Research on the Training Mode of Software Engineering Applied Talents under Emerging Engineering

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ABSTRACT

Based on the concept of "Emerging Engineering", the training mode of applied talents was studied in this paper in four dimensions, i.e., New Orientation, New Mode, New System and New Concept, to solve the problems with the training mode of software engineering talents in Wuhan Institute of Design and Sciences. More specifically, the new orientation is embodied in the integration of existing disciplines with deep learning or other technologies, to foster applied talents better serving local economic construction. While, the new mode highlights the cooperation with enterprises, to establish the school-enterprise collaborative education model, and realize the integration between industry and education. And the goal of the new system is to scientifically formulate a theoretical and practical system according to the talent training orientation. Finally, the new concept aims to enhance morality education and foster talents by introducing ideological and political theories teaching into classrooms in all courses. After several years of exploration and practice, the career destinations of graduates have become increasingly widespread, and the employment rate is getting higher and higher, meanwhile, the quality of graduates is highly recognized by the society, which proves that the reform of the talent training mode is effective.

Keywords: *emerging engineering; software engineering; talent training mode; applied talents*

1. INTRODUCTION

From the "Fudan University Consensus" to the "Tianjin University Action", and then to the "The guide in Beijing", at the national macro level, the construction standards for emerging engineering disciplines and the teaching requirements for talent training have gradually formed. The connotation should be to improve students' ability to adapt to change and engineering innovation, improve the quality of engineering and technical personnel training, so as to improve international competitiveness [1]. At present, the software industry is the strategic emerging industry of national economy in China, and it is also a discipline that requires students to have a strong practical ability [9]. Under the trend of " emerging engineering ", how to reposition the talent training target of software engineering and carry out comprehensive reform on the program, mode and content of specialty training is a great significance to the establishment of characteristic specialty.

Applied talent training aims at promoting local economic development, meeting the needs of industries and enterprises, and improving students' practical ability, comprehensive application ability of knowledge and innovation and entrepreneurship ability[2-3]. At present, the training mode of software engineering in most universities has the following problems:

- The quality of talent training lacks an effective guarantee mechanism. Professionals have not established a sound talent training mode top-level design, progressive levels of goals and effective management mechanisms, resulting in a lack of systematic, logical and practical work operation in the talent training mode.

- The goal of talent training is too broad and not clear enough. Due to the limitations of traditional concepts, teachers, computer room facilities and other conditions, the talent training system does not adapt to the development of the software industry, and the talents trained cannot meet the social emerging industries or the upgrading of traditional industries promptly, resulting in the lack of talent training.

- Talent training focuses on the integrity of the theoretical system, while neglecting the integrity of the ability training system. In practice ability training, only the applied-oriented courses are added, and the proportion of practical courses is increased, but there is no systematic research.

In response to the above problems, the paper combined with the school's development characteristics and carried out in-depth reforms from the four aspects of New Orientation, New Mode, New System and New Concept, and achieved good results.

2. REFORM THINKING OF APPLIED TALENTS TRAINING

"Emerging Engineering" not only refers to the establishment of emerging engineering majors but also puts

forward new requirements for traditional engineering subjects[1-3]. Lin Jian believed that "Emerging Engineering" includes three aspects: "New Developing", "New Type" and "New Born"[4]. "New Developing" referred to new disciplines. "New Type" referred to the upgrading of existing traditional disciplines. "New Born" referred to new disciplines generated from the cross integration of different disciplines. Therefore, "Emerging Engineering" has the characteristics of leadership, integration, innovation, transboundary and development. The talent training mode of software engineering in Wuhan Institute of Design and Sciences reflects "New type". More concretely, upgrade the traditional software engineering specialty, which is embodied in the upgrading of "New Orientation", "New Mode", "New System" and "New Concept". In order to meet the local economic construction, the New Orientation combines the talent training objective with the advanced new technology to cultivate the applied software engineering talents. While the New Mode realizes the integration of production and education by means of the cooperative education model. And the New System pays more attention to the scientific type and completeness of theory and practice system. Finally, The New Concept is to integrate curriculum ideology and politics into the mode of talent training to realize the task of cultivating people with moral standing.

