

# Discussion on the construction scheme of IOT application technology professional group training base under the background of “1 + X” certificate system

Haiye Qiao, Zhen Zhang, Manlan Liu

(Foshan Polytechnic, Foshan, Guangdong, 528137)

**Abstract:** in view of the introduction of the 1+x certificate system pilot launched by the Ministry of education, under the background of the construction of high-level professional groups advocated by the state, how to build the training base of professional groups in higher vocational colleges, whether it can meet the daily training teaching, while taking into account the needs of talent training for the transformation and upgrading of local economy and industry, the improvement of professional social service ability, and the realization of the integration of industry and education, These are the puzzles faced by the construction of professional group training base. This paper takes the construction of high-level professional group of IOT application technology in Foshan Polytechnic as an example, and puts forward the construction ideas and contents of professional group training base, so as to provide high-quality teaching conditions and environment for professional group talent training.

**Key words:** “1+x” certificate; Professional group; Vocational skills; Job position

[CLC No.] g712 [document identification code] a

## 1 Summary

In April, 2019, the Ministry of education, the national development and Reform Commission, the Ministry of Finance and the State Administration of market supervision jointly issued the pilot plan for the implementation of the system of “academic certificate + several vocational skill level certificates” in Colleges and universities, According to the plan, “combining academic certificates with vocational skill level certificates and exploring the implementation of the 1 + X certificate system is an important reform and deployment of the 20 items of vocational education, and also a major innovation. Pilot colleges and universities should promote the organic connection between” 1 “and” X “, further play the role of academic certificates, and consolidate the foundation for students’ sustainable development, Actively give play to the advantages of vocational skill level certificate in promoting talent training in Colleges and universities and implementing vocational skill level evaluation, organically integrate the certificate training content into the professional talent training program, and optimize the curriculum and teaching content.

The 1+x certificate system is a basic system for the construction of the national vocational education system. The implementation of the 1+x certificate system will boost the reform of vocational education towards a modular teaching mode of further innovation. The vocational skills training course launched in combination with the real needs of enterprises and the talent training plan of colleges and universities aims to help cultivate digital talents and effectively improve students’ employability and the quality of vocational education.

In the “1+x” certificate, “1” is the foundation, and “X” is the supplement, reinforcement and expansion of “1”. While learning the teaching content of the major (Group), students can understand the vocational skills courses in the fields similar to their major, which can broaden the field of employment and expand employment opportunities. The academic certificate and the vocational skill level certificate are

investment in China. 2013,3(285):30-31.

[7]. Liu Lingshun. Practice and discussion of bilingual teaching in electrical information majors in colleges and universities [J]. China Electric Power Education, 2011 (35):26-29.

[8]. Shen Li. Exploration on the bilingual teaching mode of management courses in higher education--based on the investigation and practice of bilingual teaching in Shanghai University of Technology[J]. Higher Education Research (Chengdu), 2011 (4):77-79.

[9]Lu Heyun. Research on “Immersion”teaching mode in bilingual music classroom [D]. Tianshui Normal University. Master thesis. 2022.6.

[10]. He Yang. Evidence from a Bilingual Emotional Stroop Task [D]. Xihua University. Master thesis. 2014.6.

[11]. Shi Desheng. Research on Bilingual Teaching of Skills Training for Business English Post Group [J]. Vocational technology, 2012,11(147):33-35.

[12]. Zhou Fubao. Mine ventilation and air conditioning [M]. Xuzhou: China University of Mining and Technology Press, 2020.

[13]. Xiong Ying. Research on the team building of professional teachers in bilingual teaching in higher education institutions[J]. China Education Innovation Herald, 2012,30:74-75.

[14]. Zhang Yi, Fan Guiping, Zang Jianling, Song Ming, Wang Yan, Wang Fengzhi. Strengthen the bilingual teaching of international trade majors and improve the practical teaching system for application-oriented talents [J]. Science and technology information. 2012,13:201-201

[15]. Xueqin He. Narrative Research on Professional Development Process of Bilingual Teachers [D]. Northwest Normal University. Master thesis. 2019.6.

not connected and compatible with each other, so the employer can have a clear understanding of the job seeker's competence in completing the job field and tasks, and accurately allocate the job seeker to the right job for the most suitable job.

