



Research on Professional Development in the Context of New Engineering Disciplines

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Abstract At present, almost all majors in undergraduate colleges and universities are set up according to discipline categories, and their professional construction is mostly carried out for individual majors. In order to meet the needs of the intelligent manufacturing industry for complex, innovative and applied talents, it is necessary to strengthen the top-level design and implement the construction of professional groups that are seamlessly connected with the intelligent manufacturing industry.

Keywords Professional development, New engineering, Intelligent manufacturing industry

1. Introduction

Taking "Made in China 2025" and "integration of the two" as an opportunity to serve the intelligent manufacturing industry as the goal, to improve the quality of personnel training as the core, and to "mechanical design, manufacturing and automation" as the core, the university will continue to develop its own research and development programs. With the two majors of "Automation" and "Hacker" as the lead, we plan the training system of professional group, construct the "platform + module" professional course group; take the hacker education as the lead, rely on practical projects, and actively promote the innovation of college students. In addition, we will take the international engineering education certification as an opportunity to actively promote the certification of majors, strengthen international exchanges and cooperation, and continuously expand the international vision of teachers and students. +1" high level teacher team construction, improve teachers' teaching and research level,; innovative professional cluster management and operation mechanism, improve management level. We will strive to build this cluster into an intelligent manufacturing cluster and intelligent manufacturing industry talent cultivation highland that can meet the needs of local economic transformation and upgrading, with distinctive characteristics, high resource sharing and great social influence.

2. Construction Initiatives

In line with the principle of being based in Hangzhou, facing Zhejiang and serving the industry, focusing on the intelligent manufacturing industry cluster, we will focus on building up a professional direction of advantageous disciplines, forming an intelligent manufacturing professional group with mutual support, mutual integration and resource sharing, and building up a "composite and application-oriented" group with ability training as the core, interaction with local economy and structural optimization. Professional Group System.

Actively promote the construction of talent training system that integrates industry and education and educates people together, integrate and infiltrate professional education with innovation and entrepreneurship education, promote the reform of applied talent training that integrates "teaching, learning and doing", and build an open system relying on the "integration of industry and education". The talent training model focuses on cultivating



students' professional knowledge application ability and practical innovation ability, improving their employability and social adaptability.

Taking the construction of "Golden Courses" as a guide, building a good platform course system and characteristic professional direction course modules. Taking application as the guide and ability as the basis, we set and build several "gold courses" and high-quality core courses for the emerging intelligent manufacturing industry, and build several school-enterprise courses through cooperation between industry and education, and build an integrated "gold course + platform + module" curriculum system.

Strengthen the construction of practical teaching platform, and gradually build a comprehensive practical teaching platform supported and shared by multidisciplinary majors, forming cross-fusion of practical teaching resources within discipline professional groups. Relying on innovative practice projects, we will give full play to the nurturing advantages of various majors and improve the cultivation of complex talents.

Relying on the certification of majors, we promote the certification of majors and raise the level of internationalization of majors. We will deepen international cooperation and exchanges, and constantly innovate the international talent training model, so as to cultivate application-oriented senior talents with a solid foundation, high professional quality, strong practical ability and innovative consciousness, and a certain international vision.

Relying on hacker education, we actively introduce external educational resources, carry out hacker education and training at multiple levels, set up hacker education and practice teams, and increase students' enthusiasm for innovative practical activities through hacker marathons, hacker carnivals and other activities. We also discover good projects in innovative practice activities in a timely manner, do technology incubation at a later stage, and guide students to carry out entrepreneurial activities.

Taking the construction of curricula and the guiding practice projects of industry-education cooperation as opportunities and promoting the construction of a dual-teaching team. Focusing on building a high-level team and improving the quality of talent cultivation, we will combine introduction and cultivation to build a high-quality teaching team of "dual-teacher + management".

3. Construction content

Fully analyze the structure and development trend of intelligent manufacturing industry, each major within the professional cluster horizontally corresponds to the development demand of related industries in each industrial chain of the industrial cluster. Longitudinally based on the comprehensive ability cultivation of students, strengthen the synergistic development and cooperation among the majors of the professional cluster. Based on the students' ability cultivation as the main line, we clarify the talent cultivation target and the development orientation of the professional cluster.

To dock closely with the intelligent manufacturing industry chain, sort out the personnel training goals and professional development orientation of each professional within the professional group, analyze the personnel training goals and professional group development orientation of the design professional group, make the top design of the professional group construction, and form a good advantage in personnel training and industry-education integration in order to form a synergistic development with the intelligent manufacturing industry chain. The correspondence between professional group and intelligent manufacturing industry chain is shown in Figure 1.

Take mechanical design and manufacturing and automation and automation majors as a lead, drive the collaborative development of other majors, achieve good embedding and integration in the curriculum system, faculty construction, etc., and realize resource sharing and intercommunication on the innovative practice platform. Mechanical majors align with the industrial chain in high-end equipment, industrial robots, etc. to form talent cultivation characteristics; automation majors align with the industrial chain in intelligent manufacturing key technologies to form talent cultivation characteristics; electronic science and technology majors align with the industrial chain in the design of core components to form talent cultivation characteristics; communication engineering majors align with the industrial chain in communication and industrial Internet to form talent cultivation characteristics.



To strengthen the construction of special professional direction of professional group, all majors are aligned with the intelligent manufacturing industry chain, optimize and adjust the existing professional direction, and carry out good planning and combing on the course setting and content to form the characteristics of professional direction. Mechanical design and manufacturing and automation majors focus on "intelligent manufacturing technology" to create characteristics, mechanical and electronic engineering majors focus on "industrial robotics" to create characteristics, automation majors focus on "artificial intelligence control technology". "In addition, the communication engineering major focuses on creating characteristics in "communication technology and industrial internet", and the electronic science and technology major focuses on creating characteristics in "core component design".

