Journal of Computing and Electronic Information Management
ISSN: 2413-1660 | Vol. 10, No. 3, 2023

Practice and Exploration of the Construction of New Engineering Skills Studios under the "Three navigation and Five Integration" Model from the Perspective of Industrial Demands

Jing Sun

Zhongshan Polytechnic College, Zhongshan, Guangdong 528400, China

Abstract: According to the talent demand statistics of the IoT industry by the China Academy of Information and Communication Technology, the total talent demand gap in the intelligent hardware industry in the next few years will exceed 16 million people. It is urgent for vocational colleges to cultivate a large number of technologies integrated technical and skilled talents in the form of artificial intelligence professional groups. Starting from the needs of the positions, various mentors deeply participate in the development of studio training courses, "1+X" certificate training, order project guidance, innovation and entrepreneurship guidance, and other routine work. Using the studio management system as a driving force, clarify the division of labor for each mentor, specific requirements for mentoring and passing on skills, and performance evaluation indicators, to ensure that mentors are not "absent" and provide protection for students' growth. We precisely meet the needs of talent training for new positions in the information technology industry. Driven by the application research and development task, guided by students' interests, driven by enterprise product research and development, and driven by the research and development of intelligent hardware and consumer electronics, we complete the whole process from professional training to precision employment, and improve employment competitiveness. Students participate in real projects or enterprise real orders, master the latest industry development, technical information, mainstream work methods, and achieve precise education.

Keywords: New Engineering Skills Studio; "Three navigation and Five Integration" Model; Industrial Demands.

1. Research background

[Made in China 2025] clearly puts forward the strategic goal of making innovation driven, quality first and talent oriented as a manufacturing power [1]. Information technology and intelligent manufacturing technology have developed at a high speed, which puts forward newer and higher requirements for the cultivation of talents in the electronic IoT artificial intelligence professional group at the forefront of technology [2].

Under the new infrastructure policy, the construction of new technology infrastructure represented by artificial intelligence engineering and intelligent hardware is accelerating. The number of IoT device connections and network data is increasing exponentially, the number and mobility of intelligent terminals are significantly increasing, and data transmission paths are frequently changing [3]. Smart homes, the Internet of Vehicles, smart cities the urgent demand for technological integration at the four levels of "cloud, management, edge, and end" in various fields and work scenarios such as smart office and smart factories has prompted China's Internet of Things to accelerate into a new stage of "cross-border integration, integrated innovation, and large-scale development". The innovation of the intelligent Internet of Things technology environment presents four major characteristics: "intelligence at the edge, ubiquitous connectivity, platformization of services, and data extension", This has led to the emergence of a large number of technical integration oriented positions such as artificial intelligence engineering design, intelligent hardware engineering implementation and operation maintenance, IoT system application development, and artificial intelligence application and service[4]. The new demands and technological integration of these positions require a large number of technical integration-oriented talents.

According to the talent demand calculation of the Internet of Things industry by the China Academy of Information and Communication Technology, the total talent demand gap in the intelligent hardware industry in the next few years will exceed 16 million people. It is urgent for vocational colleges to cultivate a large number of technologies integrated technical and skilled talents in the form of artificial intelligence professional groups. Section Headings

2. Main issues and research methods

1). Effectively solving the problems of weak cross disciplinary practical ability of professional talents and insufficient motivation for enterprises to participate in school enterprise cooperation

Corporate motivation has a significant positive impact on the willingness to collaborate in educating students, while corporate desire is significantly influenced by perceived benefits, perceived costs, and perceived risks. It indicates that the participation of enterprises in the cultivation of skilled talents in vocational colleges is a comprehensive result based on their expected benefits and balancing costs and risks.

In the process of school enterprise collaborative education, explore the construction of an integrated "cultivation cooperation employment" school enterprise collaborative education model based on full enterprise participation, in order to balance the cost, benefits, and risks of enterprise education. Figure 1 is a schematic diagram of the "three leading, five integrating" education mode.

Specifically, in the process of talent cultivation, industry

talent cultivation standards are introduced, and talent cultivation plans and teaching modules are jointly developed with enterprises. Courses such as "Internet of Things Enterprise Project Practice", "Electronic Product Design and Production", "Python Machine Vision Technology", and "1+X Sensor Network Evaluation" are successively offered, and three project-based teaching materials are jointly written; In terms of teaching mode, schools, enterprises collaborate to develop tutorials, teach together, cultivate together, and recruit students based on their strengths; In terms of cooperation, the projects that students participate in come from the actual production problems of the enterprise, and the results are evaluated by the enterprise. In this dual subject and full process model, enterprises always stand on the perspective of self-education and collaborate with vocational colleges to cultivate talents. The skilled talents cultivated are "useful and sustainable", which not only reduces the risks of enterprise education, but also increases the expected returns of the enterprise, and can further stimulate the enthusiasm of enterprise collaborative education.

