



Construction of Trinity Practical Education Platform of “Course Ideology and Politics, Discipline Competition and School-Enterprise Cooperative” for Software Engineering Major Based on New Engineering

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Abstract. For the purpose of contributing to software engineering major construction based on new engineering, the research is devoted to designing of a feasible trinity practical education platform, which three dimensions of course ideology and politics, discipline competition and school-enterprise cooperative are embodied indispensably. As an example of software engineering major construction in Anhui Sanlian University, the platform is applied and the abilities of students' practice and innovation are promoted positively. Furthermore, further work is put forward in the future. Firstly, software engineering intelligent laboratories for discipline competition are required to be established. Secondly, cognitive practice resource database of software engineering major should be developed for freshmen.

Keywords: new engineering · software engineering · course ideology and politics · discipline competition · school-enterprise cooperative

1 Introduction

For the purpose of integration of production and education, abilities of practical and knowledge application for students are improved positively and it has become the direction of talent training goals for more application-oriented local universities [1]. The rapid development of technology of mobile Internet has provided crucial opportunities for software industry, and at the same time, the strategy of “Internet+” which is proposed by China has also provided an important platform for supporting the development of software engineering industry. The continuous growths of the society's requirement for software engineering talents promote universities in domestic begin to pour more attention to the key training of practical application talent [2]. New engineering education mode highly emphasizes innovation, which is the new direction of engineering education reform. Under the background of the new engineering construction, in the process

of training the innovative practical talents in software engineering major, and an open whole-process practice system is constructed, which improves students' engineering practice ability, innovative ability and international competitiveness [3]. Construction of a mode of school-enterprise cooperative for applied-oriented talent training is conducted by the requirement of new engineering, which the development of the new economy, new industry, information society and the needs of students' future development are prerequisites. In addition to being able to apply new knowledge and new technologies to solve complex engineering problems, new engineering talents must have the ability to innovate and entrepreneurial awareness, and also need to have good humanistic quality, patriotism, legal system and ecological awareness [4]. For other words, new engineering education emphasizes the "good ability in the professional field" of cultivating high-quality applied talents, but ideological and political education is based on the excellent traditional Chinese cultural education and socialist core values, and improves students' soft power in terms of "national pride, ideological and moral standards, scientific literacy, legal literacy, daily norms of words and deeds, philosophy of life and other humanistic literacy". "New Engineering" and "course ideology and politics" are the new directions for the reform and development of higher education in the future. Discipline competition is a practical activity which focusing on exploring knowledge with obvious professional nature for university students and it is a crucial way to cultivate applied and innovative talents [5]. Discipline competition plays a significant role in cultivating students' practical and innovative abilities. By conducting discipline competition, students' professional knowledge field could be expanded, and the interdisciplinary thinking is trained. Students' engineering and practical abilities are also improved. Therefore, more and more colleges and universities pour attention to the importance of discipline competition on campus.

This paper devotes to exploring a feasible trinity practical education platform for applied software engineering major under the background of new engineering, which the three aspects of course ideology and politics, discipline competition and school-enterprise cooperative are embodied in the platform positively. The structure of the paper is organized as the following: Sect. 2 describes the structure of this trinity practical education platform. Section 3 describes the application and effectiveness of this platform as a case of software engineering major of Anhui Sanlian University. Section 4 concludes the paper and puts forward the further work.

2 Structure of this Trinity Practical Education Platform

2.1 Design Concept of the Platform

Under the background of new engineering, the platform is constructed for resolving the following key issues, which is shown as Fig. 1.

Firstly, top priority should be given to cultivating talents by virtue. Teachers need to complete the ideological and political goals of "combining knowledge with value guidance", and focus on establishing socialist core values to implement on ideological and political teaching reform activities in software engineering courses. Secondly, In view of the phenomenon that the graduates of software engineering specialty are not suitable for the applied talents needed by enterprises [6], taking various discipline competitions in

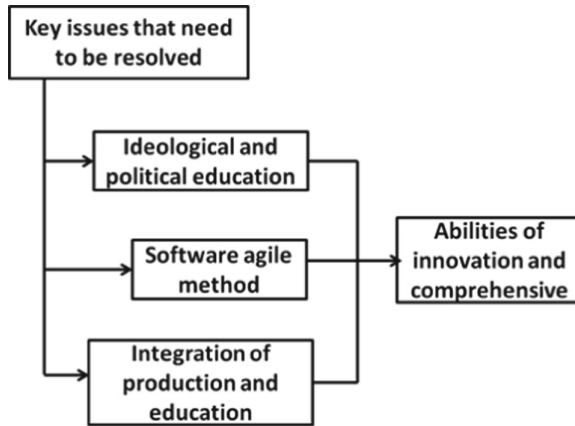


Fig. 1. Design concept of the platform.

the field of computer science and software engineering as the starting point, the various discipline competitions are integrated into the practical teaching of relevant professional courses, and an innovative practical teaching system is formed with the collaborative training of innovative teams, innovative practice and innovative teaching. It cultivates outstanding engineering talents with practical ability, innovation ability and team spirit in the new era, which meets the needs of enterprises [6]. Thirdly, a school-enterprise collaborative innovation for talent cultivation mechanism with complementary advantages and benign interaction is constructed that based on new engineering.