## 2 “1+x” certificate pilot development status

Since the launch of the “1+x” certificate system pilot project, the Ministry of education has announced four batches of 447 vocational skill level certificates as pilot projects in April and September 2019, January and December 312020. There are 6 pilot vocational skill level certificates in the first batch, including 10 in the second batch, 76 in the third batch and 355 in the fourth batch. There are 22 certificates for specialties including Internet of things application technology, including 9 for system application development and design, 7 for system deployment and operation and maintenance, 3 for system integration applications, 2 for cloud platform applications, and 1 for security. See Table 1 for the name and batch of the corresponding vocational skill level certificate. Each certificate is a focus of IOT professional training. According to the development of professional group, professional group training base is an important teaching place and resource for the construction of professional group. How to build professional group training base under the background of 1 + X certificate is the main problem discussed in this paper.

**Table 1 Statistical table of names and batches of vocational skill level certificates corresponding to IOT application technology specialty group**

| Serial number | Certificate name   | batch | Serial number | Certificate name   | batch |
|---------------|--|-------|---------------|--|-------|
| 1             | Application development of sensor network                  | 2     | 12            | Integration and application of Internet of things smart agriculture system | 4     |
| 2             | Integration and application of IOT smart home system       | 3     | 13            | Application of Internet of things communication technology                 | 4     |
| 3             | Integration and application of Internet of vehicles system | 3     | 14            | Development and design of IOT intelligent terminal                         | 4     |
| 4             | Integrated circuit development and testing                 | 3     | 15            | Application and development of MCU in Internet of things                   | 4     |
| 5             | Big data application development (Java)                    | 3     | 16            | Intelligent Internet of things (aiot) application development              | 4     |
| 6             | Big data analysis and Application                          | 3     | 17            | Internet of things security assessment                                     | 4     |
| 7             | Cloud computing development and operation                  | 3     | 18            | IOT scenario design and development  | 4     |
| 8             | Cloud computing center operation and maintenance services  | 3     | 19            | Implementation and operation and maintenance of Internet of things project | 4     |
| 9             | 5g base station construction and maintenance               | 3     | 20            | Application and development of elevator Internet of things system          | 4     |
| 10            | 5g mobile network operation and maintenance                | 3     | 21            | IOT installation, commissioning, operation and maintenance                 | 4     |
| 11            | Network system construction and operation and maintenance  | 3     | 22            | Application of Internet of things cloud platform                           | 4     |

## 3 Thoughts on the construction of training base

The construction of high-level specialty groups is to meet the practical requirements of improving the ability of specialty construction, such as industrial transformation and upgrading, improving the ability of professional social services, optimizing the allocation of professional teaching resources and optimizing the layout of schools. Due to the different group logic of IOT application technology groups in different higher vocational colleges, the number and name of specialty groups are also different, the positioning of core majors and curriculum system are different, and the construction scale and type of training base of specialty groups are quite different due to the limitation of school construction funds. According to incomplete statistics, at present, most of the IOT training rooms in higher vocational colleges generally do not have corresponding 1+x equipment. There are problems that the equipment and facilities can not be well integrated with the core courses and certificates, and that the training model is disconnected from the actual application technology of enterprises. The specific construction ideas are as follows:

### 3.1 Innovating the “new” path of school enterprise cooperation

With industry enterprises as the support carrier for professional development, we will work with training and evaluation organizations, leading enterprises, etc. to formulate talent training programs, develop high-quality information resources, cultivate innovative teaching teams, and build open and shared training bases. Explore diversified and diversified cooperation, form a mechanism of “co construction, co management, sharing and sharing”, build an integrated platform of production and education integration to meet the needs of “1+x” teaching and training, and jointly build industrial colleges and enterprise studios, laboratories and innovation centers.

### 3.2 Broaden the “new” orientation of social services

The orientation of the training base is to carry out training for students and all members of society. For social members who have obtained a number of vocational skill level certificates, they are supported to exempt part of the courses according to the certificate level and category, and obtain academic certificates according to laws and regulations after completing the required contents. For technical

personnel of industrial enterprises: carry out vocational skill level training in the form of continuing education and training, vocational skill improvement, etc., so that they can obtain vocational skill level certificates and accumulate credits for academic improvement at the same time. For migrant workers, laid-off workers and ex servicemen: on the basis of academic education, flexible vocational skill level training is carried out to improve their knowledge and skills and employment and entrepreneurship skills.