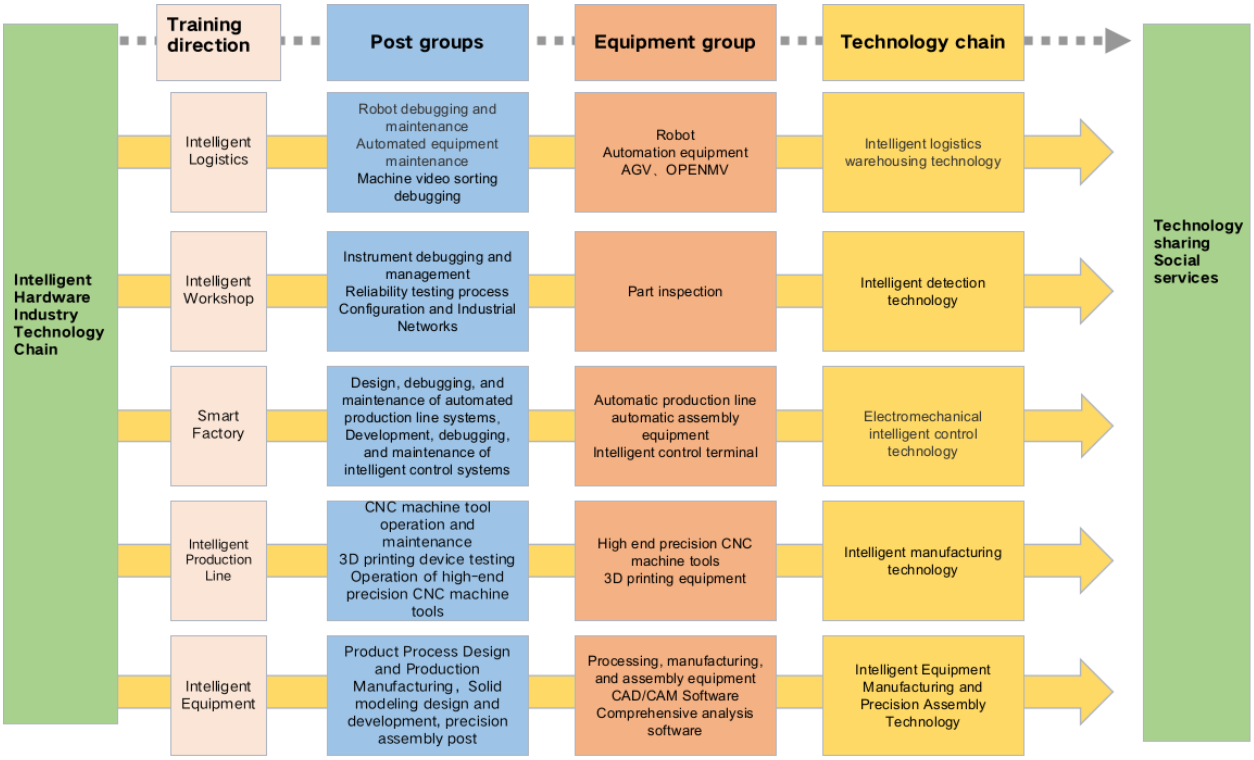

Figure 1. Schematic diagram of the "three leading, five integrating" teaching mode.

2). Effectively solving the problem of lacking a collaborative environment and real enterprise projects in the cultivation of skilled talents

Relying on Skills Master Studio in colleges, we have cooperated deeply with industry enterprises, integrated multiple enterprise advantages and resources according to the requirements required for real product research and development, and jointly invested and built an enterprise level research and development space of 960 square meters and a 1500 square meter main base for educating people. There are fixed technology development zones, testing zones, production zones, and cooperation negotiation zones within the studio. Multiple training bases supported by the central government and provincial and municipal governments on campus, as well as multiple government, school, industry, and enterprise platforms such as the Information Technology Industry Education Integration Park, provide favorable guarantees for the studio to carry out technical research work.

