Analysis for the Construction of Software Technology Professional Group Based on Intelligent Manufacturing Led by Double High-levels Plan

Yumei Li

College of Computer and Information Engineering, GuangXi Vocational Normal University,Nanning, GuangXi, China

Abstract

With the strategies of Internet plus, made in China 2025, AI 2.0 raised andnew information technologies of artificial intelligence, Internet of Things, big data, cloud computing, network securitydeveloped and applicated, Intelligent manufacturing will become the main direction of made in China 2025,information technology, especially the software technology is urged to integrate deeply with all walks of life, promoting the transformation and upgrade of relevant industries(such as industrial industry). Thus, it will further promote the development of new economy, which puts forward higher requirements for the characteristic construction and talent training of software engineering. This paper will explore the construction that "Double High-levels Plan" leads vocational education technical skills innovation platform and the construction that emerging education technology and the way of thinking, such as artificial intelligence, big data intelligent embedsin subject courses to form a professional group of software technique in vocational education led by "Double High-levels Plan". Disciplines and lessons boundaries should be broke through in the process of professional education teaching and innovation teaching means and methodsshould be iterated with the cooperation between course teaching and industrial development to create aprofessional group of software technology in line with the era development, and promote the reform of vocational education personnel training.

Keywords: *Double High-levels Plan;Intelligent manufacturing;software technology; Construction of professional group*

I. Introduction

With the strategies of Internet plus, made in China 2025, AI 2.0 raised and new information technologies of artificial intelligence, Internet of Things, big data, cloud computing, network security developed and applicated,Intelligent manufacturing will become the main direction of made in China 2025,information technology, especially the software technology is urged to integrate deeply with all walks of life, promoting the transformation and upgrade of relevant industries. Thus, it will further promote the development of new economy, which puts forward higher requirements for the characteristic construction and talent training of software engineering. In February 2019, China's Education Modernization 2035 plan was released, which proposed to accelerate the education reform in the information age, build intelligent campuses, coordinate the construction of an integrated intelligent teaching, management and service platform, and accelerate the reform of talent training mode.[1]In April 2019, the Ministry of Education and the Ministry of Finance issued on the Implementation of Chinese characteristics in planning the development of the high level of higher vocational schools and professional building, thus launched the plan (hereinafter referred to as " Double High-levels Plan"), and focus on the construction of a number of higher vocational schools and professional group, which will lead the reform, support the developmentin Chinese characteristics withworld standard. [2]The plan will continue to deepen reform of vocational education, strengthen connotation building, and achieve high-quality development. We should build vocational education technology and skill innovation platform led by "Double High-levels Plan", and integrate artificial intelligence, big data intelligence, trans-media perceptual computing and other emerging educational technologies and thinking modes into courses in professional to break subject vallum, and make "Double High-levels Plan" leading vocational education software technology course cluster.

The plan focus on the construction of a batch of special high-level higher vocational schools and professional group, and uses new generation of education technology,such as artificial intelligence, big data in the course to infiltrate independent intelligent, hybrid intelligent and collective intelligence, thereby formsthe course groups with the interdisciplinary and universalgeneral course system of artificial intelligence thinking and technology infiltration and produces a chain reaction in the curriculum group.Knowledge, curriculum and knowledge system of communion mix and fissionand new technology innovation, theory innovation, application innovation creative activate, then forms a knowledge system of sustainable development.This paper will explore the construction that "Double High-levels Plan" leads vocational education technical skills innovation platform and the construction that emerging education technology and the way of thinking, such as artificial intelligence, big data intelligent embeds in subject courses to form a professional group of software technique in vocational education led by "Double High-levels Plan". Disciplines and lessons boundaries should be broke through in the process of professional education teaching and innovation teaching means and methods should be iterated with the cooperation between course teaching and industrial development to create a professional group of software technology in line with the era development, and promote the reform of vocational education personnel training.