### 3.3 Establish an open and shared off campus training base with the help of technical skills platform

Relying on the win-win mechanism of joint construction and common development of software science and technology parks, industrial parks, industrial associations and IOT enterprises. Establish a long-term stable cooperative relationship with the park to radiate enterprises in the park; Relying on industry associations, establish a sustainable cooperation mechanism, strengthen the construction of 1+x skills certification platform, serve the certification training services of neighboring brother colleges, and build an open and shared off campus training base. Strengthen the learning of the new concept of the 1+x certificate system, accurately grasp the background and significance of the pilot work, the connotation and requirements of the vocational skill level certificate and standard, and lead the professional team to do a good job in the top-level design of the pilot work such as the development of talent training program.

## 4 Construction content of training base

### 4.1 construction of productive teaching environment highly matching the job position

To adapt to the high-speed development and transformation and upgrading of the local economy, with the connotation construction of the training base as the core, build a high-level and professional multi-functional training base integrating practical teaching, real production of enterprises, scientific and technological innovation and social training. Build a high-level industry education integration training base for the Internet of things, artificial intelligence and blockchain. Through the addition, upgrading and transformation of professional basic training rooms, such as circuit, MCU, sensor and other training rooms, the comprehensive functions of the training room can be improved, which can meet the requirements of "1+x" research and realize the six in one training base of production, teaching, research, competition, learning and training. Build a training base close to the production and service scene of modern enterprises, integrate the corporate culture, create a workplace atmosphere, strengthen the cultivation of practical education function and craftsman spirit, realize openness and sharing, and radiate to schools and enterprises in the region. Focus on the construction of demonstration virtual simulation training base. Build a collaborative innovation center for the application of virtual simulation technology.

### 4.2 Radiation of core majors drives the construction of on campus training base of major groups

Based on the provincial IOT application technology training base, the professional group plans as a whole and designs at the top level, and integrates the existing practice teaching environment. According to the corresponding relationship of the industrial chain, the training rooms in each school are improved to realize the integration and systematization of the professional group training environment. Relying on the new generation of information technology such as virtual reality and artificial intelligence, we will promote the new forms of "Internet +" and "intelligence +" education, build a demonstrative virtual simulation training base for vocational education, and increase investment in the construction of training environment. In order to give full play to the role of existing training equipment and facilities, improve the utilization rate, strengthen the management efficiency, break the limitations of the existing training environment, and enable students to participate in training anytime and anywhere.

### 4.3 construction of off campus practice base

It is an off campus practice teaching base for enterprises that cooperate closely with industry enterprises in surrounding regions, give full play to the resource advantages of industry enterprises, and implement in-depth cooperation. Based on the new requirements of the national digital economy era and the digital and intelligent transformation and upgrading of the manufacturing industry, cooperate with the government, schools, banks and enterprises to build technical skills innovation service platforms such as research institutes and technology collaborative innovation centers to serve small, medium and micro enterprises. Complete the informatization management of the training base. With the help of the advantages of modern information technology and network technology, combined with the "Internet +" development trend of the school, the network management mode of the basic information of the training room, the use of training teaching, project construction and training consumables is implemented, and the training intelligent IOT control system, the training teaching site management system and the training room project construction performance evaluation management system are built. Build hardware systems such as teaching facilities and equipment, access control, etc. required to support the information management of the training room, integrate the existing scattered management systems, open up data islands, and form an information management platform that integrates the functions of output and input performance evaluation, training consumables management, and open sharing.

### 4.4 Construction of technical skills platform

We will actively build an innovative school enterprise collaborative education mechanism, and build a collaborative innovation center, a collaborative education center, a technology application center, and an Engineering Center for higher vocational education. Based on the provincial IOT application technology training base, integrate the existing practice teaching environment, improve and improve the on campus training room according to the corresponding relationship of the industrial chain, and realize the integration and systematization of the professional group training environment; Increase investment in the construction of training environment, build a new 1+x training room, develop and build a simulation virtual training platform for the Internet of things professional group, break the space-time limitations of the existing training environment, and enable students to participate in training anytime and anywhere; Strengthen in-depth cooperation with key enterprises and large enterprises in the IOT industry chain, and expand the number and scale of off campus training bases.

