ISSN: 2710-0588

Curriculum System Construction of Internet of Things Major in Higher Vocational Education under the Background of "1+X" Certification

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Abstract

With the progress of society and the rapid development of economy, the application of Internet of Things technology has attracted more and more attention. However, the students of the Internet of Things major in higher vocational colleges have weak learning foundation, unreasonable curriculum structure and lack of practical teaching, which have a negative impact on the output of talents. Through the research on the "1+x" certification curriculum system corresponding to the IoT technology major, this paper introduces the background, curriculum system and new ideas for the construction of the "1+X" certification curriculum system for the IoT technology major in higher vocational colleges, which is the joint construction of the "1+X" certification curriculum system by schools and enterprises, so as to put the theoretical curriculum project into practice and optimize the curriculum connection. The training mode of combining documentary evidence shall be adopted to enable students to learn by doing, learn by doing, and comprehensively improve their professional level and practical ability.

Keywords

Internet of Things Application Technology; 1+X; Course System Construction.

1. Introduction

Nowadays, the social economy is developing rapidly. As one of the national strategic emerging industry development planning fields and the advanced layout fields of emerging industries, the IoT professional technology should accelerate the construction of the "1+X" higher vocational IoT application technology professional curriculum system, and cultivate more computing talents. As a new interdisciplinary discipline, the IoT application technology major is widely involved in IoT, cloud computing, big data, artificial intelligence and other fields. In the next few years, the demand of enterprises for IoT technology professionals will be a big gap, due to the imperfect curriculum of IoT technology in domestic universities and colleges, unreasonable talent structure and other factors. In order to reverse this situation, the teaching mode of "academic certification+vocational skill grade certification" is gradually accepted and recognized by schools and enterprises, comprehensively promoting the reform of the curriculum system, teaching materials and teaching methods of the Internet of Things technology specialty, and implementing the construction of the "1+X" certification curriculum system, focusing on students, to comprehensively improve the quality of vocational education and students' employability.

ISSN: 2710-0588

2. Background of "1+X" Certification Curriculum System Construction for Internet of Things Technology Major in Higher Vocational Colleges

1) At present, the occupational orientation of the IoT technology major in higher vocational colleges is vague, and the basic professional knowledge is weak. Today, with the rapid economic development, all walks of life in China have been developing rapidly. The demand for IoT technology professionals has increased dramatically, and the market demand for talent is particularly biased towards intelligent talents. Because the courses of IoT technology include electronic information, computer network, artificial intelligence and other disciplines. The Internet of Things technology covers the central technology of the entire industrial chain in China, involving many posts and functions. For the professional courses of Internet of Things technology in higher vocational colleges in China, there is no clear positioning for the training objectives of technical personnel, nor can it highlight the professional characteristics. At present, the basic knowledge of the biological networking technology specialty in higher vocational colleges is weak, and the students' interest in independent learning is insufficient, leading to the students' lack of enthusiasm for learning. How to solve the seamless connection between higher vocational colleges and enterprise posts, and cultivate social and application oriented professionals, has put forward higher requirements for the construction of the "1+X" certification curriculum system [1].

2) The training scheme for IoT technology professionals in higher vocational colleges is inflexible, and it is difficult to stimulate students' interests. In order to solve the employment problem of IoT technology professionals in higher vocational colleges, higher vocational colleges have formulated corresponding curriculum system based on the enterprise's post and social needs, and little consideration has been given to students' interests and employment intentions. In higher vocational colleges, students majoring in Internet of Things technology have weak basic professional knowledge and learning enthusiasm, which cannot meet the interests of each student. Therefore, the talent training method formulated in this way lacks flexibility. If students' personality is also taken into account in the curriculum system, it can not only improve students' learning interest, but also help a large number of talents to export to the society, because "interest is the best teacher for students", This requires students to develop relevant certifications corresponding to their posts according to their interests, so that they can find jobs that they are interested in after graduation.

