Study on Talent Training Mode of Software Engineering Based on CDIO Background

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Abstract: In view of the deficiencies in the traditional teaching of software engineering, this article is based on the CDIO project concept and takes social demand as the guide to analyze how to improve the core competitiveness of software engineering students based on the CDIO concept and how to train high-quality software engineering talents to form Develop a training model for software engineering professionals with clear goals and accurate positioning.

Keywords: software engineering; CDIO; personnel training;

1. INTRODUCTION

As the foundation of the national economy informatization, the software engineering industry is involved in various fields such as agriculture, industry, finance, science and education culture, national defense, and people's life, covering almost all fields. In recent years, the software industry has developed rapidly. Software products have been widely used in all walks of life. Software engineers have surpassed hardware engineers in terms of scale. The demand for talents continues to grow, and there is a large gap in software talents. In order to realize the leap-forward development of the software industry and software talents and adapt to the strategic adjustment of the economic structure, in 2011, the State Council issued a document to further encourage the development of the software engineering industry and made a very clear request to "strengthen the construction of software colleges and software engineering majors". Requires further requirements for the software academy. It requires that the software academy must be able to cultivate national advanced software talents and cultivate engineering-oriented international software talents that can meet market demands and face industry development.

However, for a long time, the training objectives of university software engineering majors are single. No matter in terms of quality or quantity, they cannot meet the needs of rapid industrial development and cannot provide strong support for the development of the industry.

2. CDIO ENGINEERING EDUCATION MODEL

In 2001, MIT, Sweden, Linkoping University, Sweden, Chalmers Institute of Technology, Sweden, and Royal Swedish Institute of Technology, worked together to develop a new type of engineering education model called the CDIO. Among them, the meaning of C refers to Conceive, the meaning of D refers to Design, the meaning of I refers to implementation, and the meaning of O refers to Operation (Operate) from product development. The life cycle of the operation is the carrier, and the basic knowledge, individual ability, social environment, and teamwork are merged, and the combination of theory and practice is particularly emphasized. The concept of CDIO has inherited and developed the concept of engineering education reform in the United States and Europe for more than 20 years. More importantly, 12 standards have been proposed. These 12 standards are highly operational and can be implemented comprehensively and can be tested and evaluated. The 12 standards provide guidance for the implementation of the CDIO engineering education model, provide detailed implementation points and processes for the implementation of the CDIO education model, and enable the engineering educators to design and implement the background environment of the engineering education, curriculum planning, and teachers. Under the framework of engineering practice and teaching ability, students' learning experience and ability, experimental conditions, learning methods, and evaluation criteria, the teaching plan and training objectives can be more precisely formulated.

3. TRAINING MODE BASED ON CDIO SOFTWARE ENGINEERING TALENTS

Software engineering is an interdisciplinary engineering discipline. It applies the basic principles of mathematics, computer science, management, and engineering to the development and maintenance of software. The focus is on demand analysis, project design, and quality acceptance of large-scale software, involving quality, management, standards, innovation, team writing, personal skills, and professional practices. Based on the CDIO concept, this article proposes the following suggestions for the training of software engineering talents.

3.1 In-depth integration with IT companies, establishing a software engineering talent training model based on CDIO engineering education model

Based on the concept of CDIO, the concept of TPC-CDIO was proposed, in which T refers to engineering

capability and practical ability, P refers to professional quality, professional ethics and professional competence, and C refers to team collaboration, communication and management capabilities. Taking the pilot project of reforming software engineering talents as a turning point, after continuous research, the "1331" model of joint training of universities and enterprises has been established, ie, 1 excellent software engineer as the training goal, 3 ability levels (innovation ability, Engineering practice ability and entrepreneurial ability, ability at all levels are divided into three levels of ability indicators and corresponding to the three-level combat project), three years in school (school learning theory knowledge for 3 years), and enterprise one year (mainly for corporate internships), through this The training mode enables students not only to master theoretical knowledge, but also to achieve training objectives by participating in practical projects, combining theory with practice, and a training model diagram shown in Figure 1.
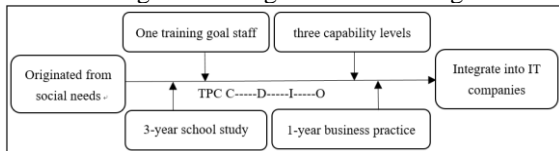

