system and emphasis on the construction of three-dimensional teaching materials which include basic course materials, teaching reference books, study guides, practical teaching materials, teaching materials supporting the construction. Meantime, we strengthen the computer-aided teaching software, multimedia software, e-lesson plans, teaching resources library supporting construction. The course construction attaches importance to the research on the reform of the teaching contents and curriculum system of famous universities at home and abroad. Good foreign teaching materials may be introduced and digested. With professional advantages, we give full play to the network technology and multimedia technology in teaching ancillary roles. A large number of graphic essay courseware for students to provide guidance and help after class in order to make up

the limitations of classroom teaching and give convenient for students to learn at any time. This way not only cultivates students' self-learning ability and learning consciousness, but also facilitates individualized teaching and targeted learning.

3.3 Teaching design and implementation

We divide the learning process into two stages which include knowledge teaching and engineering practice. In the stage of knowledge teaching, first of all, a project is imported in order to attract students' interest. Students will be tell what relevant knowledge we should have to complete this project. Then target will be explained in order to lead students to learn. The purpose of this stage is to lay a theoretical foundation for the future development of students. If students have no theoretical basis, the development potential and space of students will be restricted to varying degrees. In the engineering practice stage, the students have mastered the relevant theoretical knowledge and basic methods, the project phase of actual combat. This phase focuses on the software design and software coding phases because this phase is the most exposed aspects of a student's employment. Project sources include corporate projects, teacher development projects and student-owned projects. During the implementation of the project, the exchange and cooperation in the group should be emphasized and the adaptability of the program to the change should be investigated. We demand that the development process be iterative and iterative. What's more, we develop students' ability to learn in error.

We divide software engineering practice teaching into basic experiment and comprehensive practice. Basic experiments develop students 'understanding of the components of the software life cycle and focus on students' mastery of skills and tools for requirements analysis, software design, and software testing. The content of the basic experiment emphasizes on the design type and the experimental form has the verification type. The basic experiment is the extension and application of the case teaching method in the classroom teaching. The teacher expounds how to apply software engineering theory, skills and tools in the classroom through teaching cases. During the experiment, students simulated software problems similar to the teaching case. Through practical methods, students understand and consolidate software engineering knowledge. The basic experiment emphasizes the complete training of every student on the basic skills of software engineering. Through experiments, students get the cognitive process of software development, master the theory and method of software engineering and improve their ability of software project. The comprehensive practice of software engineering focuses on the development of student software project ability and teamwork awareness training. The implementation process is a systematic engineering practice. Practice covers the complete process of software project development. Students can gain more real-world software project development experience through integrated practice.

4. Conclusion

Software engineering practice teaching directly affects students' software development ability. Students improve the ability of software development is a gradual process. Conventional software engineering course training program mainly arranged the basic experimental content. The program does not pay enough attention to students' awareness of engineering and comprehensive practice ability. We take a multi-level, step-by-step arrangement of practical teaching content. The gradual transition from basic experiments to comprehensive practice teaching can gradually integrate the concept of software engineering disciplines with the research and development capabilities of students' software projects. Above teaching design enables students to gradually master the subject knowledge. In the process of software engineering practice, students should master the subject knowledge step by step and improve the analysis ability and project implementation ability.

References

[1] Guo Q, University H. Research on the Reform of "Software Engineering" Course Based on

Multiple Teaching Mode[J]. Journal of Hubei Correspondence University, 2017.

[2] Zhang R. Research on the teaching mode of school enterprise cooperation in software engineering course[J]. Electronic Test, 2016.

[3] Huang W. Teaching Reform of Software Engineering Course based on CDIO [J]. China Computer & Communication, 2017.

[4] Chen P, Xiong Y, Zhou H. Research of Software Engineering Practice Courses Construction Based on CDIO [J]. Software Engineering, 2016.

[5] Zhang J, Li L. Research and practice on the course system of applied software engineering in private colleges and universities: A case study of Zhengzhou Shengda University of Economics, Business and Management [J]. Wireless Internet Technology, 2016.

[6] Wang G, Zhou Y, Jiang H, et al. Research on practical teaching of embedded software engineering based on flipped classroom and MOOC[J]. Experimental Technology & Management, 2016.

[7] Shu W H, Qian W B, Yang J. Teaching Practice of "Software Engineering" Course Based on KM Teaching Methodology[J]. Education Teaching Forum, 2017.

[8] Sun C. The Application of Project Teaching Method in the Course of Higher Vocational Software Engineering[J]. Shipbuilding Vocational Education, 2017.

[9] Ke G U. Elementary Introduction to the Teaching of Software Engineering Course for Computer Science Major[J]. Guide of Science & Education, 2017.

[10] Wei W, Yan D, Song H, et al. Research on Innovation Practice Teaching of Software Engineering Major in Nationalities Universities[J]. Research & Exploration in Laboratory, 2017.