3) At present, the course structure of the IoT technology major in higher vocational colleges cannot meet the needs of social enterprises. As a new major of technological innovation in the next few years, the course structure of some colleges has many deficiencies in today's rapid economic development. It is mainly shown as follows: teaching is mainly based on theory, with a wide range of subjects, a large span of subjects, and a lack of effective connection between subjects, which cannot systematically impart professional knowledge to students. For example, the curriculum learned in the first grade cannot lay the foundation for learning the curriculum knowledge of the second and third grades. The knowledge learned is relatively scattered, which makes students lack flexibility in learning. In the process of students' learning, there is a lack of practical operation and the corresponding project research cannot be carried out in time. Unable to better improve learning interest and focus students' attention on learning, resulting in unsatisfactory teaching quality, so the curriculum system needs to be optimized urgently. The Internet of Things is a comprehensive discipline covering multiple technologies. This requires that the students of the Internet of Things technology major should have the basic professional quality of electronics, communications, computer networks and other majors at the same time, which puts forward higher requirements for the training of Internet of Things technology professionals. The professional knowledge of the Internet of Things technology is updated quickly and has the characteristics of the times. The logical thinking requirements are

ISSN: 2710-0588

very strict. This requires that the knowledge teachers impart to students should be the latest and real-time professional knowledge. However, at present, most of the teaching materials of the Internet of Things major in vocational colleges can not follow up the actual needs in a timely manner, the teaching of various courses is not connected, and the teaching content of related courses is not unified, which leads to the lack of systematic learning of professional knowledge for students, and it is difficult to find suitable jobs after graduation [2].

4) The content of the practical teaching link can not support the improvement of technology required by the enterprise post. The direct goal of talent training in higher vocational colleges is to cultivate skilled front-line craftsmen. In today's rapid economic development, especially the Internet of Things application technology specialty is particularly important, requiring its specialty to emphasize students' practical ability. In the course system design of the Internet of Things technology major in most higher vocational colleges in China, in order to let students summarize the technical knowledge they have learned in practice, relevant practical teaching courses have been set up, and their courses occupy a relatively long class hour in the entire teaching process. However, in this process, the content of practical courses is too simple, which is out of touch with the actual engineering projects and cannot provide technical support for future practical work. If the course teaching system is not constructed according to the actual project, the professional quality and skills of students cannot meet the requirements of the enterprise. These require that the Internet of Things technology major in higher vocational colleges build a corresponding "1+X" certification curriculum system to meet the needs of the community for talents.

3. Course System of IoT Technology under the "1+X" Certification System

The application technology of the Internet of Things is a new profession. With the rapid development of social economy, the application field of the Internet of Things technology has gradually expanded. 5G technology, low power consumption, blockchain technology and edge computing technology, these emerging technologies are deeply integrated with the Internet of Things technology. The Internet of Things technology has broadened the development field, and its industry has undergone tremendous changes. In this development process, the core knowledge of various disciplines has been integrated, which requires the cultivation of interdisciplinary and complex technical talents [3]. As a vocational college focusing on the Internet of Things project, it should make full use of the training platform constructed by "universities+enterprises", break the traditional curriculum system and build a new integrated curriculum teaching system of "1" and "X" for the Internet of Things application technology specialty according to the orientation of running a school and the actual characteristics of students. The course system is divided into stages, and the new specifications and requirements of enterprises for technical requirements are integrated into the construction of the course system of the Internet of Things technology specialty. Each stage corresponds to the corresponding vocational skill grade certification. The grade standard should conform to the content of the "X" element. Students can choose the technology they are interested in according to their hobbies, and can plan their future employment direction from the beginning of enrollment. Higher vocational colleges of the Internet of Things technology specialty should combine with vocational education institutions to enhance students' practical ability in practical projects, summarize learning knowledge from practice, improve the quality of learning the Internet of Things technology specialty, and enhance the core competitiveness of talent employment [4].

