

# Driving Mechanism of Entrepreneurship and Innovation Projects in Universities

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**Abstract:** Innovation is the soul of a nation's progress and an inexhaustible driving force for a country's prosperity. On the basis of building an innovative country, "mass entrepreneurship and multitude innovation" was put forward as a slogan. In order to respond to the national appeal, but also to provide students with innovative and entrepreneurial concepts, the course of the innovation and entrepreneurship system was established. The construction of innovation and entrepreneurship projects under the new development perspective of University of Shanghai for Science and Technology mainly includes two parts: innovation and entrepreneurship, and is more in line with the current national and industrial development situation through year-by-year revision and optimization. It is particularly important to investigate the project-driven innovation and entrepreneurship education system under the new development concept, especially to find an innovation and entrepreneurship project system and evaluation model that is more in accordance with the development of the times and students. Exploring and practicing the ways, methods and means of innovation and entrepreneurship education, establishing a sound education model driven by innovation and entrepreneurship projects in colleges and universities, and improving the comprehensive quality of modern college students are the keys discussed in this paper.

**Keywords:** Innovation and entrepreneurship project-driven, Modern educational concepts, Innovation and Entrepreneurship Education

## 1. Introduction

Innovation is the soul of a nation's progress and an inexhaustible driving force for a country's prosperity and development. In response to the national slogan of "mass entrepreneurship and innovation", University of Shanghai for Science and Technology has carried out a series of projects on innovation and entrepreneurship. Innovation and entrepreneurship can be seen as two lines: one is innovation, and the other is entrepreneurship. In terms of innovation, students are required to complete 4 innovation credits, of which 2 innovation credits are practical credits, which need to be recognized by including but not limited to awards in science and technology competitions at or above the school level, patent authorization, professional skills certificates and paper publication, and cannot be obtained by taking courses. In terms of entrepreneurship, an independent entrepreneurship class and a comprehensive entrepreneurship theory course system and entrepreneurship project practice system have been piloted. Through the dual-track innovation and entrepreneurship project and its judging system, the concept of innovation and entrepreneurship has been deeply ingrained in students' minds. However, under the new development vision, there is still a need to further strengthen the training system for innovation and entrepreneurship projects.

## 2. Current status of the innovation and entrepreneurship curriculum system

Before proceeding with the curriculum system development, it may be helpful to learn the innovation and entrepreneurship courses offered by other sister institutions as well as domestic and international universities [1], with the hope of finding aspects suitable for University of Shanghai for Science and Technology (USST) or serve as a reference to establish a unique aspect.

### 2.1. Status of foreign innovation and entrepreneurship curriculum systems

The research and practice of foreign innovation and entrepreneurship curriculum systems are mainly

in countries and regions such as the United States, the United Kingdom and the European Union. The United States is one of the earliest countries to offer courses related to innovation and entrepreneurship, with nearly 40% of higher education institutions in the country currently offering such courses [2]. The United States has developed an entrepreneurial education curriculum system, which is continuously evolving and being put into practice. Renowned American universities such as Harvard University and Babson College offer entrepreneurship education courses and conduct research and practice on innovation and entrepreneurship curriculum systems. Stanford University offers an MBA entrepreneurship course, and the Massachusetts Institute of Technology (MIT) has a model of university-industry collaboration in education. Successful entrepreneurs like Bill Gates, Steve Jobs, and Mark Zuckerberg were all exposed to relevant education in American universities before embarking on their entrepreneurial journeys and achieving tremendous success. In addition to American universities, British universities have also achieved a significant level of popularity in offering innovation and entrepreneurship-related courses, which have established innovation and entrepreneurship curriculum systems [3]. The European Union's innovation and entrepreneurship curriculum systems have the following characteristics: (1) Case study teaching method is the main instructional approach. (2) The curriculum covers a wide range of topics with a comprehensive system. (3) The curriculum system is well-developed, with a focus on incorporating teachers' practical experiences.