2.2 Structure of the Platform

Figure 2 demonstrates the trinity practical education platform for software engineering major based on new engineering.

In this trinity practical education platform, three aspects of course ideology and politics, discipline competition and school-enterprise cooperative are included, which are the core for construction of software engineering major.

- Integrating ideological and political education into the classroom. Table 1 describes the key elements of course ideology and politics for this aspect.
- Contest-driven practice teaching session by discipline competition. Table 2 describes the key elements of discipline competition for this aspect.
- Integration of production and education of talent cultivation mode of the “six commons” [9]. Table 3 describes the key elements of school-enterprise cooperative for this aspect.

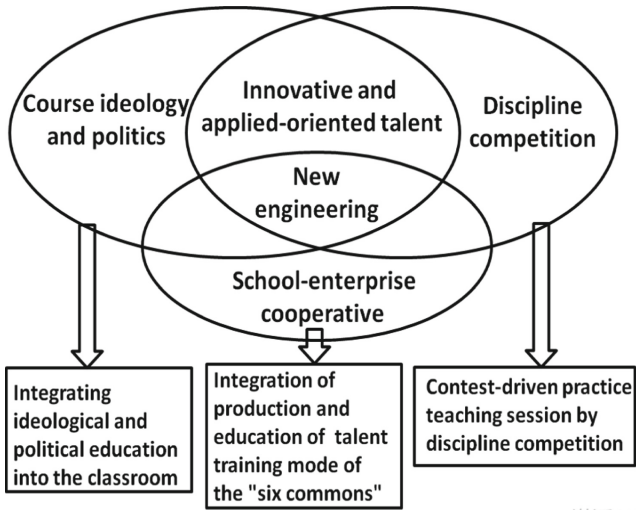


Fig. 2. Trinity practical education platform for software engineering major.

Table 1. Key Elements of Course Ideology and Politics

Key Element	Method of Implementation
Focus on ideological and political education	According to the content of the course, focal points of national confidence, the core values of Chinese socialism, scientific quality, innovation awareness, moral quality and legal literacy, teamwork ability and life philosophy are deeply concerned.
Integrate ideological and political education elements into the course content	According to the teaching content of the course, the knowledge points which incorporate the content of ideological and political education with the content of course knowledge will be designed, and the moral education connotation is extracted indispensable [7].
Design cases of ideological and political education	Development of cases of ideological and political education with standardized format for each unit of the course content.
Construction of a ideological and political resource database	Development of a visual resource database of course ideology and politics for software engineering major with relevant software technology.
Diversified teaching process of ideological and political education	Diversified teaching methods are adopted in teaching, and life examples are connected, so that students can accept ideological and political education in a subtle way.

Table 2. Key Elements of Discipline Competition

Key Element	Method of Implementation
Design and refine the study case of the competition-style	According to the knowledge units of each chapter for a certain course, collecting relevant cases of various discipline competitions in the field of computer and software engineering. From the perspective of engineering, teachers redesign and optimize cases, and design practical teaching content.
Group learning in competition style	Teachers introduce group learning into the teaching process to cultivate students' awareness of teamwork.
The whole process through the competition-style practical teaching	In the practice teaching section for a certain course, students select topics in groups, complete tasks on each stage, and submit the development content and related documents of each stage to teachers for reviewing in time, and optimize and adjust plans according to feedback.
Assessment method and evaluation mechanism competition-style	Referring to the evaluation process and mechanism of subject competitions, adopt qualitative and quantitative, supervisory and objective, process and result evaluation methods, aiming at participation, quality, contribution and other aspects [8].

Table 3. Key Elements of School-enterprise Cooperative

Key Element	Method of Implementation
Co-design talent cultivation scheme	Construction of talent cultivation scheme of local applied-oriented for software engineering major based on OBE, and cultivates applied software talents which are engaged in mobile Internet agile development and big data maintenance and service.
Co-design of course syllabus	Cooperation with enterprises to revise the key course syllabus of software engineering major.
Co-development of teaching material	Cooperate with enterprises to compile textbooks for software engineering major, professional practice textbooks based on discipline competitions, training books for professional practice, etc.
Co-construction of training base	Cooperate with local IT enterprises to build training base for practice education off the campus.

