

Thinking and Analysis on the Construction of Open Curriculum System from the Perspective of Connectivism Learning Theory——Take the Internet of things Engineering major in Ningxia Institute of Technology as an Example

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Abstract: This article analyzes the construction of an open curriculum system based on the perspective of Connectivism learning theory. From the perspective of online and offline connectivity, an open curriculum system model is designed to further refine the offline open curriculum system framework of the Internet of Things engineering major. At the same time, a scientific analysis will be conducted from the connection of two dimensions of time development and spatial architecture.

Keywords: Connectivism; Open Curriculum; Space Construction

Ningxia Institute of Science and Technology has always adhered to the school motto of "Seek for essence, strive for excellence." in the sense of a responsible community. All faculty and staff participated in the revision and formulation of the talent training program. The open curriculum system is a very important link in the talent training program that links the same level of university talent training in different provinces. The perfection and innovation of the talent training program all reflect the teaching essence of all staff of the Ningxia Institute of Science and Technology. Taking the open course system of the Internet of Things engineering major as an example to carry out construction and exploration.

1. Currentsituation analysis

1.1 The starting point of the open course module of the Internet of Things Engineering

With the vigorous development of the Internet of Things engineering major, the Internet of Things engineering major of Ningxia University of Science and Technology has realized the open elective courses for students of the whole school. Based on the Ningxia Institute of Technology, the School of Electrical and Information Engineering proposes the cultivation of 5A talents. Each professional graduate has a cross-fusion background, that is, professional background and common knowledge of other open professional new technologies. At the same time, considering the needs of innovative and entrepreneurial talents to enhance the comprehensive competitiveness of student employment, we set up an open curriculum module for the Internet of Things engineering major.

1.2 Analysis of open course modules of the Internet of things engineering major

Under the principle opinion of the school's talent training program, since the 2017 and 2018 open course module courses of the

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Internet of Things engineering major are the same. In the development of the credit system talent training program in 2019, the Internet of things engineering major course module has 6 courses, 4 of which are relatively professional courses "Circuit and Electronic Technology", "Network Management", "Sensor Technology and Application" and "Embedded System" replaced "Introduction to the Internet of Things Engineering", "Computer Network", "Application of Internet of Things Perception Technology" and "Artificial Intelligence and Information Society", reserved two courses "Application Software Design" and "Internet of Things Data Communication". The iterative update of the courses in the open curriculum module is firstly the gradient leap of the leading teachers of the IoT engineering major responsible for the revision of schools and colleges. Secondly, specific measures of the cross-discipline of collaborative education have been established for individual students who have chosen the Internet of Things engineering major.

1.3 The situation of students choosing an open course in Internet of things engineering

The 2017 elective open Internet of things engineering major include electrical engineering and automation, automation, electronic information engineering, mechanical engineering and automation, energy and power engineering, industrial design, safety engineering, applied chemistry, pharmaceutical engineering, computer science and technology, engineering, data science, digital media technology, e-commerce, and international trade with a total of 324 people in 15 majors

The 2018 elective open Internet of things engineering majors include 315 people in nearly 9 majors in electrical engineering and automation, automation, electronic information engineering, industrial design, mechanical engineering and automation, computer majors, e-commerce, pharmaceutical engineering, and applied chemistry.

The 2019 elective open Internet of things engineering majors include computer science, electrical engineering and automation, engineering management, applied chemistry, resource recycling science and engineering, mechanical engineering, automotive service engineering, transportation, energy and power engineering, business administration, material molding and control engineering with 267 people in 11 majors.

Through the data information analysis of the students who have taken the open IoT engineering major in the past three years, the student size has stabilized at about 300. From the perspective of connected learning theory, the open curriculum module is continuously analyzed to improve the student's learning data. The number of elective students in 2017 and 2018 is relatively concentrated in a few majors, while the number of students in 2019 is relatively broad. One of the reasons is the choice of students' subjective changes, and the other is the update of the open curriculum module.

2. Connectivism learning theory

Connectivism learning theory is called the learning theory of the digital age. The core point of view is systematically elaborated from the article "Connectivism: A Learning Theory for the Digital Age"^[1] can be attributed to the learning concept^[2], knowledge concept, teacher concept, student view^[3].

3. Ideas for building an open curriculum system

The open course system of the Internet of Things Engineering major is for students of different majors throughout the school. The professional background of the students involves the liberal arts, science and engineering majors. This requires us to gradually build the online course module online and offline courses. The construction of the open curriculum system is based on the professional subject background of the elective courses and combined with the scientific compression and integration of teaching resources. Our open curriculum system construction follows three basic principles of professional integration, laterality of disciplines and scientific popularization of knowledge.