3. EXPLORATION ON APPLIED TALENTS TRAINING

3.1. Oriented by Local Demand for Talents, Scientifically Locate Training Goals

In the face of the rapid development of IT technology and employment situation, oriented by local needs, applied talents with the spirit of innovation and entrepreneurship and comprehensive quality are cultivated, which provides an important way for the reform of talent training mode. Through the research on the needs of local IT enterprises, Wuhan Institute of Design and Sciences software engineering integrates with big data and deep learning technology, scientifically locates the talent training goal. cultivate talents with all-round development of morality, intelligence, physique, aesthetics and work, and enable students to have a basic theory of mathematics, physics, computer system and core theory of software development, as well as strong practical skills of software system analysis, design, development, have strong innovation and entrepreneurial spirit and social adaptability, engaged in various fields, such as scientific research, software project management in the Internet, mobile Internet, big data, and artificial intelligence and so on.

3.2. Integration of Production and Education to Build a new Mode of Collaborative Education

The "Emerging Engineering" indicates the transformation of education mode, from "passive reception" to "active education". According to the development of software engineering and the need for talent training, a new talent training mode of collaborative innovation with enterprises is set up. Enterprises can use advanced technology and ideas to complete the process management of talent training with colleges and universities.

Firstly, invite corporate experts to participate in the revision of talent training, to optimize the curriculum structure and curriculum content system, and construct a curriculum system based on the trinity of knowledge, ability, and quality. Realize the modularization and integration of big data and artificial intelligence courses, and highlight the combination of work and learning.

Secondly, build practice bases inside and outside school with enterprise, and integrate the technology, equipment and facilities resources of school and enterprise. At present, software engineering has successively cooperated with many enterprises to establish off-campus practice and training bases such as Wuhan Rruandy group, GEM-INNO and so on. In addition, based on the existing internship and training as the main cooperation, the depth of integration of production and education is strengthened. In particular, it is working with GEM-INNO to build an engineering practice education system and practice platform--"Project Factory", introducing corporate cases into classroom, allowing students to get in touch with real corporate projects as soon as possible, and improving engineering practice capabilities.

Thirdly, build a practical teaching mode with enterprises, employ enterprise talents as guidance teachers, introduce enterprise projects to schools, and integrate enterprise production and collaborative education. In the past three years, the school has introduced enterprise teachers to participate in school curriculum training like basic comprehensive training, professional comprehensive training and college students' comprehensive training projects for more than 20 times, so as to ensure that students can meet the needs of enterprises and future society for software talents.

3.3. Combining "Modules And Directions" to Build a new System for Talent Training

Under the collaborative education model of school-enterprise cooperation, according to the development trend of disciplines and the analysis of the demand for talents, the talent training scheme is to teach students by their aptitude. The curriculum system of software engineering is set up through the course group, that is "liberal arts and science+ Professional foundation + Professional core + professional direction" of the course system of multi-level, three-dimensional, to promote the reform of talent training

scheme that combine "modules and directions." as shown in Figure 1.

