

# Thoughts on the Construction of Software Engineering Specialty Under the Background of First-Class Specialty, Engineering Education Certification and New Engineering

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**Abstract:-** In the era of rapid development of information technology, how to organically integrate the first-class specialty, engineering education certification, and new engineering into the construction of software engineering specialty is a problem worthy of consideration. This paper analyzes the problems faced by the construction of software engineering, puts forward a construction idea focusing on cultivating high-quality talents, improving the quality by revising the training scheme, strengthening the construction of teachers, creating "golden Courses" and curriculum ideology and politics, deepening the cooperation between schools and enterprises.

**Keywords:-** Software Engineering; New Engineering; Information Technology.

## I. INTRODUCTION

At present, the technological revolution represented by information technology is in full swing, and the development and changes of information technology are profoundly affecting society, disciplines, and industries. As an important part of the new generation of information technology, software engineering, while developing rapidly in related fields in recent years, is also facing problems such as shortage of software talents and weak faculty to cultivate software talents, which has put forward new requirements for software engineering talents cultivation in higher education.

In order to cope with the changes brought by the development of information technology on society, economy, and industry and improve the quality of talent cultivation, the Ministry of Education launched a plan related to the construction of national first-class undergraduate majors in 2019, focusing on deepening the reform of cultivation mode [1]. In this context, colleges and universities need to take the development needs of the national software industry as the guide, base on the demand of regional economy for talents and aim to cultivate applied senior engineering and technology talents with comprehensive innovation ability and comprehensive development of moral, intellectual, physical and aesthetic skills [2]. However, by comparing the requirements of national and provincial first-class

undergraduate majors on talent cultivation, the existing talent cultivation mode of software engineering majors still has some problems that need to be solved as follows.

*A. How to coordinate the construction of first-class majors, engineering education accreditation, and the construction of new engineering disciplines to improve the quality of talent cultivation*

First-class undergraduate majors, engineering education certification, and new engineering construction are naturally interconnected. Software engineering majors need to organically combine them based on integrated planning, and fully consider national and local development strategies to enhance talent cultivation and professional construction, and change the talent cultivation mode that cannot adapt to the development of the times.

*B. How to promote curriculum reform, strengthen the construction of first-class curriculum and teaching and research teams, and cultivate the all-round development of students' moral, intellectual, physical, and aesthetic abilities*

The quality of talent training depends on the overall quality of the curriculum, and the construction of the curriculum is the support point for the stable operation of first-class undergraduate majors. The existing courses of software engineering majors have problems such as insufficient research on course theory and insufficient depth of teaching practice, and the construction of first-class courses is not urgent. Therefore, it is urgent to promote curriculum reform, strengthen the construction of curriculum and teaching and research team, eliminate "inferior courses", create "golden courses", and cultivate students' all-around development in moral, intellectual, physical, and aesthetic aspects.

*C. How to deepen industry-university cooperation and collaborative education mechanism to improve students' engineering practice ability and innovation ability*

The cultivation of engineering practice ability and innovation ability of students in software engineering is a complex system project, which requires in-depth cooperation between industry enterprises and schools to jointly cultivate talents that meet the needs of social development and industry enterprises. At present, due to the constraints of mechanism,

faculty, funding, and platform, enterprises and schools cannot achieve deep-level collaboration, and students' engineering practice ability and innovation ability need to be improved.

## II. IDEA OF CONSTRUCTION

Professional construction mainly focuses on the integrated construction of first-class undergraduate majors, engineering education certification, and new engineering disciplines, with the cultivation of high-quality talents as the core. The university will establish a new concept of student-centered, output-oriented, and continuous improvement of education and teaching, adhere to moral education, participate deeply in the construction of quality projects, strengthen the mechanism of collaborative education through industry-university cooperation, build a continuous improvement method, and innovation of the curriculum, graduation requirements and training programs with the participation of industry and enterprises. The entrepreneurship education system, cultivates excellent faculty, establishes first-class teaching and research team, focuses on creating "golden courses", strengthens the construction of curriculum thinking and politics, and improves the quality of innovative talent training mode.

