

# Major Course "Iot Cloud Platform Application Development" Design under the Background of School Enterprise Cooperation

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## Abstract

Higher vocational major courses provide important support for talent training. Considering the goal of highly skilled talents training and serving the development of local industries, this study takes "IoT cloud platform application development" as an example to explore how to jointly develop course content and carry out course teaching with the help of school enterprise cooperation. By summarizing the experience in the process of curriculum implementation, this paper provides significant suggestions for the design and implementation of this kind of courses.

## Keywords

Course design; School enterprise cooperation; IoT cloud platform application development.

## 1. Introduction

With the industrial upgrading and the continuous adjustment of economic structure, the demand for high skilled IoT talents is becoming eager. In order to support local strategic industrial development, vocational colleges aim to cultivate highly skilled talents suitable for the industry [1, 2]. In the process of talent training, colleges are closely combined with the industry. Curriculum teaching is the most important way to cultivate talents. The construction of curriculum content, curriculum platform and ect need in-depth integration of industry and education. The specific mode of school enterprise cooperation is closely related to the industrial characteristics [3, 4].

Taking IoT industry as an example, most of the enterprises are small and medium-sized enterprises engaged in overall solutions. These small and medium-sized enterprises are customers of the leading enterprises, like communication industry giants represented by China mobile and Huawei, Internet enterprises represented by Ali, and etc. They use the platform built by the giants. To establish cooperative relationship with these enterprises is not only necessary to cultivate students' familiarity with major technologies, but also to make students better adapt to more diverse application fields of the whole IoT industry. It can also fill the employment gap of small and medium-sized enterprises in this industry, which is more representative in terms of industrial support and student skill training. However, the scale of one single small and medium-sized enterprise is small, which can not meet the sustainable employment problem of school training students. Small and medium-sized enterprise clusters are more suitable for school enterprise cooperation to train students jointly. In the formation of industrial clusters, the construction of platform is particularly important. It has been studied to serve the enterprise clusters in the industrial park [5]. However, the industries in which enterprises are located are vary greatly. It is difficult to extract the demand for common talents. China Mobile has built a complete ecosystem with the help of OneNET platform for IoT area.

The platform has already gathered a large number of small and medium-sized enterprises with similar needs. A small and medium-sized enterprise cluster is built. These enterprises have common needs in the use of IoT cloud platform which is suitable for school enterprise cooperation taking OneNET as link.

## 2. Course Co-construction

**Table 1.** Design scheme of "Data Uploading based on HTTP Protocol using Python "

Teaching theme	Data Uploading based on HTTP Protocol using Python		
Applicable object	Sophomore majoring in Internet of things	Teaching platform	OneNET
Teaching background	Internet of things cloud platform application development is a major course for electronic information engineering technology, Internet of things application technology and other majors, which enables students to understand the cloud platform architecture, master the common protocols of cloud platform. Cloud platform debugging ability and application ability are also cultivated.		
Teaching objectives	Knowledge objectives	Skill objectives	Literacy goal
	Master the function of library files Master Python language message packaging method	Master the packaging method of request message Master the steps of uploading data based on HTTP protocol	Cultivate meticulous professional habits Cultivate vocational skills of drawing inferences from one instance and integrating with their posts
Student characteristics	The teaching objects are sophomores majoring in IoT, who are familiar with the Internet of things architecture and common technologies. They have poor ability to master theoretical knowledge and lack of classroom focus. But they have active thinking and strong practical ability. They are interested in practical operation.		
Learning focus And difficulties	Teaching focus: To realize http protocol from API debugging to Python language. Teaching difficulties: To guide students understanding the meaning of the code, finding out the wrong code and solving the problem		
Instructional design	<p style="text-align: center;">Before class</p> <ol style="list-style-type: none"> <li>1. Students review the content of HTTP message and API debugging course.</li> <li>2. Students watch the video, install the python software and configure the environment</li> <li>3. Students install the libraries which are necessary for HTTP.</li> </ol> <p style="text-align: center;">Classroom</p> <ol style="list-style-type: none"> <li>1. Teacher explains the Python code and its corresponding relationship with API debugging. Students learn to consult the developer documentation of Enterprise Edition.</li> <li>2. Students write their own Python program to upload data points.</li> <li>3. Teacher assists students to solve errors in the debugging process.</li> <li>4. Students share errors and discuss solutions in the debugging process.</li> <li>5. Teachers summarize the course content and common problems.</li> </ol> <p style="text-align: center;">After class</p> <ol style="list-style-type: none"> <li>1. Students finish personalized homework.</li> <li>2. Students are encouraged to consult the developer documents and implement other HTTP request methods.</li> </ol>		

In the process of curriculum construction, school enterprise cooperation is mainly reflected in the formulation of curriculum standards and the development of curriculum resources. Specifically, according to the teaching standard of Internet of things application technology major in higher vocational colleges, school and enterprise formulate the curriculum standards of talent training scheme jointly. Course standard of "IoT cloud platform application

development" is also developed jointly, including teaching objectives, content, and etc. To meet the professional job requirements of Internet of things engineering technician, Internet of things cloud platform operation and maintenance engineer, and etc, common post requirements such as protocol selection, protocol debugging and program implementation are refined. The course is designed in combination with the post requirements.

