

Vertical Innovative and Entrepreneurship Education Based on IOT Major

Jing Sun

Zhongshan Polytechnic College, Guangdong, 528400, China.

Abstract

it is noticed that the professional value of the subject domain in innovative and entrepreneurship education is missing in some colleges. However, with the help of science and technology of industry enterprises, we can reverse the vision of innovative and entrepreneurship education into more market-oriented teaching content. Based on professional technology, industry characteristics and engineering projects, opportunities of contacting industry enterprises, studying market demand, college set up relevant professional courses and innovative entrepreneurship courses and practical projects which includes frontier developments, scientific research methods, innovation of specialties, entrepreneurial thinking training, innovative entrepreneurship and competition practice, order-based graduation design and on-the-job internship.

Keywords

Innovative Education; Entrepreneurship training; internship.

1. Introduction

Recently, innovative and entrepreneurship education in higher vocational colleges has been paid more and more attention, and the related academic research in this area are growing rapidly [1,2]. It is noticed that a great number of researches focused on the theme of "Innovative and Entrepreneurship Education in college". The publish of this sort of paper increased rapidly from 118 in 2016 to 739 in 2019 and 302 in the first half of 2019, totaling 1876[3]. After visits to enterprises and colleges, a multivariate statistic we produced shows that most of the entrepreneurship base established by higher vocational colleges owns incubation rules, but most of the incubation systems are universal and flat, which do not express characters of industries and related professional major.

There is no unified understanding of the subject domain of innovative and entrepreneurship education in most of colleges in china, and it is not regarded as an independent subject in college. The major orientation is vague and the value of the major is marginalized. Even in many universities, innovative and entrepreneurship education is classified as one of the general courses such as mental health education, career planning, or part of the subject of economics or enterprise management, which limits the scope of innovation to technological innovation.

2. Definition of core concepts

2.1 Innovative and entrepreneurship education based on major and profession

Innovative and entrepreneurship education based on major and specialty is no longer the original entrepreneurship education at all levels, but is based on talent training and technic training to build special expertise projects and expertise teams. Based on professional technology, industry characteristics and engineering projects, contacting industry enterprises, studying market demand, college set up relevant professional courses and innovative entrepreneurship courses and practical projects including frontier developments, scientific research methods, innovation of specialties, entrepreneurial thinking training, innovative entrepreneurship and competition practice, order-based graduation design and on-the-job internship.

2.2 Vertical Innovative and Entrepreneurship Education Model Based on major and profession

Vertical innovative entrepreneurship education mode is to train and cultivate students with innovative entrepreneurship consciousness and thinking skills from specialized courses. Meanwhile, it builds a bridge of school-enterprise collaborative connection with the carrier of teacher-student studio, and a series of progressive ways. An innovative and entrepreneurship education model can be described as follow: Project-based Professional Course - > Studio Training - > College Students' Innovative and Entrepreneurship Project startup - > Parent-enterprise Order Design - > Post Practice.

3. Key issues to be addressed in this research

(1) Professional value marginalized. There are technical barriers between majors, and most students' knowledge structure is incomplete, that often fails to meet the requirements of innovation and entrepreneurship. Most of the entrepreneurship colleges established by higher vocational colleges have entrepreneurship incubation base and incubation rules, but most of the incubation systems are universal and flat. They do not distinguishable in terms of industries and related professional technics. Even in many universities, innovative and entrepreneurship education is just classified as one of the general courses such as mental health education or career planning.

(2) The experiences of team members are short. There are many problems in student teams, such as single technical expertise, insufficient comprehensive business ability of project and insufficient complementarity of advantages.

(3) At present, there is no survey data of graduates of IOT Major which can guide the construction of double-innovative course design. From 2017 to 2019, members of the project team conducted a comparative grouping survey for three consecutive years on the graduates of this major, and formed a three-year survey report on the graduates of the Internet of Things major year by year, which has not yet formed a combing and analysis of historical data.

(4) Practical dilemma. Taking the major of IOT in our college as an example, some students have strong ability of hardware development or software design. Teams are formed in teacher-student studios. There may be many problems in the process of simulation project. For example, to develop an electronic product with intelligent hardware, we need to design a prototype, build and deploy a cloud platform for users to upload and download data. After that, the product needs to be proofed. After the proofing is checked, it needs to be put into the market, produced in the industrial chain, and the products produced need to be sold. Then the question is how to build an offline physical store. Therefore, the pressure of cost in the whole process is great and the work is just difficult for students.