## III. RELATED MEASURES

*A. Carry out the construction of first-class majors and engineering education accreditation, promote the construction of new engineering disciplines, revise cultivation programs, and continuously improve*

Based on the school's orientation, fully investigate the current development situation of software engineering in regional industries and enterprises, the opportunities and challenges faced, deeply analyze the demand for talents and employment situation of graduates in industries and enterprises, refer to the construction content of similar majors in domestic and foreign institutions, clarify the core curriculum system of software engineering, determine the positioning, characteristics, and talent training objectives of the major. We will continue to coordinate the construction of engineering education certification and new engineering disciplines, continuously improve the construction planning of majors, continuously improve the quality of talent cultivation, condense the characteristics of majors, make efforts to build a perfect mechanism of industry-education integration and school-enterprise cooperative cultivation, construct a comprehensive practical ability enhancement cultivation system, and implement the full coverage of informatization curriculum construction.

On this basis, adhering to the concept of "student-centered, output-oriented, and continuous improvement", the major training objectives, graduation requirements are determined and decomposed, and the major training program and course teaching objectives are formulated jointly by the major leader, key teachers, enterprise experts, and representatives of students and graduates. Based on the teaching objectives of the courses, the course leaders and course team teachers prepare the syllabus that meets the requirements of national first-class major construction,

provincial first-class undergraduate major construction, and engineering education accreditation, formulate the evaluation mechanism for the achievement of course objectives and graduation requirements, revise the training program and implement the whole teaching process management, analyze students' teaching feedback, calculate the achievement of course objectives, and optimize the syllabus every year according to the results, of course, achievement evaluation. Under the guidance of the working group for evaluation of teaching quality of the majors, the majors, course leaders, and students cooperate with the evaluation working group to complete the internal evaluation of teaching quality and process monitoring, and coordinate the construction of the mechanism for revision of training program, evaluation mechanism for the achievement of course objectives and evaluation mechanism for the achievement of graduation requirements for continuous improvement, improve and optimize the index points of graduation requirements every two years, and conduct a review of the professional training program based on the achievement of graduation requirements every four years. Every four years, the professional training program will be revised according to the degree of graduation requirements achievement. This process is repeated to realize the continuous improvement of the talent cultivation process.

*B. Strengthen the construction of faculty and teaching and research level, and organically combine the construction of the "Golden Course" with the curriculum of Civics*

We will implement the strategy of "talent first", improve and refine the construction plan of faculty, strengthen the construction mode of "high-level introduction + deeper internal cultivation", strengthen the construction of faculty, and optimize the structure of faculty. By expanding the high-level faculty, increasing the ratio of professors, associate professors, doctoral teachers to students, optimizing the construction of teaching and research teams, and improving the level of teaching and research. Newly introduced doctors are provided with mentors to help them adapt to teaching and research work as soon as possible, equipped with a good office environment and equipment to solve the worries of work, to promote their rapid integration into the teaching team, so that new doctors can become the backbone of teaching and research as soon as possible. We actively encourage teachers to participate in domestic and foreign study visits, doctoral training, training assistants, enterprise exercises and increase the proportion of teachers visiting domestic and foreign schools, dual-teacher teachers, and doctoral teachers. Through the selection of teachers to participate in software engineering seminars, industry presentations, and promote the comprehensive development of teachers in teaching, research, and other aspects of quality.

In terms of curriculum construction and practical teaching, we improve and optimize the professional curriculum construction plan, strengthen the construction of curriculum and practical teaching system, enhance the process management of training program and syllabus revision, and strengthen the measures for the construction of professional core curriculum system. According to the professional orientation and cultivation program, based on national planning teaching materials and professional characteristic

teaching, measures are formulated to support the development planning of characteristic teaching materials and reference books. By establishing systematic activities and guarantee mechanisms within the major, actively support the construction of teaching teams, strengthen mutual communication among team members, regularly carry out teaching and research activities within the team, strengthen the construction of curriculum resources, improve the degree of integration of teaching and scientific research, guide and encourage teachers to strengthen communication and cooperation between teaching and scientific research, summarize the methods of integration of teaching and scientific research, encourage the publication of high-quality papers on teaching and research and teaching reform, participate in We encourage teachers to publish high-quality papers on teaching and research, participate in project declaration and promote the transformation of project results. Build a curriculum group around the core courses of software engineering and further optimize the corresponding teaching team to cover all professional courses and teachers. Through the continuous work of the teaching team members, the core teaching contents of the courses in the course cluster will be optimized continuously, and the relationship between the course contents will be rationalized and the teaching quality will be improved.