## ***2.2. Status of domestic innovation and entrepreneurship curriculum systems***

In response to the national call, domestic universities are continuously exploring the establishment of innovation and entrepreneurship curriculum systems and innovation project-driven models that are more closely aligned with the actual domestic market. Based on their own circumstances, many universities in China have established innovation and entrepreneurship education and practice systems, with some universities forming an innovation and entrepreneurship curriculum system that combines classroom teaching with entrepreneurial practice. For example, Tsinghua University has developed a demonstration course called "Xtreme Learning Process". The entrepreneurial guidance curriculum system at North China Electric Power University integrates the first classroom and second classroom, while Peking University offers the "Peking University Fifteen Entrepreneurship Classes" and similar projects. Meanwhile, domestic universities in China provide students with comprehensive entrepreneurial guidance and services through the establishment of "one-stop" platforms, including technology parks and specialized entrepreneurial incubation spaces [4]. These universities have explored and practiced innovation and entrepreneurship education courses and project systems from multiple perspectives based on their own strengths and development characteristics. However, certain challenges persist within this framework. Excessive and one-sided emphasis on innovation and entrepreneurship can inadvertently lower the success rate of entrepreneurial endeavors, leading to a prevalence of low-quality startups. The curriculum system for innovation and entrepreneurship courses aims to foster students' awareness, entrepreneurial spirit, knowledge, and skills, while continuously adapting to the evolving landscape of societal and market demands. It reflects the principles and models of diversified talent cultivation [5]. Xia and Luo [6] emphasized the centrality of the curriculum system within the broader context of innovation and entrepreneurship education. Against this backdrop of educational reforms, there has been a growing body of research focusing on the innovation and entrepreneurship curriculum system. Ju et al. [7] argues that, compared to entrepreneurship education abroad, there is a lack of integration between entrepreneurship courses and specialized programs in Chinese universities. Ma and Bai [8] research findings reveal significant challenges facing entrepreneurship education in Chinese universities.

## **3. Multi-dimensional Innovation and Entrepreneurship Project-driven System**

While innovation and entrepreneurship are often discussed together, they intersect and have distinct implications. Innovation primarily pertains to a wide range of university student competitions, some of which are related to entrepreneurship. Entrepreneurship, on the other hand, involves the provision of goods or services by individuals or teams. However, without innovation, entrepreneurial ventures are highly susceptible to market displacement by mature or latecomer products.

### ***3.1. Discipline-oriented Project-driven System***

To support innovation and entrepreneurship among university students and further align with their developmental needs, University of Shanghai for Science and Technology strongly encourages students to participate in a variety of discipline-oriented competitions. These competitions serve as the driving

force for project-based innovation and entrepreneurship training for students. Table 1 comprises the discipline-oriented competitions currently supported, but not limited to.

*Table 1: Statistics of Mechanical Discipline Competitions*

No.	Competition Name
1	LAN QIAO Competition
2	National College Mechanical Innovation Competition
3	“The Challenge Cup” National College Student Extracurricular Academic Science and Technology Work Competition
4	National Undergraduate Electronics Design Contest
5	China College Students’ ‘Internet+’ Innovation and Entrepreneurship Competition
6	National 3D Design Show
7	National College Students Innovation Competition of Advanced Mapping Technology and Modeling on Product Information
8	RoboMaster
9	The National University Students Intelligent Car Race

*Table 2: Relationship between Discipline-Oriented Competitions and Theoretical Courses*

No.	Competition Name	Theoretical Courses
1	National Undergraduate Engineering Training Integration Ability Competition	Engineering Drawing, Computer Aided Design, Theory of Machines and Mechanisms, Machine Design, Principle and Application of Single-Chip Microcomputer
2	National College Students Innovation Competition of Advanced Mapping Technology and Modeling on Product Information	Engineering Drawing, Computer Aided Design
3	National Undergraduate Electronics Design Contest	Electrotechnics, Electronics, Foundation of Programming, Principle and Application of Single-Chip Microcomputer
4	National 3D Design Show	Computer Aided Design, Theory of Machines and Mechanisms, Machine Design, Fundamentals of Mechanical Manufacturing Technology, Fundamentals of Engineering Material Manufacturing Technology, Engineering Materials
5	RoboMaster	Introduction to Control Engineering, Principle and Application of Single-Chip Microcomputer, Robotic Technology Foundation
6	National College Student Digital Design Competition for Mechanical Products	Computer Aided Design, Theory of Machines and Mechanisms, Machine Design, Fundamentals of Mechanical Manufacturing Technology, Fundamentals of Engineering Material Manufacturing Technology, Engineering Materials
7	National College Mechanical Innovation Competition	Computer Aided Design, Theory of Machines and Mechanisms, Machine Design, Fundamentals of Mechanical Manufacturing Technology, Fundamentals of Engineering Material Manufacturing Technology, Engineering Materials
8	China College Students’ “Internet+” Innovation and Entrepreneurship Competition	Computer Aided Design, Theory of Machines and Mechanisms, Machine Design, Fundamentals of Mechanical Manufacturing Technology, Fundamentals of Engineering Material Manufacturing Technology, Engineering Materials
9	“The Challenge Cup” National College Student Extracurricular Academic Science and Technology Work Competition	Computer Aided Design, Theory of Machines and Mechanisms, Machine Design, Fundamentals of Mechanical Manufacturing Technology, Fundamentals of Engineering Material Manufacturing Technology, Engineering Materials