1) Phased teaching of courses of Internet of Things technology

Public courses such as Ideological and Moral Cultivation and Fundamentals of Law, College English, Advanced Mathematics and Fundamentals of Computer in the courses of Internet of

ISSN: 2710-0588

Things Technology in higher vocational colleges complete the knowledge required for the major in the first to second semesters. Basic courses such as Circuit Basis, Computer Network, C Language Programming, Java Language Programming, and Introduction to Internet of Things Technology need to be completed in the second to third semesters. The courses such as Wireless Sensor Network Technology, Embedded Technology and RFID Technology are set as the contents of the fourth to sixth semesters. Students are required to carefully study the essence of knowledge in various subjects, and obtain the corresponding "1+X" certification according to their personal interests, so as to provide technical capital for future work.

2) Hierarchical construction of curriculum system for IoT technology specialty

According to the relevant requirements of the "1+X" certification system, the layered concept of the courses of the Internet of Things technology specialty was constructed. In combination with the certification requirements of professional skills, the core curriculum system of the major includes the contents of the primary and intermediate examination courses, and the professional development courses include the contents of the advanced certification courses.

3) The construction of the course system of the Internet of Things major should meet the requirements of the enterprise unit's tasks and the assessment criteria of the "1+X" professional qualification certification.

First of all, the Internet of Things technology major in higher vocational colleges should use relevant course knowledge to build a common platform for general education and core courses, so that students can learn at any time and anywhere. Secondly, develop professional courses according to the needs of the industrial chain. The curriculum teaching innovation team uses the existing curriculum materials, curriculum teaching methods, enterprise project cases and various teaching resources to support the overall platform of each curriculum module and professional core curriculum. Professional technology, industry integration and education, school enterprise cooperation, new industry standards and other elements are integrated into the curriculum system.

3.1. Select Teaching Content, Plan Courses and Construct Professional Courses

One of the effective ways for IoT specialty to connect with the industrial chain is "integration of industry and education, school enterprise cooperation". In this process, combining the rules of students' learning and the rules of professional skills growth, we analyze and classify the work tasks of enterprise posts, refine the professional skills mainly used in work, determine the corresponding courses of Internet of Things technology, and require students to be proficient in the software and hardware facilities corresponding to the courses, so as to improve the professional quality of students.

3.2. Combination of Teaching and Practice

Based on the certification standard of the Internet of Things industry, the course content of the Internet of Things technology specialty introduces typical enterprise practice cases and knowledge of skill competitions to achieve the unification of the course teaching standard and the certification standard of enterprises, which is conducive to improving the employment of students.

3.3. Integration of Production and education and Social Services

The IoT technology specialty should cooperate with enterprise units. The construction of professional courses should serve the needs of the industry. The teaching content of the courses should be consistent with the professional standards. The content of the courses learned should be consistent with the technical knowledge involved in the enterprise positions. The graduation certification should be consistent with the professional qualification certification. We will integrate curriculum planning, curriculum standards, faculty building, student internship

ISSN: 2710-0588

environment, curriculum knowledge updating and other fields with enterprises closely, and carry out various cooperative education work in an orderly manner to serve the society.

4. The School and the Enterprise Jointly Build a "1+X" Certification Curriculum System

Colleges and universities should jointly establish a curriculum system applied to post requirements with enterprises, and design a program to train students according to the standards of enterprise post employment, so as to achieve the coordinated training of talents between schools and enterprises. Integrate the core technical knowledge required by the enterprise's post into the classroom, guide students to learn professional skills under the "1+X" certification system, promote students' personalized development, incorporate the key points of competition practice technology into the course teaching content, and improve students' interest in learning professional knowledge and their sense of competition among classmates. In the process of designing the classroom system, the IoT technology specialty in colleges and universities adopts the mode of "case" - "task driven" - "work engineering centered", in order to better improve the effectiveness of engineering application ability. According to the needs of enterprises for talents, adjust the methods of talent training in real time. For example, the talent training program jointly created by the IoT technology major, China Telecom, Huawei and the University of Science and Technology. NB-IOT Internet of Things application technology, Internet of Things security technology, UAV technology and application, cloud computing technology, artificial intelligence application testing and other related technologies are the core technologies of enterprises. They are gradually incorporated into the subject system of Internet of Things technology, and the economic transformation process module and innovation and entrepreneurship process module are added. More module courses are provided for students to stimulate their personalized development. The transformation of competition knowledge content is the core content of the competition curriculum module, which aims to improve students' competition awareness and learning. According to their own interests and hobbies, they obtained the "1+X" professional qualification certification to meet the needs of enterprises for innovative talents. Innovation and entrepreneurship courses focus on teaching students in accordance with their aptitude.