II. Construction of Software Technology Professional Group

"Double High-levels Plan" leads the innovation and development of course clusters, and collaborates with the grid integration of industrial clusters. High quality industrial cluster matcheswith characteristic high level vocational schools and professional group, forming a collaborative innovation alliance between discipline and industry around the core of promotion and integration in innovation alliance core competence and the transformation of scientific and technological innovation outcome into win-win between colleges and industries as the key driver. Industry development demands guides the adjustment and optimizationof course cluster,while preponderant discipline cluster and industry cluster develop perfectly in a coordinated way, which effectively improves resource integration, reorganization, fission and cluster expansion, enhance knowledge and technology and industrial added value. It plays the role of discipline "power producer" to speed up the transformation and upgrading of industrial clusters.[3]

Take a software college of a university in western China as an example, the college has two major categories, namely software major and hardware major, with a total of seven majors and 15 directions. The seven majors are as follows, software technology, computer network technology, computer application technology, animation production technology, application of electronic technology, photoelectric technology and application, photovoltaic technology and application in the industry fields of software, artificial intelligence, big data, Internet, digital media, integrated circuit, new energy, high-end display.The implementation opinion of promoting the development of electronic information industry quality released in Chengdu in 2019, mentioned that it would revolve around six industrial areas of integrated circuit, the new display, intelligent terminal, high-end software, artificial intelligence and information network to build a "chip - screen - terminal - software - intelligence - internet" integration of electronic information industry ecosystem. It would also promote the high-quality development of electronic information industry, focus on cultivating the emerging business forms of "software plus hardware", "software plus content" and "software plus service". Software definition, data-driven and integrated innovation should became the new driving force to promote the upgrading of Chengdu electronic information industry. The artificial intelligence field and the traditional field mix and penetrate cross typical work in typical positions and project integration, team integration and technology integration in typical application project with a single core radiating professional core group, taking electronic information industry chain as the core to form a professional group of software technology, meanwhile, software technology as the professional core to dock on electronic information industry.Professional group of talents training is targeted at software technology professionalgroup of "software plus" inter-disciplinary talent, using software to realize the new functions of the hardware, given intelligence to the traditional software and hardware, using digital program to increase the value of the hardware, training talents of hardware and software combination, data driven compound type and innovative technology skills and establishing electronic information industry highland of talents cultivation, forming a particular pattern to promote radiation.

III. "Software Plus" Zone-Based Talent Training Model

The concept of "integration of industry and education, integration of innovation and innovation, and project orientation" is carried by the way of the zone talent training to reflect the "four-integration": first is the integration of teaching and production, the establishment of enterprise class, project studio, and integration and innovation center; second is that enterprise engineer and the project tutor are integrated, and the enterprise project manager serves as the teaching project tutor; third is that the teaching project and the enterprise production project are integrated, the enterprise commodity project is transformed into the teaching project and the last is the integration of professional education and innovative and entrepreneurial education, student innovation team, enterprise project team, project incubation team. The contents of teaching and production integration are divided into three aspects: first is the enterprise class comes into effect in the training fusion between industry and school, taking the industry enterprise standard as a school-based training standard and curriculum standard based on a simulation project teaching in enterprise class, and taking the integration of professional quality education and professional education as the breakthrough point to strengthen professional spirit infiltration in technical skills education, strengthen the craftsman culture, abide by professional ethics, advocate strives for perfection, cultivate students' "craftsman spirit"; Second is that project studio fuses teaching and production by making the new technologies, new processes, new specifications and other advanced elements into the cultivation standard and curriculum implementation to build the simulation project, product innovation projects, incubation project and project course platform, making full use of the advantages of enterprise project, docking industry standards and the advantage of advanced technology, to develop enterprise project resources transformation, actively transform the enterprise production projects into teaching resources, and widely used in the whole process of education and teaching; third, specialized and innovative integrated training is carried out in the integrated innovation center, integrating "innovation, entrepreneurship and creativity" education into the whole process of talent training to build a project-oriented curriculum platform for innovation projects and incubation projects, build an enterprise innovation platform, and provide project and site resources to carry out the incubation of entrepreneurial teams, setting up a team of three mentors to guide innovative and entrepreneurial education.[4]