3.1 Online construction of an open curriculum system

The online construction of an open curriculum system is a long and arduous process. Teachers must first accumulate open digital resources. Secondly, they need to discuss the online transmission of digital resources with their counterparts in education technology. Finally, they must be evaluated by the effect of digital education. Our national quality online open courses provide a reliable guarantee for the reference of digital resources for the construction of an open course system. The online construction of the open course system of the Internet of Things Engineering major is not limited to the course module composed of 6 courses, and can be expanded into more courses, as long as the macro control of the network database and the objective permission of students to receive digital resources can be achieved.

3.2 Offline curriculum system offline construction

It is easier to build an open curriculum system offline than online resources. The paper resource data accumulated by teachers in the long-term teaching paradigm are relatively rich, and only the paper resources need to be digitized into logical copy, and then

the teaching arts are processed and archived. It is not easy to build too many offline courses for the Internet of Things engineering major. On the one hand, the study energy of students' objective entities is considered; on the other hand, the fragmentation of teachers' organization management is too high, which leads to the lack of concentration and the development of quality effects that cannot achieve the expected goals. Our preset offline open curriculum system construction proposal is shown in Figure 1. The two courses of "Introduction to the Internet of Things Engineering" and "Application of Internet of Things Perception Technology" in the existing open curriculum modules of the 2020 class of Internet of Things engineering are combined into one "Introduction to Internet of Things Engineering". It is recommended to add "Blockchain and Innovative Thinking" or new courses that are constantly updated.

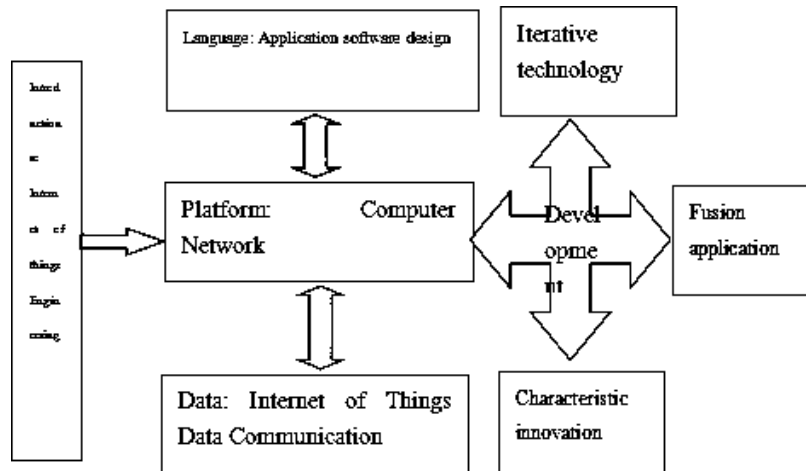


Figure 1. Offline Construction Framework of Open Curriculum System.

4. Scientific Analysis of the Open Curriculum System

4.1 Connectivity at the time level of the open curriculum system

The construction of an open curriculum system begins with students taking elective courses in the second semester of the first grade of college until the end of the second semester of the third grade of college. Students take the elective open course module at the end of the first semester of the first year of the university, and then learn the elective open course module in the subsequent step by step. The construction of an open curriculum system must not only follow the law of gradual upgrading of the open knowledge system, but also focus on the curriculum ladder diagram at the time level. The construction of an open course system for the Internet of Things engineering major forms a continuous connection of time in the development of IoT perception.

4.2 Connectivity at the spatial level of the open curriculum system

The construction of online and offline courses in the open curriculum system itself belongs to spatial curriculum connectivity. Teachers and students use the online and offline curriculum systems to form communication between teaching and learning. The starting point of the construction of the open curriculum system not only enables the spatial knowledge groups between students of different disciplines and different professional backgrounds to jointly establish, but also uses the open IoT perception technology to make the grassroots organizational units match the greatest common divisor of denominators of selected knowledge point collections in the digital resources of the open curriculum system. This is the spatial connectivity of the open curriculum system we are pursuing.

5. Conclusion

From the perspective of connectivity theory, the construction of an open curriculum system for the Internet of Things engineering major in the talent training program not only depends on the entire open professional information data, but also obtains the scientific effect of the construction of the open curriculum system. Our starting point is that students can obtain wireless and open knowledge and skills in limited professional disciplines. The ultimate goal is to cultivate students to become talents in the new era adapting to the rapid changes through the construction of an open curriculum system. The construction of online and offline teaching resources for the open curriculum system of the Internet of Things Engineering requires the perseverance and unremitting efforts of our grass-roots teaching units.

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