

Teaching Reform Measures For Software Engineering Specialization In The Context Of New Engineering

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ABSTRACT

With the rapid development of science and technology and the deepening of industrial change, the new engineering discipline has become an important direction of higher education reform. As an important part of the new engineering, the reform of software engineering education mode is of great significance for the cultivation of software engineers who can adapt to the future development. This paper firstly introduces the characteristics of software engineering under the background of new engineering discipline, then deeply analyzes the problems existing in the current teaching of software engineering, and puts forward the targeted reform measures. By practicing these reform measures, we can effectively improve the teaching quality of software engineering and cultivate more excellent software engineers with innovative ability and practical ability.

KEYWORDS

New engineering; Software engineering; Teaching reform; Innovation ability; Practicing ability.

1. INTRODUCTION

With the rapid development of information technology, the field of software engineering is changing rapidly, and the demand for talents is also changing. In order to adapt to this change, the teaching reform of software engineering is imperative. The purpose of this paper is to discuss the specific measures for the teaching reform of software engineering, including optimizing the curriculum, introducing diversified teaching methods, strengthening the practical teaching links, improving the quality of the teaching team and establishing a perfect evaluation system. Through the implementation of these reform measures, we aim to improve students' innovation and practice ability, independent learning ability, practical ability and comprehensive quality, so as to adapt to the demand for software engineering professionals in the context of new engineering disciplines. In today's information society, software engineering plays an increasingly important role in various fields. With the rise of cloud computing, big data, artificial intelligence and other new technologies, software engineering is facing a series of new challenges and opportunities. In order to cultivate high-quality talents who can cope with these challenges and opportunities, the teaching of software engineering must be reformed and innovated. However, there are some problems in the existing teaching of software engineering, such as irrational curriculum, single teaching method, weak practical teaching links, and poor quality of the teaching team. These problems restrict the overall development of students and affect the quality of software engineering education.

Therefore, we need to take a series of reform measures to improve the teaching quality of software engineering from various aspects. In this paper, we will focus on how to optimize the curriculum, introduce diversified teaching methods, strengthen the practical teaching links, improve the quality of teachers and establish a perfect evaluation system and other specific measures. These measures are aimed at improving students' innovation and practice ability, independent learning ability, practical

ability and comprehensive quality, so that they can better adapt to the demand for software engineering professionals in the context of new engineering disciplines. At the same time, the implementation of these measures requires the joint efforts and cooperation of schools, teachers, enterprises and students in order to achieve good results. Through in-depth discussion of the implementation methods and effects of these reform measures, this paper hopes to provide some useful ideas and reference for the teaching reform of software engineering majors. At the same time, we also hope to attract more people to pay attention to and think about the teaching reform of software engineering, and jointly promote the sustainable development of software engineering education.

2. CHARACTERISTICS OF THE SOFTWARE ENGINEERING PROGRAM IN THE CONTEXT OF THE NEW ENGINEERING DISCIPLINE, THE

1)Emphasize the cultivation of innovation and practical ability:Under the background of new engineering discipline, software engineering majors focus on cultivating students' innovative thinking and practical ability to adapt to the ever-changing needs of the industry. Students not only need to master a solid theoretical foundation, but also need to have the ability to solve practical problems.

2)Strong cross-discipline, extensive knowledge system: software engineering involves the knowledge of computer science, mathematics, management and other disciplines, which requires students to have a broad knowledge base and interdisciplinary vision. At the same time, with the continuous development of technology, the knowledge system in the field of software engineering is also constantly updated and expanded.

3)Keeping up with the development trend of science and technology, focusing on the application of cutting-edge technology: The teaching of software engineering under the background of new engineering emphasizes the close integration with the development trend of science and technology, and encourages students to master the latest technical knowledge and application skills. For example, artificial intelligence, cloud computing, big data and other cutting-edge technologies are more and more widely used in the field of software engineering.

3. PROBLEMS IN THE CURRENT TEACHING OF SOFTWARE ENGINEERING MAJORS, THE

1)Outdated curriculum, lack of innovation and practice: traditional software engineering curriculum often focuses too much on the teaching of theoretical knowledge, while ignoring the cultivation of practical and innovative skills. This leads to insufficient practical ability of students, and it is difficult to adapt to the needs of industry development.

2)Single teaching method, lack of interaction and participation: The current teaching method of software engineering majors is mainly based on lecturing, without effective interaction and participation. This not only affects students' motivation to learn, but also limits the cultivation of students' innovative thinking.

