

The reform of the training mode of building intelligent engineering technology professionals based on the Internet of Things smart home 1+ X certificate

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Abstract. As the third batch of "1+X" certificate pilots, the integration and application of the Internet of Things smart home system is of great significance to the reform of talent training programs for building intelligent engineering technology majors in higher vocational colleges. Integrate the standard of "educational certificate + vocational skill certificate" into the training plan for building intelligent engineering technology professionals, and reform the teaching of "project penetration and module progression" by reconstructing the "platform foundation + course certificate integration" curriculum Methods and methods such as building a "trinity" functional teaching team, to achieve the integration of courses and certificates , and to cultivate compound talents majoring in building intelligent engineering technology.

1. Implementation of the pilot project of building intelligent engineering technology based on the "1+X" certificate of IOT smart home.

The Internet of Things technology has changed the basic structure of the existing building intelligence technology and related products, optimized the "5A" in building intelligence, and maximized the integration of building intelligence systems^[1]. IoT smart home is an important development direction of building intelligent technology, including smart security, smart home, and smart network applications. The Internet of Things smart home system is mainly for the following occupations: including the installation and commissioning of general equipment such as the Internet of Things, smart home, smart elderly care, and smart communities, pre-sales technical support, after-sales technical services, Internet of Things system integration and application, Internet of Things Hardware product development, IoT software system development, artificial intelligence technology application and development, etc.

On the other hand, the challenges brought by vocational skill certificates in various fields to the construction of various majors are not only challenged by the 1+X certificate system, but also have their own individuality due to different evaluation organizations and mechanisms. So far, four batches of "1+X" certificate pilots have been released, corresponding to the professional groups of the "Higher Vocational Education (College) Professional Catalog and Professional Introduction (as of 2019)" in Ordinary Colleges and

Universities, applicable to the construction equipment professional group 1+X certificate pilot shown in Table 1.

Table 1. 1+X Certificate Pilot Statistical Table Applicable to Construction Equipment Professional Group.

serial number	certificate name	batch	Applicable professional group
1	IoT smart home system integration and application	third batch	Construction equipment, communication, electronic information
2	Security system construction and operation and maintenance	fourth batch	Construction Equipment
3	Smart security system implementation and operation and maintenance	fourth batch	Construction Equipment
4	Smart community integration and operation and maintenance	fourth batch	Construction Equipment

4 1+X certificates applicable to the construction equipment professional group , while the building intelligent engineering technology belongs to the construction equipment professional group, integrating technologies such as building intelligent engineering, security, communication and integrated wiring engineering, etc. It is an interdisciplinary applied technology major. Therefore, for building intelligent engineering technology majors, the IoT smart home "1+X" certificate is the most suitable "1+X" certificate

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pilot among the first four batches , which can better integrate the Internet of Things into smart buildings.

2. Under the implementation of the "1+X" certificate of IoT smart home, the training mode of building intelligent engineering technology professionals faces new challenges.

At present, the construction equipment majors of most vocational colleges mainly include building intelligent engineering technology, building electrical engineering technology, building equipment engineering technology, heating ventilation and air conditioning engineering technology, etc., while building intelligent engineering technology is biased towards weak current. The professional talent training mode adopts the combination of work and learning talent training mode based on professional post ability. The "1 + X" certificate system brings many new challenges to the training mode of building intelligent engineering technology professionals.

2.1 Certificates are not yet integrated into the current curriculum.

At present, the building intelligent engineering technology major sets up a curriculum system according to the professional direction, which is divided into security, fire protection, building control, integrated wiring and other directions. The course system and practical teaching of each direction are independent of each other. The Internet of Things smart home system belongs to a new professional development direction of building intelligent engineering technology, but there are no relevant courses and content in the curriculum to support the needs of the IoT smart home system integration and application vocational skill level certificate assessment.

2.2 Teaching method challenges.

The traditional teaching method emphasizes the basic literacy training of building intelligent engineering, and pays attention to the platform ability training for multiple technical directions; but now the vocational ability education emphasizes the integration of certificate requirements and traditional classroom teaching. The Internet of Things smart home is an interdisciplinary subject of the Internet of Things and architecture, so it is necessary to seek interdisciplinary teaching methods to integrate, integrate and reset existing resources to form more suitable resources.

2.3 The teaching team needs to be restructured. The traditional teaching team is built on the core courses of majors.

Under the implementation of 1 + X certificates, the teaching team needs to be built on the basis of professional fields. Whether the traditional double-

qualified teachers carry out teaching around the requirements of vocational skill level certificates is One of the tasks to test the pilot school.

As one of the pilot colleges, Guangdong Institute of Mechanical and Electrical Technology combines the major of building intelligent engineering technology with the major of Internet of Things and telecommunications, and cooperates with well-known enterprises in the industry to carry out the pilot work of the integration of IoT smart home system and the application of professional technical grade certificate .