4. Construction of Diversified and Progressive Innovative and Entrepreneurship Platform

Relying on the major of IOT, we use the techniques of artificial intelligence, cloud platform and system integration. On this basis, we create a vertical innovative and entrepreneurship education model which is called "Four Classrooms". "Four Classrooms" provides an environment of interactive cooperation platform between schools and enterprises to lead students with the latest information and technology related to their major and opportunities for in-depth exchanges with enterprises.

With the help of science and technology of industry enterprises, we can reverse the vision of innovative and entrepreneurship education into more market-oriented teaching content. Around the core curriculum of the major, the teachers from different professionals in Electronics, Internet of Things, Software Development grouped up together to develop the content of the " Four Classrooms " courses. Starting from the reality of subject specialty and IOT project, Four Classrooms guides students to acquire the necessary interdisciplinary thinking mode for innovative and entrepreneurship in interdisciplinary professional knowledge.

Through the comparative survey of graduates in the past four years (the IOT major was established in 2014), the past data and parallel grouping data were summarized to find out the achievements and

shortcomings of the " Four Classrooms " education in this major, and constantly revise the training program.

Taking the major of IOT as an example, the teaching contents of designing Four Classrooms are shown in Table 2. The training strategy of "one person, one mentor; one person, one plan; one person, one expertise" will guide students to grow independently and develop individually.

Table 1 Training contents of four classes

	content	Competence requirements	Student coverage
First Class: Basic training for IOT	Team positioning	According to the requirements of the "Internet+" innovative competition and the "Challenge Cup" innovative competition", students will design an entire project and improve the understanding of professional knowledge.	73%
	How to Exercise Product Thinking		
	Project scheme design process		
	Mainstream research methods		
	Case Analysis and Practice		
Second Class: Apprenticeship (Studio)	STM32 Microprocessor Advanced Application Training	Relying on the scientific and technological key projects declared by teachers, students participate in the whole process of project design and acceptance.	40%
	Application Development of Intelligent Gateway		
	Industrial UAV from Assembly to Commissioning		
	NB-IOT Development Training		
	Common Techniques and Applications of Artificial Intelligence		
Class 3: Order project (School- enterprise incubation space)	Practice of Web Front-end Development Technology	Undertake real business orders talk directly with project managers understand project content implement plan team division of labor complex system design skills.	30%
	Practice of Web Backend Development Technology		
	Development and Application Practice of Complex Database		
	Introduction and Practice of Mainstream Framework		
	Integrated Design of Internet of Things System		
Class 4: Business Classroom (Enterprise)	On-the-job Practice in Cooperative Enterprises	On the basis of order training in enterprises, students practice in cooperative enterprises, contact the real working environment of enterprises, participate in project analysis, management and implementation.	30%

5. Combining on-campus Order Practice with Off-campus Practice

During the third class (order class), the fourth class (enterprise class), students undertake real orders from enterprises, and participate in the whole process of project design and project acceptance, relying on the school-enterprise incubation space (currently three).

At present, there are three enterprises the Institute of Information Engineering and business incubation center in the college: Graffiti Intelligence, Baidu Baijiu and Guangdong Embedded Science and Technology. There are plenty of chances for students to undertake real business orders, to directly talk with project leaders, to understand the project content, implement plan. They can talk directly with project managers to learn the latest industry development, technical information, project progress, and the mainstream working methods in other groups; even feel the real working environment of enterprises, and participate in project analysis, management, and implementation.

6. Conclusion

Through the penetration of professional skills through pro-enterprise teaching projects "Four Classrooms", project materials, project design structure, project previous work are provided to students by the cooperative enterprises. Relying on the objective and technological projects declared by tutors, students participate in the whole process from project design to implementation. On the basis of order training in enterprises, students internsh in cooperative enterprises, participate in real project analysis, management, operation and implementation, and further improve the professional skills and innovative and entrepreneurship competence. Meanwhile, through "one-to-one" training mode, the training strategy of "one person, one mentor; one person, one plan; one person, one expertise" can guide students to grow independently and develop individually.

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