3)Weak practical teaching links, poor hands-on ability of students: Although practical teaching is an important part of the software engineering profession, it is limited by various factors, such as insufficient investment in facilities, lack of systematic design of practical links, resulting in the practical teaching links are often in the form. This directly affects the cultivation and improvement of students' practical ability.

4)Teachers' quality needs to be improved and lack of practical experience in enterprises: Some teachers of software engineering majors lack practical experience in enterprises, which makes it difficult for them to teach practical operation experience and coping strategies effectively in the teaching process. At the same time, the disconnection between the teachers' research direction and

the industry demand also restricts the improvement of teaching quality and students' practical operation level.

4. SPECIFIC MEASURES FOR TEACHING REFORM OF SOFTWARE ENGINEERING SPECIALTIES IN THE CONTEXT OF NEW ENGINEERING

In response to the above problems, this paper proposes the following specific reform measures.

1)Optimize the curriculum and increase innovative practice courses: Adjust the curriculum of software engineering and increase the proportion of innovative practice courses. Through the introduction of project-based courses, design experiments, etc., students are guided to actively participate in innovative practical activities to cultivate their innovative thinking and practical ability.

Emphasize the combination of basic theory and practice: in the basic course of software engineering, add more practical aspects, such as small projects, simulation development, etc., to help students apply the theoretical knowledge in practice.

Introducing open source culture and community practices: Increasing the number of courses related to open source software, community participation, etc., to cultivate the spirit of collaboration and opportunities for students to participate in open source projects.

(b) Setting up special courses: special courses are set up for a particular technical field or issue, such as artificial intelligence, big data, cloud computing, etc., to enable students to have an in-depth understanding and mastery of these cutting-edge technologies.

Integration of interdisciplinary courses: Encourage the cross-fertilization of software engineering with other disciplines, such as mathematics, physics, design, etc., to cultivate students' comprehensive quality and interdisciplinary problem-solving ability.

Encourage course design competitions: Regular course design competitions are organized to stimulate students' enthusiasm for innovation and teamwork, and to provide a platform for excellent works to be displayed and promoted.

Provide online learning resources: Provide students with a wealth of online learning resources, such as video tutorials, online courses, open source projects, etc., to facilitate students' independent learning and knowledge expansion.

2)Introducing diversified teaching methods, such as project-based teaching, flipped classroom, etc.: Changing the traditional lecture-based teaching methods and introducing diversified teaching modes, such as project-based teaching method and flipped classroom, to enhance students' independent learning ability and participation through project-driven teamwork and online learning. Through project-driven, teamwork, online learning, etc., we can improve students' independent learning ability and participation.

Project-based learning: Through real software development projects, students can learn and practice the theoretical knowledge of software engineering in projects.

Reversed classroom: Learning materials and videos are provided before class, and questions and answers and in-depth discussions are held in the classroom to encourage students to take the initiative to learn and think.

Inquiry-based learning: Students are guided to learn through inquiry questions that develop their problem-solving skills and critical thinking.

Collaborative learning: Encourage students to work together in groups to complete projects or tasks to develop their teamwork and communication skills.

Case study teaching: introducing actual software engineering cases, allowing students to analyze and solve real problems, and improving their problem-solving ability.

Online learning platform: use online learning platforms such as Moodle, Canvas, etc. to provide students with rich learning resources and interactive learning environment.

Technology-assisted teaching: Use of multimedia, online tools, simulation software and other technology-assisted teaching to enhance the interest and effectiveness of teaching.

Encouragement of independent learning: Provide students with time and space for independent learning and encourage them to engage in in-depth learning and exploration according to their own interests and needs.

Regular assessment and feedback: Regular assessment and feedback are provided to students to help them understand their learning status and progress, and to adjust their learning strategies and methods in a timely manner.

Through the introduction of diversified teaching methods, we can better stimulate students' interest and initiative in learning, cultivate their independent learning ability and problem solving ability, and further improve the teaching quality of software engineering. At the same time, teachers also need to update their teaching concepts and methods to adapt to the changing educational environment and needs.

Strengthening practical teaching and establishing joint training mechanism between schools and enterprises: Strengthening the input and management of practical teaching and establishing a stable joint training mechanism between schools and enterprises. Through the introduction of enterprise mentor system and internship training, students are provided with more practical opportunities and actual operation experience.

3)Strengthening the practical teaching link and establishing a joint training mechanism between schools and enterprises.

Establishment of stable practice bases: We cooperate with famous enterprises to establish stable practice bases to provide students with practice opportunities and help enterprises to discover and cultivate excellent talents.

Introducing the enterprise mentor system: inviting enterprise mentors to participate in practical teaching, sharing industry experience and the latest technology, and providing students with guidance that is closer to reality.