In recent years , in the training program for building intelligent engineering technology professionals, the course system is connected with the certificate, and the course content is connected with the professional standard of the certificate, covering the design of smart home system solutions, the installation, commissioning, integration and troubleshooting of cloud devices, and The whole process of cloud platform Web terminal , APP terminal and cloud platform service development and application.

3. The reform strategy of the training mode of building intelligent engineering technology professionals under the implementation of the "1+X" certificate.

3.1 System of "platform foundation + integration of courses and certificates"

The X certificate refers to a collection of multiple vocational skill certificates suitable for the development of the profession, covering the teaching objectives and requirements of various branches in the professional teaching standards^[2]. Below, we will take the 1+X certificate for the integration and application of IoT smart home systems as an example. Based on the talent cultivation plan for the building intelligence engineering technology major in vocational colleges, we will conduct research, comparison, analysis, and sorting of the platform foundation courses and professional courses in the talent cultivation plan. Based on professional skills, according to the national teaching standards for building intelligence engineering majors and the IoT smart home system integration and application 1+X professional skill level standards, we will embed, compare, analyze, and sort the platform foundation courses and professional courses in the talent cultivation plan Strategies such as supplementing and strengthening will integrate the training programs of enterprises into the talent cultivation programs of universities, achieving the integration of course certification in the curriculum system. Its purpose is: firstly, to strengthen professional knowledge and skills in smart home by comparing the needs of the smart city industry; Secondly, supplement new methods, technologies, techniques, and norms for the development of the smart city industry; Thirdly, expand professional fields, professionalism, and skills, and cultivate versatile talents in the field of intelligent building engineering technology..

As shown in Figure 1, for the IoT smart home system integration and application level certificate vocational skill level certificate, the higher vocational building intelligent engineering technology major can add basic platform courses such as "Computer Control Fundamentals", and add the learning content of the Internet of Things development board to the course, Let students have a systematic understanding of the functional principle and development process of the IoT development board. Secondly, promote the integration of lectures and certificates in professional courses^[3]. For example, for the vocational skill level certificate for the system integration and application level certificate of the Internet of Things smart home system, the "Integration and Application of the Internet of Things Smart Home System" and "Comprehensive Practice for the Integration and Application of the Internet of Things Smart Home System "Training" is an X certificate course to promote the integration of courses and certificates.

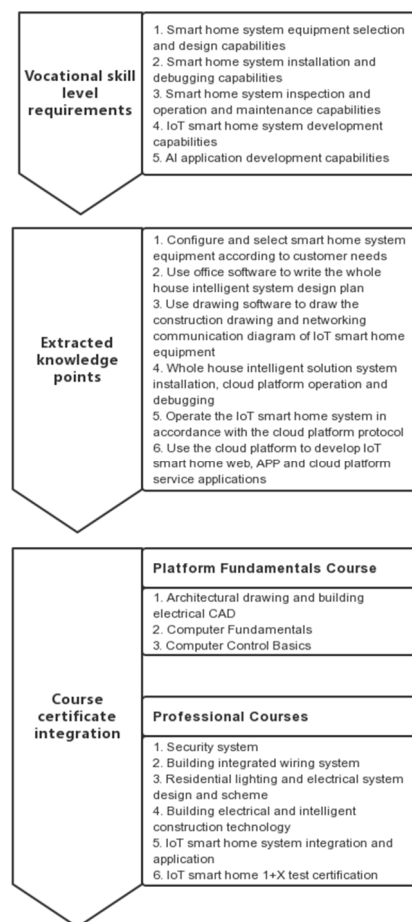


Fig. 1. Integration Plan for the "Internet of Things Smart Home 1+X Certificate" Course Certificate in Building Intelligence Engineering Technology Major.

3.2 Reform the teaching method of "project penetration, module progression".

Taking the course "Internet of Things Smart Home 1+X Examination and Training" as an example, the teaching

of skill certificate takes the intermediate standard of Internet of Things smart home system integration and application of vocational skills as the course design idea, integrates theory and practical operation points into the teaching content, and is divided into four teaching modules of Internet of Things smart home system selection and design, installation and commissioning, detection and operation and maintenance, and system development, and establishes modular practical courses^[4] to improve students' vocational skills in IoT smart home systems. As shown in Figure 2:

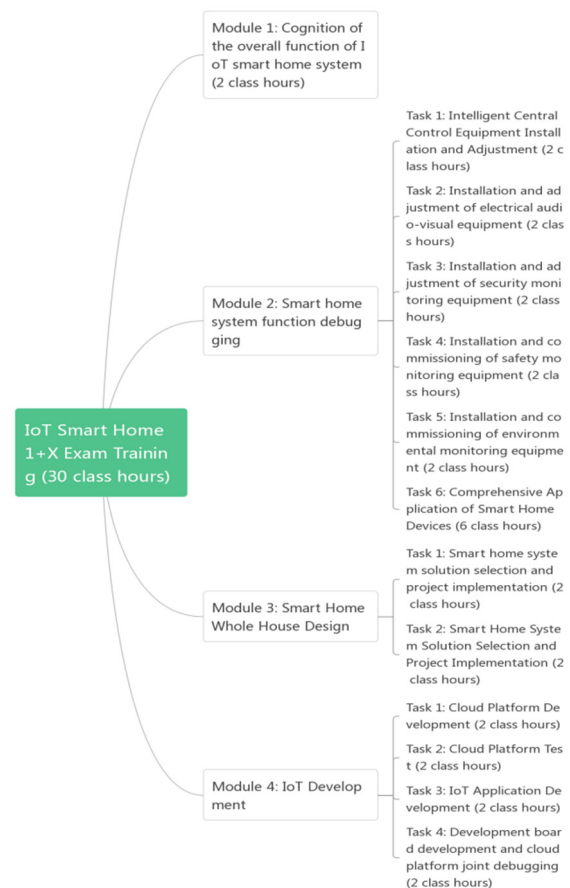


Fig. 2. The course design idea of "Internet of Things Smart Home 1+X Examination and Training"

In the teaching implementation aimed at job requirements and work tasks, the original "theory + practice" course form is changed, task-driven as the lead, and in the process of course implementation, pay attention to the cultivation of professional norms and professional qualities, and reasonably organize the teaching implementation. The course is guided by the X certificate and takes the project as the core, and will be divided into the knowledge, skills training part, professional norms and professional quality, and ideological and political integration part. As shown in Figure 2, take "Task 6: Comprehensive Application of Smart Home Devices" in "Module 2: Smart Home System Function Debugging" as an example to implement teaching and learning based on the work process. In terms of topic selection, the task of

"implementing the home care scene and empowering smart home 'suitable for aging'" reflects the traditional virtues of the Chinese nation of "caring for the elderly" under the epidemic prevention and control, and integrates ideology and politics into the whole process of the classroom. According to the needs and tasks of teachers released by teachers, analyze the relevant knowledge to be mastered; Guide students to analyze and complete the steps, develop a preliminary smart home plan according to the needs and tasks, and start a discussion; In the third step, after the teacher's evaluation, students grasp the key points, skills and key post-revision plan; The fourth step is to conduct on-site debugging to verify the feasibility of the scheme; The fifth step is to carry out inspection and review and summarize the application.

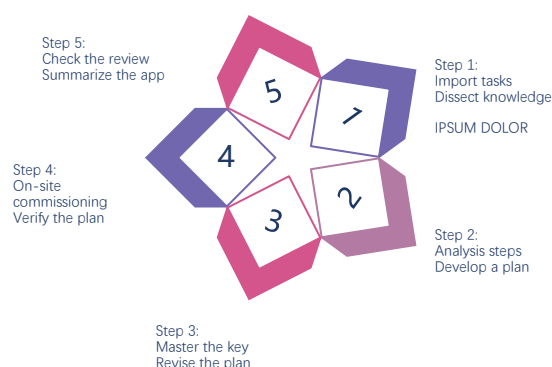


Fig. 3. Pedagogical implementation based on the work process

3.3 Build a "Trinity" functional teaching team

Because the traditional teacher's work is based on the course, many teachers identify themselves with some course teachers more than teachers of a certain profession. Under the "1+X" certificate system, teachers will form a team to form a functional teaching team that integrates theoretical teaching, practical teaching, and corporate practice according to the requirements of professional skill level standards^[5]. The professional core course teaching team for building intelligent engineering technology major mainly includes the teaching team for the design, cost, construction and maintenance of building intelligent subsystems such as building security system, building fire protection system, residential lighting system, building system control technology, and integrated wiring system; skill certificate teaching The team includes computer control and smart home system teaching teams; according to the needs of professional talents and the pilot promotion of professional vocational skills certificates, the teaching team of professional core courses and vocational skills certificates will be flexibly added.

The IoT smart home 1+X certificate reflects the new technologies, new processes and new specifications of the building intelligent industry in the direction of smart home. This requires higher vocational teachers under the "1+X" certificate system to have solid theoretical knowledge and various professional operational skills. Therefore, the teaching team needs to be multi-level,

including the integration of full-time teachers in the school and teachers from enterprises outside the school, and industry experts, and at the same time form a gradient in age, title, major, and ability to meet the needs of students at all levels and diversified values.

4. Conclusions

Under the 1+X system, the major of building intelligent engineering technology carries out professional reform from the three dimensions of curriculum system, teaching method and teaching team, and jointly promotes X certificate and academic certificate, making it a new model with the characteristics of vocational education in China.

Acknowledgment

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