We follow the standard of "one degree of gender", strengthen the construction of "golden courses", establish a new concept of curriculum construction, further promote curriculum reform and innovation [3], systematically sort out and reconstruct teaching and research activities and regulations, and strengthen the construction of online and offline hybrid courses and internship practice classes. The construction of courses. By condensing the characteristics and advantages of the course construction process, introducing the frontiers of scientific and technological innovation, the latest achievements in industrial technology, and the latest requirements of industry development into the course content and teaching process, combining the characteristics of discipline construction, realizing the integration of science and education, industry and education in the course construction, promoting the construction of first-class courses, and advancing course reform and innovation. Encourage the teachers of this specialty to actively participate in the construction of the specialty (cluster), including comprehensive reform courses, research and development of teaching materials, pilot informatization courses, construction of public elective courses, and online open courses. In addition, outstanding teachers are selected to participate in international training and exchange programs to provide support for the construction of bilingual courses.

To strengthen the demonstration construction of "Curriculum Civics", focus on reflecting the school's orientation and professional characteristics, pay attention to the unity of value shaping, knowledge transfer, and ability cultivation, integrate the ideological and political education content and ideological value leadership in all aspects of the curriculum, promote the construction of the Civics system with curriculum planning, strengthen the political attributes of the socialist university with Chinese characteristics, and

implement moral education. The political attributes of the university, the implementation of the fundamental task of building moral character. Actively participate in the declaration of the curriculum Civic Politics project, select a typical course for the Civic Politics project construction demonstration, actively explore the curriculum Civic Politics teaching method reform, and lay the foundation for the promotion of the curriculum Civic Politics.

*C. Deepen school-enterprise cooperation and collaborative education, strengthen practical teaching, build a multi-dimensional innovation and entrepreneurship education system, and improve the overall quality of students*

Focusing on the needs of the software industry, the university and enterprises continue to deepen the cooperation mechanism, build a collaborative education platform with industry enterprises, invite experts from industry enterprises to participate in professional construction, jointly build professional courses, and actively carry out the transformation and incubation of scientific research achievements. By improving the construction of software engineering laboratory, adopting virtual simulation and online/offline mixed teaching methods for practical teaching, combining theoretical teaching with practical teaching, improving students' practical hands-on ability and ability to solve complex engineering problems. Integrate the education work of innovation and entrepreneurship into the overall program of software engineering talents cultivation, progressively deepen the practical content, articulate the close practical links, highlight the cultivation of innovation ability, and establish the cultivation mechanism of cross-education.

#### IV. CONCLUSION

With the rapid development of science and technology, it is a question worth considering how to integrate the construction of first-class majors, engineering education certification, and new engineering disciplines into the construction of software engineering majors. Based on sorting out the problems facing the construction of software engineering majors, we propose a professional construction idea with the core of cultivating high-quality talents and improve the quality of software engineering majors by revising the cultivation program, strengthening the construction of teachers, creating "golden courses" and curriculum thinking and government, deepening the collaboration between schools and enterprises, and building a multi-dimensional innovation and entrepreneurship education system.

#### REFERENCES

- [1]. Wang Zhaohui. The Practice and Exploration of School-Enterprise Collaborative Construction of Software Engineering Major for "Double Million Plan [J]. Education and Teaching Forum,2020(32):49-52.
- [2]. Zhao X, Huang R, Feng Rumei. Research and practice of reforming the talent cultivation system of engineering majors under the background of engineering education accreditation--Take the transportation majors of Dalian

Maritime University as an example[J]. Research on maritime education,2020,37(03):66-72.

- [3]. Zhang Guanjie, Xu H. An analysis of the path to building an online "golden course" of aerobics in physical education in colleges and universities[A]. Chinese Society of Sports Science, Sports Biomechanics Branch. A compilation of abstracts of the 21st National Conference on Sports Biomechanics [C]. Chinese Society of Sports Science, Sports Biomechanics Branch: Chinese Society of Sports Science, 2021:2.