Figure 1 Schematic diagram of TPC-CDIO based software engineering talent training system

3.2 Research on innovative experimental projects based on the CDIO concept capability outline

This article takes the practice of undergraduate innovative experimental projects as an example. In the project selection stage, the evaluation criteria for the project are based on "a clear choice of objectives, clear design, innovative content, and realistic expectations", focusing on cultivating students' ideas. Capability and system engineering capabilities. In the implementation phase of the project, students' initiative is emphasized and students' ability to implement projects, communicate and communicate with the team is cultivated. Through the implementation of innovative projects, the students' autonomy, exploration and collaboration are cultivated, students' interest in learning is effectively stimulated, students' learning effects are improved, and the ability of students to solve problems encountered in practical work is improved. The ability to communicate and demonstrate teamwork has clearly improved.

In addition, this article is guided by the CDIO's standards and concepts, continues to explore and research, combines classroom teaching with scientific research, implements a new model of engineering education, and uses various educational resources, such as schools and research institutions, to Education and practical education are combined to give full play to the role of various kinds of education in the process of personnel training so that the trained personnel can meet the requirements of society.

3.3 CDIO-based Software Engineering Training System Construction

The discipline of software engineering incorporates multiple disciplines. When formulating the basic curriculum, the theoretical knowledge is an important aspect. At the same time, software engineering is an applied discipline and hands-on ability is also a very important aspect. Therefore, it is more necessary to consider the student's hands-on capabilities and focus on students' practical learning. Based on the concept of CDIO engineering education and combining with the actual situation of the school, this paper studies the overall structure of the new software engineering education curriculum, as shown in Figure 2.
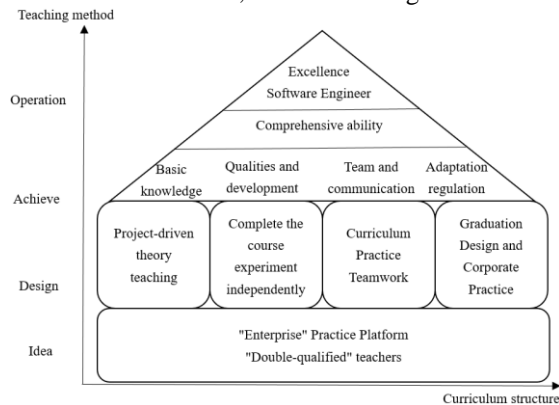

Figure 2 Software Engineering Course Infrastructure

The curriculum system draws on the four levels of CDIO's first-level capability system training objectives, using an "enterprise-oriented" practice platform and a "dual-qualified" faculty team as the basic framework. It draws on the CDIO's engineering education model in the curriculum, based on the CDIO project. The teaching philosophy makes each course follow the four links of "conception-design-realization-operation". In terms of curriculum setting, the requirements of the software engineering industry for professional talents and the requirements of the professional itself are used to meet the demand of the industry for talents.

4. CONCLUSION

This article combines the requirements of general education and personality development, based on the concept of CDIO engineering education, and actively explores the innovative talent training mode of software engineering. Through in-depth research, several suggestions are proposed to change the current emphasis on the practice of software engineering talents, lack of attention to practice, and neglect the training of teamwork awareness. Focus on cultivating students' practical ability, innovation awareness, teamwork spirit and communication skills from the aspects of teaching mode, curriculum setting, training plan, and innovation projects. Strengthen students' mastery of theoretical knowledge, improve students' innovative ability in practice, improve the

quality of software engineering talents, and promote the rapid and healthy development of China's software industry.

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