During the course design, the projects come from the real projects of ecological chain enterprises. Taking HTTP protocol application as an example, this skill is a common skill of OneNET ecological chain enterprises. All enterprises using this platform need to master the ability of HTTP protocol application. Talents should be familiar with the meaning of parameters and be able to debug the protocol. Combined with students' learning rules, the school and enterprises designed three projects from easy to difficult jointly, which are API debugging, Python code transplantation and embedded code transplantation. These three projects are common projects of enterprises.

Considering the characteristics of OneNET platform users, construction of online resources is important for curriculum promotion. Taking "Data Uploading based on HTTP Protocol using Python" as an example, the design scheme of online teaching course is given below.

### 3. Summary of Teaching Experience

The course "IoT cloud platform application development" has been open to 306 students in the school. After three rounds of teaching, students' feedback is excellent. In tracking the learning effect of this course, it is found that the degree of learning motivation directly affects students' learning effect. The motivation driving the young generation to learn has been completely different. Students can devote themselves to what they are approved of and interested in. Mechanically following the previous teaching methods can no longer meet the teaching needs of contemporary students. According to the characteristics of students, we mainly optimize teaching and stimulate students' motivation from the aspects of teaching content and teaching form. The development of online resources breaks the time and space constraints of learning. It plays a great role in improving students' learning interest. At the same time, the courses are shared externally with the help of OneNET open platform. The course has been promoted to other enterprises and brother Colleges, like Suzhou Etag Electronic Technology Co., Ltd., Shanghai Datang Bangyan, and etc. Through practice, the following experience is summarized.

1. The electronic information technology has been updated and iterated quickly. To solve the problem that many teaching contents have lagged behind the market technology, we select the mainstream cloud platform on the market and introduce the mainstream technology into the classroom quickly combining with OneNET platform. Teaching contents which integrate with the industry can make students to approve of the teaching contents.

2. The course content is designed hierarchically. The skill is trained repeatedly with project tasks, which are designed from simple to complex. Taking HTTP protocol debugging skill as an example, it is strengthened through framework building, debugging and code transplantation. The teaching contents echo each other and the difficulty increases gradually. Each task can make progress intuitively and is helpful to build self-confidence gradually.

3. The engineer training mode is adopted. The teaching contents are not limited to teaching materials. After explaining the basic theory and demonstrating part of practical projects, students are required to consult the technical documents provided by enterprises and complete debugging and code transplantation. They are encouraged to draw inferences about other cases from one instance by setting expansion tasks. Their sense of achievement can be stimulated during the process of finishing the task.

4. Variety information means are used. In the process of teaching and practice, various information means are adopted. The programming part of the course needs a development

environment. For very few students who do not have a computer, a teaching video of the mobile programming environment has been specially recorded. So that students can carry out practical practice using mobile phones after class. Information methods to tutor students online also gradually iterate, from the initial text and voice to remote operation. Among them, remote operation is more intuitive and the effect is the best in the process of practical operation guidance.

5. The assessment content is personalized. Team cooperation helps students master knowledge in offline teaching. After class, online learning needs less teamwork, which increases the practice of each student and reduces the dependence on team members. With personalized assessment, students can learn more independently and achieve better teaching results.

#### 4. Follow up Initiatives

How to deepen school enterprise cooperation and improve curriculum construction is a long-term task of teaching reform. In the later teaching, we will further stimulate students' learning motivation and improve the quality of talent training through the following points.

1. Schools and enterprises should introduce frontier teaching contents jointly, like practical engineering cases and scientific research transformation cases. It is helpful to further stimulate students' interest, their sense of identity with themselves and courses, and their pride in the development of the industry.

2. A mixed teaching team should be built by schools and enterprises jointly. Teachers' professional ability should be improved through various forms of training. At the same time, enterprise experts who are expert at frontier technology are invited to give learning suggestions from a professional perspective in class.

3. The integration of online and offline teaching should be promoted. Differences between online and offline should be clarified, so that the complementarity with each other can be realized. Based on the existing information-based methods such as MOOC, cloud classroom, cloud conference and other means can also be used to break the space-time constraints of teaching. Interaction between teacher and students can be increased after class. The teaching effects will be improved.

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#### References

- [1] Li Chen, Xinglong Xia; Industrial IoT High-skilled Talents Training under the Background of Intelligent Manufacturing. International Journal of Social Science and Education Research. Vol.2(2019).No.6. p46-50
- [2] H.Li, Y.Yang. Suggestions on Deepening the Integration of Industry and Education in Vocational Education and School-Enterprise Cooperation, Modern Business Trade Industry, Vol.39(2018), No.33,p.174-175. (In Chinese).
- [3] M.Yu, Y.L.Zhao, Y.Qi. Research on post competence and curriculum setting of high-skilled talents in Internet of Things specialty. Computer CD Software and Its Application, Vol.20(2012),p18-20. (In Chinese).

- [4] X.P. An, Industry is an Important Field of IoT Application: Summary of the Symposium on the Application of IoT in Industry, China Industry and Information Technology, Vol.9(2010),p.62-63. (In Chinese).
- [5] Li Chen, Xinglong Xia; Exploration New Mode of School-Enterprise Cooperation in IoT Industry Linked by Industrial Park; International Journal of Social Science and Education Research. Vol.2(2019).No.8. p46-50.