Internship projects: Students are organized to participate in internship projects in enterprises so that they can practise their skills and gain experience in real projects.

Practical teaching and industry demand docking: the content of practical teaching should be closely linked with industry demand, to ensure that the knowledge learned by students can adapt to market demand.

Encourage students to participate in competitions and activities: Organize or encourage students to participate in all kinds of software engineering competitions, technical salons and other activities to enhance students' practical ability and innovative thinking.

Provision of technical support for practical teaching: Provide the necessary technical support and facilities for practical teaching to ensure that students receive adequate guidance and assistance in the practical process.

Formulate the evaluation system of practical teaching: establish the evaluation system of practical teaching, conduct regular evaluation and feedback on the effect of practical teaching, and continuously improve and perfect the practical teaching links.

4)Improve the quality of teachers and encourage teachers to participate in enterprise practice and scientific research projects: Strengthen the training and introduction of teachers and encourage teachers to participate in enterprise practice and scientific research projects. By cooperating with enterprises and carrying out scientific research projects, teachers' practical ability and industry influence can be improved. At the same time, we strengthen the evaluation mechanism of teachers and encourage them to actively explore teaching innovation and reform.

(c) Strengthening teacher training and retraining: teachers are regularly organized to participate in professional training and academic exchanges to improve their professionalism and teaching ability.

Encourage teachers to participate in enterprise practice: establish cooperative relationships with relevant enterprises and encourage teachers to participate in the actual project development of the enterprises, so as to improve teachers' practical experience and industry knowledge.

Support for teachers' scientific research projects: Provide teachers with financial and technical support for their scientific research projects and encourage them to carry out cutting-edge scientific research to improve their academic standards.

Bringing in talented people: We actively bring in talented people with rich practical experience and academic background to enrich the teaching staff and improve the overall teaching level.

Implementation of teacher evaluation and incentive mechanisms: Establishment of scientific teacher evaluation and incentive mechanisms to encourage teachers to innovate and improve the quality of teaching.

Promotion of cooperation between teachers and enterprises: A platform has been set up to promote cooperation between teachers and enterprises to carry out joint research projects and technology development.

Strengthening academic exchanges and cooperation: encouraging teachers to participate in domestic and international academic conferences, seminars and other activities, strengthening exchanges and cooperation with peers, and enhancing academic influence.

Provision of teaching resources and technical support: Provide teachers with a wealth of teaching resources and technical support to help them better prepare for and practice teaching.

5)Establishing a perfect evaluation system, emphasizing process evaluation and students' ability evaluation: Establishing a perfect evaluation system is one of the important links in teaching reform. It should emphasize the organic combination of process evaluation and students' ability evaluation, and comprehensively reflect students' comprehensive quality and ability level through diversified evaluation methods. For example, project report, work display, group discussion and other forms of process evaluation; at the same time, combined with the examination results, the evaluation of enterprise tutors and other diversified evaluation methods for the evaluation of students' ability. Such evaluation system can reflect the actual ability of students more objectively and promote the improvement of teaching quality.

Diversified evaluation methods: In addition to the traditional examination results, diversified evaluation methods such as project reports, work presentations, group discussions, oral presentations, etc., should be included to fully reflect the comprehensive quality and ability level of students.

Importance of process evaluation: Emphasize students' usual performance and learning process, pay attention to students' participation, teamwork ability, problem solving ability, etc. in the project.

Evaluation by enterprise tutors: Introducing the evaluation mechanism of enterprise tutors, evaluating students' practical performance and practical results, and providing students with feedback closer to the reality.

Student self-assessment and mutual assessment: Encourage students to conduct self-assessment and mutual assessment to promote their self-reflection and mutual learning.

Establishment of evaluation criteria and rules: Establish clear evaluation criteria and rules to ensure the objectivity and impartiality of evaluations.

Feedback and improvement mechanism: Regular feedback of evaluation results to students and teachers to help students understand their shortcomings and guide teachers to improve teaching.

Continuous improvement of the evaluation system: Based on the effects of practice and feedback, the evaluation system will be continuously improved to make it more scientific, rational and effective.

5. CONCLUSIONS

Under the background of new engineering disciplines, the educational reform of software engineering is of great significance to cultivate software engineers who can adapt to the future development. This paper puts forward the targeted reform measures from the aspects of curriculum, teaching methods, practical teaching, quality of teachers and evaluation system. By practicing these measures, we can effectively improve the teaching quality of software engineering and cultivate more excellent software engineers with innovation and practical ability. At the same time, it is necessary to improve the evaluation system to better reflect the actual ability of students and promote the improvement of teaching quality. In the future research, we can further explore how to incorporate

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