A three-level cluster modular project curriculum system is constructed in teaching, which is respectively composed of public foundation platform, professional group foundation platform, single point technology course, system integration course and intelligent innovation course and the public foundation platform consists of general education courses such as public foundation and ideological and political courses, which reflects the commonality of public foundation modules. The professional group foundation platform is composed of theprofessional group of the software and hardware basic platform project courses, which reflects the sharing of professional foundation modules. Single point technology course is composed of single software and hardware technology development project course, which reflects the independence of single point technology course. System integration course is composed of software plus hardware plus network technology system integration development project course, which reflects the integration of system integration course. Intelligent innovation course is formed of artificial intelligence plus big data plus system integration development project courses, reflecting the innovation of course to innovate the modular teaching mode, break the traditional teaching mode of subjects, explore new teaching methods, and implement the project teaching reform of "four dimensions and three sections" team division and cooperation. The "four dimensions and three sections" teaching mode is shown in Figure 1:
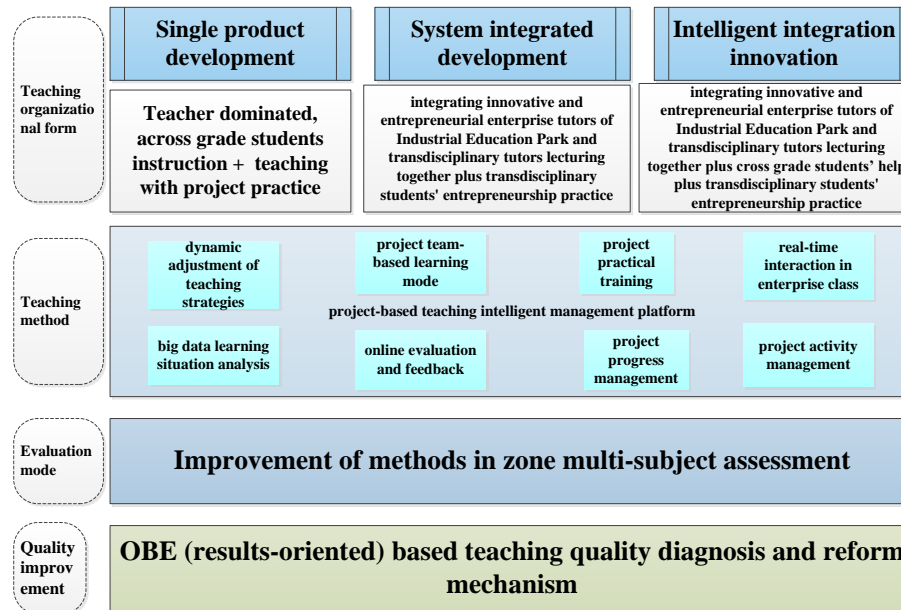
Teaching organizatio nal form	**Single product development**	**System integrated development**	**Intelligent integration innovation**
	Teacher dominated, across grade students instruction + teaching with project practice	integrating innovative and entrepreneurial enterprise tutors of Industrial Education Park and transdisciplinary tutors lecturing together plus transdisciplinary students' entrepreneurship practice	integrating innovative and entrepreneurial enterprise tutors of Industrial Education Park and transdisciplinary tutors lecturing together plus cross grade students' help plus transdisciplinary students' entrepreneurship practice

Teaching method	dynamic adjustment of teaching strategies	project team-based learning mode	project practical training	real-time interaction in enterprise class
	project-based teaching intelligent management platform			
	big data learning situation analysis	online evaluation and feedback	project progress management	project activity management

Evaluation mode	**Improvement of methods in zone multi-subject assessment**

Quality improv ement	**OBE (results-oriented) based teaching quality diagnosis and reform mechanism**