In the software engineering professional practice teaching system[6-8], in the "five-in-one" stepped practice teaching system, from course experiment, course design to basics, professional training then to graduation internship, as well as innovation and entrepreneurship projects and college students' comprehensive practical training projects, as shown in Figure 2.
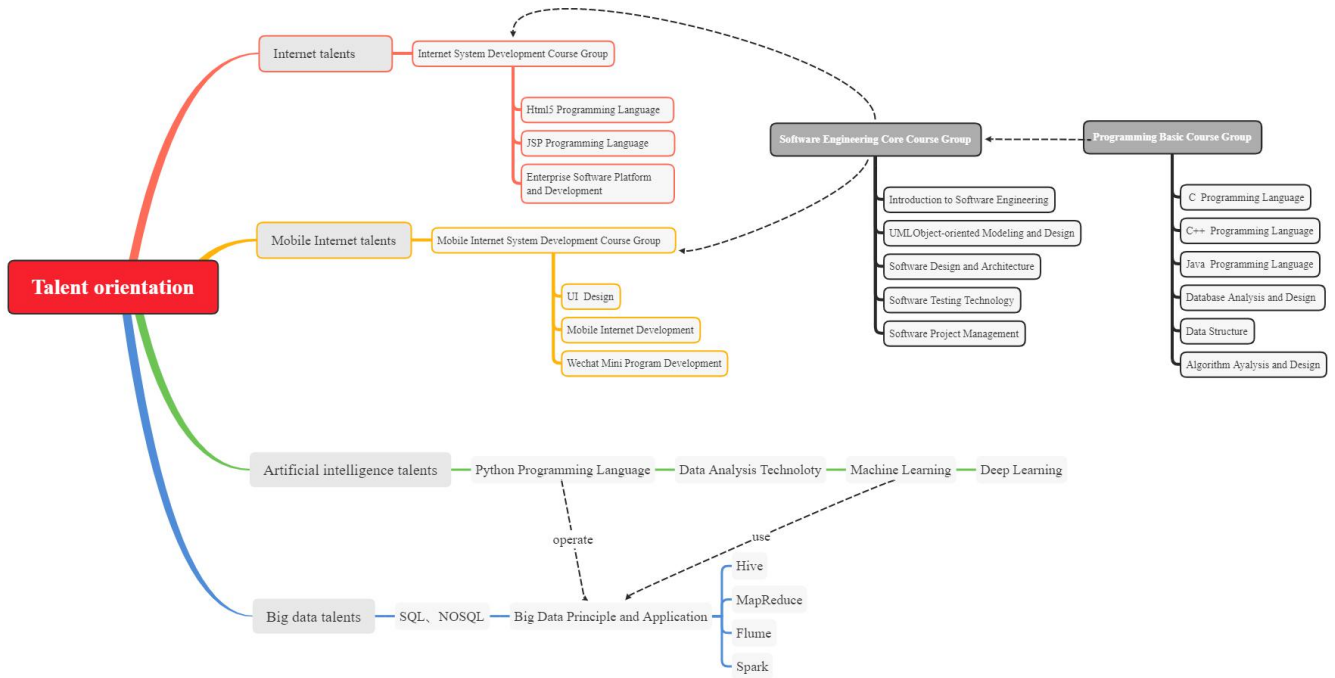

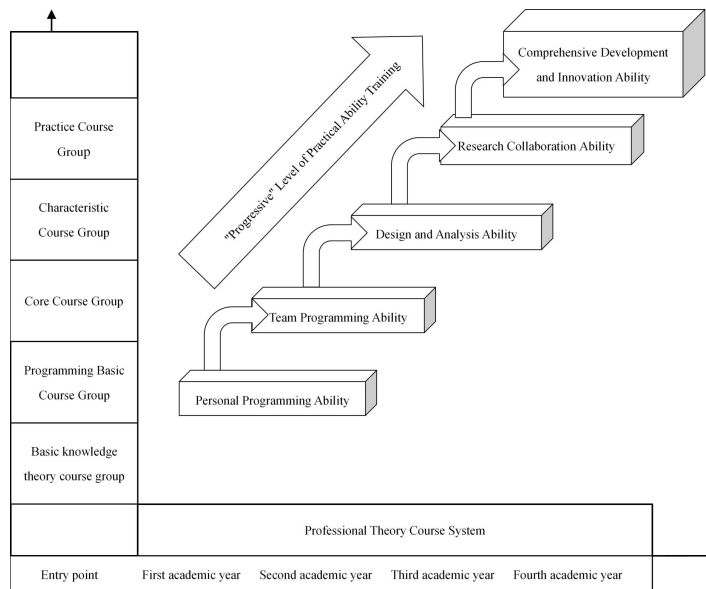**Figure 1.** Software engineering training curriculum system