Guided by the principles of "cooperative education, cooperative education, cooperative employment, and cooperative development", Master Studio leverages the complementary advantages of schools and enterprises (employers) in professional talent cultivation, industrial planning, funding, advanced technology application, part-time teacher recruitment, practical training and internship base construction, textbook development, project development, professional teaching implementation, equipment function development, and student employment absorption, Actively exploring and practicing school enterprise cooperation in running schools and modern apprenticeship talent cultivation, innovating a close school enterprise cooperation system and mechanism of "talent co-education, process co management, achievement sharing, and responsibility sharing", forming a "school enterprise integration, industry education integration" talent training model, promoting deep cooperation between schools and enterprises, guiding and motivating teachers to actively serve enterprises and society, implementing the responsibility of teachers to closely connect with enterprises, and conducting technology research and development, Promote the transformation of scientific and technological achievements, achieve mutual benefit and win-win results, enhance the vitality of education, and strive to cultivate high-quality and highly skilled talents.

Continuously establish a management system and performance assessment requirements for the Master of Building Skills Studio. Professional mentors, entrepreneurial mentors, and industry mentors are required to sign a "Work Contract" and "Transfer of Skills with Apprentices Agreement" in the studio, lead students to complete tasks according to the annual work plan, implement the transfer of skills with apprentices, and ensure that mentors are not "absent" during the growth process of students.

Studio students participate in mentor projects or real

enterprise orders, understand the latest industry developments, technical information, and mainstream work methods, learn the entire process of project design to project acceptance, and participate in project analysis, management, operation, and marketing.

3. Summary

Under the "Three navigation and Five Integration" Model from the Perspective of Industrial Demands, innovation studios precisely meet the needs of talent training for new positions in the information & electronic industry.

3.1. Application effect

(1) Wide range of benefits for students on campus

The studio recruits more than 300 students from the majors of electronics, Internet of Things, and artificial intelligence professional group. Students actively participated in the National Undergraduate Electronic Design Competition, "Internet plus" Undergraduate Innovation and Entrepreneurship Competition, Skills Competition and other competitions, and won 167 provincial awards and 26 national awards.

(2) Student technical service capabilities have improved

Guiding students to enhance their technological innovation service capabilities through the application of intellectual property rights, we have successively cultivated more than 20 student innovation and entrepreneurship projects. As founders or core members, students have established 3 startup companies, 2 innovation and entrepreneurship incubation studios, and 3 school level research rooms, directly driving the employment of 29 people and indirectly driving 497 people.

(3) Rich achievements in school enterprise cooperation

Guided by the actual work process, the curriculum is set up with 6 professional group innovation and entrepreneurship practice courses, 3 provincial-level quality engineering high-quality courses are completed, 3 project-based textbooks are jointly written by enterprises, 55 related teaching and research projects are presided over, and students directly participate in 52 horizontal course/order projects and 18 patents/software copyrights in school enterprise cooperation.

(4) Rapid improvement of mentor team's business capabilities

In recent years, the team has added 1 Guangdong technical expert, 2 Guangdong technology envoys, 2 Zhongshan technical experts, and 2 Zhongshan Skills Master Studio leaders.

(5) Wide range of social services

Provide "1+X" certification training services to the entire society. Regularly provide "1+X" certification training for small and medium-sized enterprises and domestic vocational colleges, with an average annual training population of 563 people.

3.2. Promotion effect

The achievements have promoted the IoT application technology major to become a national backbone major and a first-class brand major in Guangdong Province, driving the construction of the electronic IoT artificial intelligence professional group, and significantly improving the quality of cross disciplinary integration talent cultivation. Furthermore, many brother colleges and universities inside and outside the province came to exchange and study. Guangdong Light Industry Vocational and Technical College, Guangdong Polytechnic, Mount Taishan Vocational and Technical College, Zhongshan Torch Vocational and Technical College and other colleges and universities learned from the reform of these application achievements.

Acknowledgements

This work is supported by the 2021 Guangdong Educational Science Planning Project (special project for Higher Education) (Project Number: 2021GXJK570);

This work is also supported by Zhongshan Yunyi Electric Control Technology Co., Ltd.

References

[1] Ma Y, Wang X , Han X . Exploration of talent training mode based on engineering education concept under new engineering background[J]. Wireless Internet Technology, 2018.

[2] Liu S, Gao Z , Li D . Exploration and practice of training mode of engineering talents based on open online courses[J]. MATEC Web of Conferences, 2020.

[3] Han B Y, Bei S Y , Cui W , et al. The Exploration and Practice of the Training Mode of Engineering Talents in Automobile Specialty for "New Engineering"[J]. Science & Technology Vision, 2019.

[4] Wang X, Zhou T , Zhang S , et al. Exploration and Practice of Innovative Talents Training Under the Mode of Industry-University-Research Collaboration in Engineering Colleges and Universities[C]// the 2019 The World Symposium. 2019.