Figure 1. "four dimensions and three sections" teaching mode

Four dimensions refers to the teaching organization forms, teaching means, examination mode and the quality of diagnosis and improvement, and three sections refers to the first dimension of teaching organization form could be divided into three period of teaching stage of a single product development, system integration, intelligent integration and innovation. In a single products development teaching stage, a mentoring teaching dominated by academic advisors with across grades students guide plus training project is operated. In the teaching stage of system integration development, we should carry out specialized and coordinative teaching with enterprise tutors of Industrial Education Park and transdisciplinary tutors lecturing together plus transdisciplinary students' project practice. In the intelligent integration innovation teaching stage, entrepreneurship practice and exploratory teaching is adopted by integrating innovative and entrepreneurial enterprise tutors of Industrial Education Park and transdisciplinary tutors lecturing together plus cross grade students' help plus transdisciplinary students' entrepreneurship practice. The second dimension of "teaching method" is mainly manifested in the intelligent management platform of project teaching, by dynamically adjusting the teaching strategies, adopting the project approach of team learning, to take training and practice, which can realize real-time interaction in enterprise class through big data analysis of learning condition, evaluating online feedback, completing the project schedule management and project activities management.The evaluation is carried out by improving the multi-subject assessment method of the zone, and the teaching quality diagnosis and reform mechanism based on OBE (results-oriented) is adopted.

IV.Construction of Teaching Resources in Professional Group

The ultimate goal of win-win result realization and solution of "one-sided enthusiasm" will be achieved focusing on integration practice platform of industry and education built by industry chain, targeting for personnel training, technology research, social service, covering multi- professional group of professional and works with companies to build resource accommodation, "two-tutor" interaction, proceeding service education by teaching out of the topic, making articles of research and development, taking results used into the class. The professional group industry and education integration platform should be set up to achieve win-win development between schools and enterprises and regular meeting, activities organization, industry research are carried out. To integrate the professional group of construction of resources in and around schools, "one school", "two institutes" and "three centers" are respectively set up. "One school" means the industries are in the schools and schools are in the industries (modern apprenticeship system), including Jing Dongfang talent training base, SCL-UV testing and packaging personnel training base. "Two institutes " refer to the new technology research institutes (new

technology research, professional direction cultivation), which consists of the Optoelectronic Technology Research Institute, the Big Data Blockchain Technology Research Institute, and the Industrial Software Internet of Things Technology Research Institute. Industry College (social Service) consists of H3C ICT College, Huawei Kunpeng, Hongmeng College, Shangtang College and Sike College. "Three centers" are the engineering technology center (with project teaching in three levels of training rooms), which is equipped with artificial intelligence application engineering center, software engineering application center, network security engineering, intelligent software engineering application center, intelligent hardware engineering, electronic engineering application center, photoelectric engineering center, digital media engineering center.Science popularization training center (social training) includesJing Dongfang Optoelectronics Technology Training Base, Huawei ICT Training Base, ARM and Google National Teacher Training Base, and National Talent Training Base in short-need. Information Technology Innovation Center (Xinchuang -- a new national infrastructure) consists of incubator project studio of mass entrepreneurship and innovation team and information technology fusion innovation studio.[5]

Photoelectric professional teaching resource database and the software teaching resource database are established to develop national professional teaching resources, and the photoelectric professional teaching database is composed of standard solution and the resources. Standard solution has the talent training scheme, professional teaching standards, curriculum standards, mixed-ability teaching standards, with material resources, integral ware resources, module resources, curriculum resources. Software professional teaching database is divided into two parts, the training and test project library and platform. The training and test project library has 1 + X training library, project library of professional certification case, item bank, while the platform has curriculum resources platform, the test platform diagnosis and the platform improvement. There are seven courses of photoelectric resource database and seven courses of software technology database in the resource database at present. In the project resource database, there are 100 project databases of software technology professional group with online quality open course, innovation and entrepreneurship course, loose-leaf teaching materials, work manual teaching materials, ideology and politics course.