On the basis of the existing talent training system, taking industrial demand as the guide, focusing on the engineering practice ability and innovation ability of college students, we focus on promoting the construction of innovative practice platform and the integration of industry and education to promote the training of applied talents.

To improve the construction of a "hacker space" that is multi-disciplinary, multi-professional, teacher-student collaboration, integrating creative design, engineering innovation and practice, and student entrepreneurship, providing excellent places for students to carry out innovative practice; with the requirements of engineering practice as the standard, to improve the workplace environment and construction of engineering culture, according to the enterprise management mode, to improve all kinds of The rules and regulations are built to establish a good professionalism and professionalism among students.

Strengthen the cultivation of practical skills and build a practical teaching system that is in line with the cultivation objectives.

Practical teaching is organized according to the three levels of practical experimental training, innovative practice and hacker education and practice. On the experimental training platform, the teaching system is based on comprehensive, design and application experimental projects, which includes both basic experimental skills training and comprehensive experimental training; on the innovative practice platform, the students' engineering cognitive practice is strengthened and comprehensive training based on the project life cycle is carried out; on the hacker education and practice platform, based on hacker projects, university students' scientific research, national creation projects and academic competition projects, the students are actively trained in the following areas. Promote the practice of hacker education, and cultivate students' innovative consciousness through hacker marathon and hacker carnival activities. A practical teaching system that organically integrates basic skills, professional skills and comprehensive applied ability training will be established to enable practical teaching to develop at a deeper level, so as to meet the needs of cultivating students' applied skills and innovative abilities.

Guided by the concept of CDIO international engineering education and based on engineering projects, we strengthen the cultivation of practical and innovative abilities of college students. Actively introduce external hacker education groups, use external resources to carry out full hacker education and training for college students, encourage students to actively participate in hacker practice, and vigorously explore students' innovation enthusiasm and enthusiasm. We also strengthen our ties with the hacker industry and develop cooperation in talent training, project cooperation and social services to create favorable external conditions for the cultivation of innovative talents.

4. Curriculum reform

Curriculum teaching is not a simple transfer of knowledge, nor is it a simple combination of knowledge, ability and quality, but the content of the course is the concretization and actualization of the course objectives, which must reflect a certain social value requirements, that is, the requirements of a certain culture, a certain country's mainstream values and ideology.

Establishing a modular course sharing platform to realize mutual selection and recognition of courses. Aiming at this professional group, the basic professional courses of each major within the group are opened up, and a platform for the basic professional courses is built, forming a modular teaching mode for the theoretical courses of the academic professional group and gradually building a "platform + module" curriculum system. The platform is set according to the common basic knowledge and basic skills required for the highly skilled personnel of this professional group, as well as the common development and ability characteristic requirements



of each professional technology. The "modules" are set according to different majors (or specialty directions) and are composed of courses that reflect the characteristics of the majors. Each module reflects this specialization, is based on the work task or work process, is a synthesis of professional theories and skills necessary and sufficient for a particular work process, and is a synthesis of professional, methodological and social competence training.

Reforming course content and strengthening the construction of course connotations. Emphasis is placed on the construction of basic courses and related or similar technical courses within the group, and the systematic construction of a professional group curriculum system. Update teaching contents, highlight ability cultivation, and realize the effective convergence between teaching contents and social demands. Real-time introduction of new knowledge, new technologies, new standards, new equipment, new techniques and new achievements of industrial enterprises, and dynamic updating of teaching content. Strengthen the construction of core courses, at least one high-quality core course shared by related majors is built for each professional group, and each major within the group is at least.

Build 2 or more quality core courses that reflect the characteristics of the program.

Reforming teaching methods and means to improve teaching standards. Carry out the reform of project teaching, case teaching, simulation teaching and other methods, take doing as the core, advocate learning by doing, and truly realize the unity of "teaching, learning and doing". The focus is on the reform of project-driven practical courses, combining the advantages and characteristics of professional groups in the field of intelligent manufacturing, and establishing the practice of training new talents.

Teaching Philosophy. The reform will focus on the comprehensive projects of Industry 4.0 Intelligent Training Platform, Formula 1 Car, Di Zhi Robot, Intelligent Robot and Intelligent Car. The program features the cultivation of intelligent manufacturing talents, and the application of artificial intelligence technology in innovative practical projects, realizing the characteristics of talent cultivation with industrial characteristics.

5. Construction Results

Basically, we have built up a group of disciplines and majors oriented to the development of intelligent manufacturing industry with the core of cultivating practical engineering ability and innovation ability, positive interaction with local industries, optimized curriculum system structure and distinctive characteristics of innovation and entrepreneurship, and completed the construction of new talent training mode.

The comprehensive internal and external practical teaching platform supported and shared by multidisciplinary majors plays an active role in the whole process of talent training, and students make use of the innovation and practice platform to carry out a variety of innovative and practical activities.

The characteristics and advantages of the intelligent manufacturing cluster with the synergy of professional education and innovation and entrepreneurship education, the deep integration of industry and education, and the synergy of all majors are further revealed, and have a positive social influence in the applied universities.

Based on professional teaching, carried by applied technology research and development projects, and led by innovative thinking, the three-in-one "learning, research and competition" of cultivating high-quality "three-type" talents has begun to show results. Initial results.

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