Figure 2. Software engineering practice teaching system

3.4. Taking "Curriculum Ideology and Politics" as the Starting Point to Realize the New Concept of Moral Education

At the National Conference on Ideological and Political Work in Colleges and Universities, General Secretary Xi Jinping emphasized that we must uphold morality and cultivate people, and integrate the cultivation and practice of core socialist values into the whole process of teaching and educating people[5]. This requires college teachers to dig out ideological and political elements in the teaching content they teach. For example, in the current environment of the COVID-19, countless retrogrades have shown fearless sacrifice, perseverance to fight the virus to the end, and countless scientific research workers selfless dedication and so on, these elements are in front of us. Use these vivid examples to cultivate students' patience and carefulness; and guide them to be brave in taking responsibility and love their jobs. Curriculum ideological and political is a brand-new educational concept and practice. It is an inevitable trend to integrate curriculum ideological and political with professional curriculum teaching. Professional teachers should combine the actual curriculum to teach students a good classroom ideological and political lesson, and bravely forge a new era of soul education a member of the key human strength.

4. CONCLUSION

With the rapid development of information industry, the market demand for high-quality applied talents is more and more urgent. Based on the specific conditions of software engineering in most colleges and universities, this paper analyzed the current situation of the existing talent training mode, and take the software engineering of Wuhan Institute of Design and Sciences as an example, make a beneficial exploration and practice in the New Orientation, New Mode, New System and New Concept. At present, the specialty has initially possessed the characteristic specialty that meets the economic development of the local area, effective school-enterprise cooperation and integration of production and education have promoted the improvement of students' comprehensive practical ability and innovation ability, The career destinations of graduates have become increasingly widespread, and the employment rate is getting higher and higher, meanwhile, the quality of graduates is highly recognized by the society.

ACKNOWLEDGMENT

REFERENCES

[1] Zhong Denghua, Connotations and Actions for Establishing the Emerging Engineering Education, Research in Higher Education of Engineering, 2017 (3):1-6(In Chinese)

[2] SHEN Haibo, ZHOU Ruqi, ZHU Xiongyong, An Exploration of Characteristic Specialty Construction of Software Engineering Based on Emerging Engineering Education and Engineering Education Accreditation, Software Engineering, 2018, 21(3): 57-59(In Chinese)

[3]Wu Aihua, Hou Yongfeng, Yang Qiubo, Hao Jie, Accelerating Development and Construction of Emerging Engineering, Taking Initiative to Adapt to and Lead the New Economy, Research in Higher Education of Engineering, 2017(1): 1-9(In Chinese)

[4]LIN Jian, The Construction of China's New Engineering Disciplines for the Future, Tsinghua Journal of Education, 2017, 38(2): 26-35(In Chinese)

[5] SUN Jia-jia, DU Bing, Exploration on the Reform of Ideological and Political Education of Engineering Courses in Colleges and Universities: Taking the Course of Communication Principle as an Example, Education Teaching Forum, 2020(40):15-16(In Chinese)

[6] Sun Gang, Wang Zhongxin, Zhao Jia, Ding Zhengqi, Practical Teaching System of Software Engineering Major in College Run by Local Governments, Journal of Heilongjiang University of Technology, 2018, 18(1):19-22(In Chinese)

[7]Zhou Jing, Liu Quanju, Zhang Qing, Reform and construction of practical teaching mode under background of new engineering, Experimental Technology and Management, 2018, 35(3):165-168+176. (In Chinese)

[8]WANG Jianbin, CHEN Jianping, CHEN Changxing, Research on the Reform of Practice Teaching Model of Software Engineering Major Based on School-Enterprise Cooperation, The Guide of Science & Education, 2019(20):39-40(In Chinese)

[9]TAN Yu-Mei, YU Chang-Geng, LING Yong-Fa, On the Cultivation of Applied Talents under the Background of New Engineering: A Case Study on Electronic Information Engineering Major, Journal of HeZhou University, 2020, 36(2):160-1(In Chinese)