V. **Rely on the Teaching Team to Carry out the Reform in "Three Emphases in Education"**

Taking a Software School of a university in western China as an example, the teachers in the school are divided into inside and outside the school. The teachers in the school are divided into teaching type, teaching research type and scientific application type. The teachers outside the school are divided into research type, engineering application type and skill type. Teachers should be introduced from various channels, such as vocational education experts, industry leaders, well-known scholars, enterprise experts professional experts, part-time teachers, in a way of building a variety of platforms, such as top teacher studio, master studio, innovative Industrial and Teaching zone, entrepreneurship college, scientific research and innovation team (transducer, Internet of Things), scientific research and innovation platform (artificial intelligence innovative application platform), etc. to carry out collaborative innovation by bring together enterprises,academia and research institutes. The teachers' team is relied on to carry out three emphases in education, adhering to the idea that "teacher is main body, teaching materials (teaching resources) and teaching method are a path". Teachers in the teaching process should have the concept of vocational education that the basic idea of higher vocational education, to cultivate engineering skills of students, make students have with application skills of engineering project and project implementation.Teachers also need to have mass entrepreneurship and innovation, that is, vocational engineering ability, professional quality and industrial engineering ability. Teaching materials (resources) is the carrier and the teaching resources have the ability to use and contrast of teaching resources, through the photoelectric library, software technique library, make the students master professional knowledge and achieve the goal of the mass entrepreneurship and innovation education through the engineering project design, transformation, application of teaching project, using the mass entrepreneurship and innovation resources, such as technical resources, industry resources,team resources. The teaching method is the path. Projection teaching is carried out through teaching projects, simulation projects and commodity projects are integrated into teaching through mass entrepreneurship and innovation team, incubation project and three-tutor team to apply innovation incubation project teaching.

Ⅶ Conclusion

The construction of professional group is different from that of a single profession, which is considered as a whole, with more emphasis on the cross integration, resource sharing and social influence. It is necessary to design professional group quality indicators, professional group quality assurance system and professional group dynamic adjustment mechanism. In order to carry out the construction of high-level professional group, the construction task of professional group must be "teaching and normal", and the process construction task can be arranged and deployed together with the teaching task. The process monitoring of professional group construction should be strengthened, and the process data should be checked regularly. The coordination work involving multiple departments in professional group construction should be handled in a unified and coordinated way.[6]At present, there are the following problems in the construction of software technology professional group, the professional group is too broad in the information technology subdivision field, and there is no professional group in a specific subdivision field; How to serve the domestic information technology ecosystem in the face of professional group dynamically adjusts to the development of the industry, facing the phenomenon of key chips and the country vigorously develop the construction of information localization; How to cooperate with professional group and industrial group as big data AI technology needs an industry as the entry point; and other problems like the collaborative development of major groups and other major groups in the university.To solve these problems, we need to do the following, such as the professional group, the professional group carry out talent cultivation around the domestic operating system and chip by adjusting directions and subjects. Ecological head enterprises like Huawei and others carry out the accurate type talent cultivation, and cultivating new service incubator small micro enterprise, coordinating and developing with school professional group facing the key construction of city "intelleigent health", "intelligent logistics", "intelligent traffic" to create development needs in thesoftware technology professional group, promoting the reform of vocational education personnel training.

Reference

[1] "Ministry of Education Document Teaching and Technology," No.3 Artificial Intelligence Innovation Action Plan of Higher Education, 2018.

[2] "Document of Ministry of Education and Ministry of Finance," No.5 Suggestions on the Implementation of High-level Higher Vocational Schools with Chinese Characteristics and Major Construction Plan, 2019.

[3] D.Y.Jiang, G. Dong, Z.M. Hu, et al.,"The Construction of High-level Vocational College with Chinese Characteristics," China Higher Education Research, vol. 6, pp. 98-102, 2018.

[4] J.S.Zhou,"Research on the concept and thinking of the construction of high-level vocational schools," Vocational Education Forum, vol. 1, pp. 6-10, 2018.

[5] H.S.Pan,"The core task and construction path of high-level professional group construction with Chinese characteristics," University Education Science, vol. 1, pp. 116-119, 2020.

[6] X.Wang, C.Y.Chen,"Research on several key issues in the construction of high level vocational colleges with characteristics in the new era," China Vocational and Technical Education, vol. 13, pp. 5-11, 2019.