## 5 Epilogue

The construction of the training base takes into account the needs of different majors and the integration of 1+x certificates under the background that one major corresponds to the vocational skill requirements of multiple 1+x certificates, and multiple majors build high-level professional groups. At the same time, it realizes the functions of daily practice teaching, simulating the real production environment of enterprises, scientific and technological innovation and social training. Taking the high-level specialty group of IOT application technology in Foshan Polytechnic as the implementation specialty, this paper puts forward suggestions and methods for the transformation of the existing professional basic training room, the construction of 1 + X certificate platform, the integration of production and education, and the construction of virtual simulation center. Taking part in vocational skills training and certification while students complete typical tasks in key work areas of vocational posts can broaden the employment field of graduates and expand employment opportunities.

## References

- [1] Ping Li,Jianjun Cai,Fahu Liu Analysis on the path of 1 + X system reform of IOT application technology specialty group towards convergence [j] Vocational and technical education in China.2020, (26)
- [2] Wanping Zhu. Research on the curriculum system development of rail transit specialty under the 1 + X certificate system -- a case study of urban rail transit operation management specialty [j]Journal of Southern vocational education, 2020,10 (04): 32-38
- [3] Dawei Gui, Congratulations on the national flagResearch and practice of school enterprise deep integration information technology talent training mode based on "1 + X" certificate [j]Modern vocational education, 2020 (39): 27-29
- [4] Yizhi Tang. 1 + X certificate system: Innovation in the design of vocational education system in the new era [j]China Vocational and technical education, 2019 (16): 5-11
- [5] Songyue Yuan The practical teaching reform approach of IOT application technology specialty based on project [j]Science and education guide - Electronic Version (early).2020, (11)
- [6] Rui Yang,Zhexu Li,Xin Bi. Discussion on the 1 + X certificate system and practical case analysis of Applied Undergraduate Colleges [j]Modern distance education of traditional Chinese medicine in China, 2021,19 (10): 190-191
- [7] Yinping Li "Three education" reform in Higher Vocational Colleges Based on "1 + X" certificate system [j]Sports Illustrated.2021, (9)
- [8] Rui Yang,Zhexu Li,Xin Bi. Discussion on the 1 + X certificate system and practical case analysis of Application-oriented Undergraduate Universities [j]Modern distance education of traditional Chinese medicine in China, 2021,19 (10): 190-191
- [9] Honglei Wang Research on talent training mode and curriculum construction of "1 + X" certificate under the background of integration of industry and Education -- Taking IOT application technology specialty as an example [j]Journal of Hebei Software Vocational and technical college.2020, (4)
- [10] Shoubing Li Reflections on the pilot work of 1 + X certificate system in Higher Vocational Colleges [j]China Vocational and technical education, 2019 (10): 25-28
- [11] Jinying Su Research on teaching practice of course certificate integration of NC Technology Specialty in Higher Vocational Colleges under the "1 + X" certificate system [j]Teaching research, 2021,44 (01): 66-72
- [12] Fuchun Guo Analysis of the practical significance of high-level specialty group in the construction of high-level Higher Vocational Colleges [j]China Vocational and technical education, 2019 (05): 20-23
- [13] Hongwang Yuan,Buqing Ping,Jinping Li. Construction and implementation of extended curriculum system for elderly care under the 1 + X certificate system [j]Journal of Yangzhou Vocational University, 2021,25 (02): 59-62
- [14] Shixi Zou Research on IOT technology talent training mode based on "1 + X" certificate [j]Wireless Internet technology.2020, (21)
- [15] Xiumei Sui,Shanshan Wang,Guoqing Li Research on the construction of high-level professional intelligent manufacturing production education integration training base [j]Industrial technology and vocational education, 2022,20 (02): 61-64

### [fund project]

1. Construction of high level specialty group in Guangdong Higher Vocational Colleges - IOT application technology specialty group (gspzyq2021043)