Discipline-oriented competitions serve as a bridge between specialized knowledge and innovative

abilities. Only through certain innovation activities can students apply and validate the professional knowledge they have learned. Currently, discipline-oriented competitions are considered the most important form of innovation activity. Through these competitions, students can further deepen their understanding of the course content and practically integrate it with the theoretical concepts learned in their major courses, thus providing a solid foundation for further advancements in innovation.

Taking mechanical-related disciplines as an example, the integration of participating in select innovation competitions recognized by the Ministry of Education with relevant major course theory is demonstrated in the table below. From Table 2, it can be observed that the necessary technical skills for the main innovation competitions can be acquired through the corresponding major courses.

In general, discipline-oriented competitions can be classified into two dimensions: skills and creativity. Competitions that focus on skills require participating students to possess strong practical and hands-on abilities. They should be able to create works with a certain level of technological content according to the requirements set by the organizing committee. To achieve competitive results in skill-oriented competitions, students need to have a deep understanding of their professional skills and their practical applications.

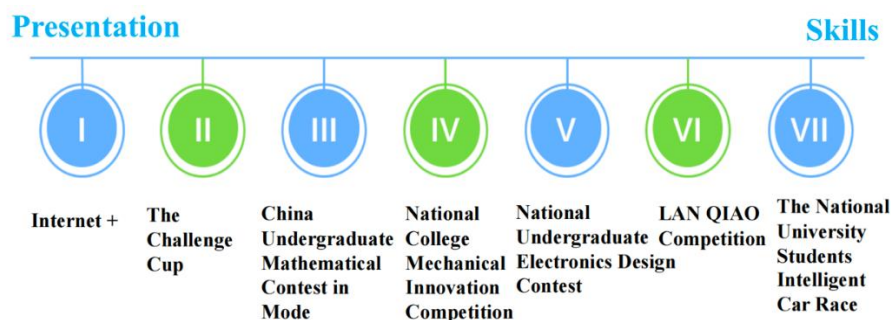


Figure 1: Two dimensions of presentation and skills in disciplinary competitions

Figure 1 above depicts the characterization of some discipline-oriented competitions in the two dimensions. Different competitions have different requirements in terms of the skills emphasized by the participating team members. For example, China College Students' "Internet+" Innovation and Entrepreneurship Competition focuses more on presentation, requiring participating teams to possess high video editing skills, PPT production skills, and public speaking abilities. On the other hand, The National University Students Intelligent Car Race emphasizes skills, and having the ability to package oneself does not contribute much to participating in the competition. As for the National College Student Mechanical Innovation Competition, it requires teams to showcase mature works to the judges and also demonstrate excellent performance during the defense. Therefore, both presentation and skills are emphasized in the selection of participating teams for this competition.

In the field of discipline-oriented competitions, University of Shanghai for Science and Technology always insists on analyzing each specific situation and providing targeted guidance to participating students based on the competition requirements and content. This approach enables students to acquire different dimensions of skills while achieving good results in the competitions. Currently, in the United States, a project and competition-driven innovation education model has been initially established, which plays a significant role in the country's development [9].

### 3.2. The Extension of Entrepreneurship Course to Entrepreneurial Projects in the Dual-Entrepreneurship Training System

Entrepreneurship without innovation cannot truly be considered entrepreneurship. For example, business models such as street vending and intermediaries are highly susceptible to replication by other entrepreneurial teams. If there is no unique product or service in the entrepreneurial process, students' entrepreneurial endeavors are likely to fail or even lead to financial burdens. Only when entrepreneurship is accompanied by innovative attributes and the goods or services provided by the entrepreneurial team are not easily mastered by others, can they occupy a place in the market and ultimately achieve success.