4.1. The Multi-dimensional Integration and Construction of "1+X" Curriculum Changes the Time and Place of Students' Learning Through Multi-dimensional Integrated Digital Curriculum and Teaching.

(1) The combination of online and offline courses of IoT technology specialty, that is, the combination of relevant (courses, discussions, experimental practices, virtual simulation, etc.) courses and (micro courses, MOOC, SPOC, cloud courses, etc.) courses. (2) Traditional high-quality curriculum resources, digital textbooks and mobile teaching resources complement each other. (3) The construction of the subject system of the Internet of Things technology specialty is shown in the curriculum forms of basic theoretical knowledge courses, technical skills courses, project courses, innovation and entrepreneurship courses, individualized teaching, practice, "X" certification, graduation design, etc. (4) Various forms of active extracurricular learning. Taking the actual work situation of the enterprise post as the learning task, in order to improve students' enthusiasm for learning, in the actual position of the enterprise, let students really practice and impart students' professional technical knowledge, and cultivate students' ability to think and judge when encountering problems and solve problems by asking questions. In the teaching process, from simple to complex, gradually improve students' mastery of technical knowledge, improve students' professional quality and ability, broaden students' innovation fields, and obtain the corresponding X certification qualification certification of enterprises to serve the society.

ISSN: 2710-0588

4.2. Innovation and Entrepreneurship Curriculum and Course Competition Integration to Construct the "1+X" Certification Curriculum System

In the construction of the "1+X" certification curriculum system, relevant examples of technological innovation and entrepreneurship are gradually introduced. The construction of the curriculum system is divided into two places: classroom and extracurricular.

1) Classroom implementation: The main courses are related to cloud computing technology, robotics, EDA tool software, IT entrepreneurship practice and other innovative courses. In the future, it will be able to cultivate students' innovation ability in new technologies, robots and artificial intelligence, obtain the "1+X" professional qualification certification, and obtain more employment opportunities in large enterprises.

2) Extracurricular implementation: For projects such as student research courses, student innovation training, and college students' entrepreneurship incubation base, students are the core of the whole project and plan setting. The whole process is to stimulate students' creative thinking and interest, obtain more opportunities for "X" certifications, and help students dream of entrepreneurship.

Talent cultivation must be market-oriented. Competition is the best test of students' skills and market competitive advantages. Teachers should infiltrate and integrate the contents of competitions and professional courses, and implement project management in the training process to achieve the goal of "competition promotes learning, competition promotes teaching, and competition promotes adaptation". Innovation and entrepreneurship process, multi-level digital education resources and skills competition, effectively improve the training quality of compound technical talents [5].

5. Implementation Results of Practical Teaching System

Through the investigation, we further clarified the talent demand of the enterprise, incorporated the post vocational ability training into the practice curriculum system, changed the traditional full office irrigation mode, and combined with the practice teaching platform to improve the teaching quality. Driven by practical projects, professional teachers pay more attention to the improvement of professional skills and knowledge in the teaching process to complete practical courses with high quality. Through the "X" qualification education and evaluation function, the students' enthusiasm for learning and teaching effect have been greatly changed and more talents have been exported to the society.

6. Conclusion

The ability to output more technical talents for social enterprises depends on whether they can build a suitable society. Through the positioning of enterprise post training objectives and updating the supporting course system, the course teaching should not only connect with the needs of enterprise posts, closely follow the technological trend, stimulate students' personalized development, improve their interest in learning, lay a solid theoretical foundation for students' employment, cultivate more complex talents for the society, and serve the society.

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