(continued)

Table 3. (continued)

Key Element	Method of Implementation
Co-implement on cultivation process	Recruit outstanding innovative talents, such as the core of technological innovation of engineers to serve as professional professors and lecturers in universities, who undertake training tasks on young teachers, advanced technology, innovation and entrepreneurship courses lectures [9].
Co-evaluate the cultivation effect	In accordance with the technical requirements and industry standards of the enterprise, evaluate the quality of talent training with enterprise standards, and evaluate learning outcomes with enterprise achievement appraisal.

3 Application and Effectiveness

Construction of new engineering for software engineering major was started at year of 2021 in Anhui Sanlian University. From then on, the trinity practical education platform of “course ideology and politics, discipline competition and school-enterprise cooperative” was implemented positively for cultivation on applied and creative talents in field of modern software engineering. Effectiveness is positively according to the feedback on application.

3.1 Students’ Enthusiasm for Learning is Continuously Improved, and Positive Life Value is Established

Ideological and political education elements are designed and integrated into the content of the key courses of software engineering major. Furthermore, teachers carefully design teaching cases that incorporate the ideological and political elements of the course. The presentation forms of ideological and political education content cases can be diversified, such as relevant video, text case display, book seminar, MOOC learning, enterprise visit and research, character interview, etc. Table 4 describes the effectiveness on course ideology and politics for key courses of software engineering major.

3.2 Significant Improvement on Students’ Software Engineering Practice Innovation Ability

Concepts of “teaching” for teachers and “learning” for students are changed positively which is promoted by discipline competitions. According to the problems that are reflected on discipline competition, the construction of laboratories, the updating of the curriculum system, the teaching syllabus and the reform of teaching methods could be promoted [10]. Through discipline competitions of the field of software engineering, students develop the habit of active learning, and cultivate students’ awareness and ability of teamwork. Table 5 describes the effectiveness on discipline competition of improvement on students’ software engineering practice innovation ability.

Table 4. Effectiveness on Course Ideology and Politics for Key Courses of Software Engineering Major

Key Course	Elements of Course Ideology and Politics	Life Value	Learning Enthusiasm
Software Engineering	14	Y	positive
Software Testing	12	Y	positive
Java Program Design	9	Y	positive
System Analysis and Modeling	11	Y	positive
Software Requirement Analysis	10	Y	positive
Human-Computer Interaction	8	Y	positive

Table 5. Effectiveness on Discipline Competition of Improvement

Discipline Competition	Practice Teaching Section	Student Participation	Practice Innovation Ability
Computer Program Design	Y	80.54%	positive
Program Design of “Lan Qiao” Cup	Y	71.02%	positive
“Internet+” Cup of Innovation and entrepreneurship	Y	82.26%	positive
Technology Competition of Challenge Cup	Y	68.19%	positive
IoT Design Competition	Y	70.87%	positive
China Artificial Intelligence Competition	Y	68.56%	positive
Innovation and Entrepreneurship Practice Project	Y	75.27%	positive

Table 6. Effectiveness on Applied-oriented and Innovation Talent Cultivation for School-enterprise Cooperative

Enterprises of School-enterprise Cooperative	Whether to Implement on “Six Commons”	Enterprise-Level Projects Development Practice	Applied-oriented and innovation Ability
SAMXVM Information Technology Co. Ltd	Y	8	positive
JING QI Network Technology Co. Ltd	Y	7	positive
SUNNY SERVICE Information Technology Co. Ltd	Y	6	positive
THANG Technology Co. Ltd	Y	4	positive

3.3 Continuous Progress on Applied-Oriented and Innovation Talent Cultivation for School-Enterprise Cooperative

Presently, integration of production and education has been implemented positively with four local enterprises by the form of school-enterprise cooperative, which “six commons” is included for construction of the software engineering major. At least one training base was co-constructed for one enterprise to implement on IT technology improvement, enterprise-level project development practice on Agile, vocational quality training, service on employment for students, guidance of students’ graduation design, and so on. Table 6 describes the effectiveness on applied-oriented and innovation talent cultivation for school-enterprise cooperative.

4 Conclusion and Further Work

Through more than one year of practice on this trinity practical education platform of “course ideology and politics, discipline competition and school-enterprise cooperative” for software engineering major construction, on the basis of the effective implementation of morality and cultivation of students, through the integration of the discipline competition mode and the form of school-enterprise collaboration, it can promote the initiative of students’ practical ability positively in the field of software engineering.

For further application on this platform, from my own perspective, further work will be done in the future. Firstly, it is indispensable to establish software engineering intelligent laboratories, which intelligent hardware and software facilities are equipped to improve the level of students’ participation. Secondly, cognitive practice resource database of software engineering major is required to be developed for freshmen for the integration of production and education.

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