In terms of the construction of the entrepreneurship course system, University of Shanghai for Science and Technology's entrepreneurship curriculum system never promotes one-sided entrepreneurship, particularly opposing student involvement in non-innovative and easily replicable entrepreneurial models. However, for entrepreneurial teams with certain innovative characteristics,

ample support is provided based on their entrepreneurial projects. For instance, the University of Shanghai for Science and Technology National Science Park offers high-level assistance during entrepreneurial incubation.

Innovation projects are at the core of the innovation and entrepreneurship curriculum system and primarily consist of project design, entrepreneurship guidance, entrepreneurship project training, and entrepreneurship simulation training. Students can learn how to identify business opportunities from market demands, conduct product design and development, and engage in market promotion and sales. Through the innovation project process, students can experience the entire entrepreneurship journey, cultivating entrepreneurial abilities and mindsets. Additionally, entrepreneurship guidance is an indispensable part of the innovation and entrepreneurship curriculum system. Students need to learn how to develop business plans, raise funds and capital, and manage financial and human resources within a company. The purpose of entrepreneurship guidance is to help students avoid common mistakes during the entrepreneurial process and increase their chances of success. Entrepreneurship projects serve as an extension of the innovation and entrepreneurship curriculum system. Through entrepreneurship projects, students can choose areas or industries of their interest, gaining in-depth knowledge about market demands and business models in those areas or industries. Entrepreneurship projects also enable students to establish their own brand and reputation within the campus, laying the foundation for future entrepreneurship endeavors. Entrepreneurship simulation is also a significant component of the innovation and entrepreneurship curriculum system. Students can participate in entrepreneurship competitions or simulated entrepreneurial projects to experience the entire entrepreneurship process in a virtual environment, thereby developing entrepreneurial thinking and innovative capabilities. Entrepreneurship simulation helps students better understand the essence of entrepreneurship while laying the groundwork for future entrepreneurial pursuits.

### ***3.3. Reflection on the Innovation and Entrepreneurship Curriculum System***

One of the current problems in the innovation and entrepreneurship curriculum system is the one-sided pursuit of entrepreneurship. This means that students are required to engage in entrepreneurial activities, regardless of whether it involves setting up a stall or engaging in other small businesses. If this is the case, our innovation and entrepreneurship education deviates from the original intention of the curriculum design. Another situation is when students are discouraged from engaging in low-end entrepreneurship but are expected to explore a new aspect of an industry or develop a business based on it. This also deviates from the positive significance of the innovation and entrepreneurship curriculum. Undoubtedly, the latter has a higher success rate than the former, but blindly pursuing entrepreneurship is not a good approach.

Take Stanford University in the United States, which has the highest entrepreneurship success rate globally, as an example. Its entrepreneurship success rate is less than 10%, not to mention other universities with even lower success rates. Therefore, blindly pursuing entrepreneurship can lead to many students losing job opportunities and ultimately becoming part of the unemployment wave or the group of flexible employment, when many of them should have stable jobs and income.

So, what is the significance of offering entrepreneurship courses? The significance of the innovation and entrepreneurship curriculum lies in providing students with the necessary knowledge and skills, enabling them to make breakthroughs in entrepreneurship and take advantage of market trends or opportunities to achieve innovative success and contribute to the overall growth of the economy and society as a whole [10]. In the curriculum, students can learn how to identify market opportunities, foster innovation, conduct market research, and develop entrepreneurial plans, among other things. These knowledge and skills are essential factors for entrepreneurial success, and students can apply them in their future endeavors through course learning.

Furthermore, the innovation and entrepreneurship curriculum can also cultivate students' innovative spirit and creativity. Through the curriculum, students can learn how to discover innovative ideas, create new business models, and solve practical problems. These abilities are indispensable in the entrepreneurial process, and the curriculum provides a platform for nurturing these abilities.

## **4. Conclusion**

In conclusion, the significance of the innovation and entrepreneurship curriculum lies in providing students with the necessary knowledge and skills to make breakthroughs in entrepreneurship or take

advantage of market trends or opportunities. Entrepreneurship is not suitable for everyone, but in the innovation and entrepreneurship curriculum, students can learn valuable knowledge and skills that will benefit their career and life, regardless of whether they pursue entrepreneurship in the future.

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