

The Research of Optimizing the Curriculum System of Software Engineering by Course Group Method^{*}

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Abstract: Through analyzing the problems in the curriculum system of software engineering and integrating with its professional features, the idea of applying course group in software engineering specialty and taking advantage of course group to optimize and build the curriculum system of software engineering have been discussed and suggested in this article.

Key words: course group, curriculum system, software engineering

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1 Introduction

Software engineering is the method of the development, operation and maintenance of software systems and it is systemic, standardized and measurable. The intention of software engineering in China is in order to cultivate high-quality talents for software industry. Therefore software engineering education should focus on the engineering method, the pivotal technology and the correlative implements in the development of large software. In the specialty education we should try hard to teach students to master the scientific method and have steady software foundation. At the same time they should experience good software engineering training, be familiar with the software applications and tools, take part in the actual project and have a good professional quality.

2 The defects in the present curriculum system of software engineering

At the present time, the software engineering curriculum are in general integrate "computer professional core curriculum" with "software engineering courses", then according to the different directions the other correlated and auxiliary course are set. To solve the problems of profound theory and the lack of practice in computer professional foundation courses, the universities adopted many measures in which adjusting professional courses, reducing theory hours and increasing practical teaching were generally used to achieve new teaching purposes, but it had little actual effect. The problems are as follows:

(1) From the course itself, the course building is separately organized, and there is less intercourse between the courses. As a result, the objectives and requirements of curriculum are discontinuous. So it will be result in the ambiguous relation between the course and the training goal, and there are a lot of simple and redundant duplication of content, which is not a fundamental solution to the gap between the software engineering teaching and training goals.

(2) From the entire curriculum, the relationship in the theory courses, practice courses and the relationship between theory courses and practice courses are neglected in this way. The multidimensional relations of curriculum are turned into one-dimensional relation, so it is difficult to reach the professional teaching request.

(3) The hours are inadequate. Each course emphasizes itself system and integrity, which will surely result in the contradictions between more content and less hours.

(4) In teaching mode it is difficult to form the integrity and scientificness of the specialty. Because the practice is very momentous in software engineering, the large system design is essential, which can be completed by many students in the longer time. But because of a few hours restrictions in a single course, it is very hard for students to complete the design with in limited time, thus it is difficult to form the integrity and scientificness of the software engineering specialty.

Therefore it has become the key of building the curriculum system of software engineering that we should accurately understand the talent training objec-

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tives and specifications of software engineering education base on the entire course groups to furthest strengthen the relation of the courses and correctly handle the relationship between theory and practice.

3 The connotations of course group building in software engineering

Course group method is a new thinking of curriculum system setting in the practice of building the curriculum system in the colleges. The basic idea is that for the courses in the teaching plan which are affected interactively and orderly with each other, we should replan and redesign them to construct an organic curriculum cluster. This method turns the conventional two tier structure, which includes course and teaching plan, to a three tier structure, which includes course, course group and teaching plan. The course group method is that the knowledge points which encircle the same teaching objectives and are included in several courses are abstracted to connect with each other at a higher level. And then the independence of the curriculum is weakened and the affinity between courses is strengthened. At the same time it gives prominence to the target location and continuity of the courses and following the teaching, the talent training can be pushed forward, deepened and expanded till coincide with the training goal.

Curriculum system based on the courses group method to the course contents, has a transmission in vertical range and an inherent relation in horizontal range. There are appropriate sub-teaching goal and the integrated and comprehensive system of teaching content in every course. But they have their own system, with a specific and integrated teaching aim and teaching mission.

Thus it can be seen that the course group building can overcome the above limitations of the curriculum system and it can make the most of existing resources and achieve the overall objectives of professional training if we take advantage of course group method to optimize curriculum system of software engineering.

4 The Course Group of Software Engineering Specialty

On the one hand, the curriculum planning of software engineering should emphasize engineering technique, practicability and composite. On the other hand, it must also fully recognize that strengthening basic education in faster, better, more efficient solution to the structure and application of complex software has played a crucial role. Therefore, we have decomposed

curriculum system of software engineering to three stages in vertical range, which are basic knowledge stage, professional skills stage and engineering practice stage, and three parts in landscape orientation, which are language courses, software and mathematics courses and application courses.

	application of programming language	database principle and so on	application of software engineering	skills and projects
	programming language	discrete mathematics and data structures and so on	software engineering and so on	basic courses
	languages	software mathematics	application courses	

(1) Language courses. They include introduction to the computer, programming language and so on.

For software engineering students, the framework of necessary professional knowledge and future development of the computer are particularly important and they are the most basic requirement for students to learn computer. Language courses focus that the learners can use computer language in average level.

(2) Foundational courses of software mathematics. They mainly include higher mathematics, linear algebra, discrete mathematics, data structure, algorithm design and analysis and relevant courses of software foundation.

Discrete mathematics, data structure and algorithm design and analysis are the courses of computer model design, and language courses are services courses for the above mentioned courses.

(3) Foundational courses of application. They consist of software engineering, software architecture, software testing, software design and other relevant courses design and so on.

To foster the ability, students should accomplish the training requirement of projects in all the foundational courses of application. So the students can have capabilities of project analysis, model design and development.

(4) Courses of application of programming languages. They consist of the latest application development tools.

The program design is introduced with a algorithm-driven, project-driven. They focus on building the technology foundation, the analysis questions and computing model design.

(5) Courses of software skills. They mainly in-

clude database principles, computer networks and computer composition theory etc.

This course group focuses on the development ability and its emphases are the exactly design and realization. The abstract and the advanced realization are emphasized. At the same time, the practice teaching is closely integrated with course group building which is an important link of achieving the professional training goal.

(6) Courses of application of software engineering. They include software project management, distributed system design, multimedia technology and courses in applications domain and so on.

The course group of software engineering building has both breadth and depth. In breadth, the relationship of the supplement each other in the group is emphasized. The project should cover research, requirements analysis, design, realization, maintenance, software quality assurance and software standards etc. In the project development we emphasize the social practice ability, interpersonal skills and collaboration capabilities. The latest research results are introduced to teaching in time to incarnate the depth of courses group. In the construction the course group, the new technology can be quickly transformed into a course.

The construction the six course groups above have a clear direction which focuses on certain or a few skills training according to the students' actual requirement.

The students' capabilities training are completely embedded in the course group building which is great significance for the achieving the training goal and promoting employment of students.

5 Conclusion

This paper has analyzed the deficiency in the current construction of curriculum system of software engineering specialty and discussed the connotation, necessity and importance of course group building. The course group building of software engineering specialty has been discussed.

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用课程群方法优化软件工程专业课程体系研究

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摘 要: 通过分析当前软件工程专业课程体系存在的问题, 结合软件工程专业特点, 探讨了软件工程专业应用课程群建设的思路, 提出了利用课程群优化建设软件工程专业课程体系的方法。

关键词: 课程群; 课程体系; 软件工程

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