

# Research on the Cultivation Mode of Undergraduate Applied Engineering Innovation Talents

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**Keywords:** FSC competition, Applied talents, Innovation and practical education.

**Abstract:** In order to adapt to the cultivation of automobile application talents in Colleges and universities, In this paper, an innovative practice platform centered on FSC competition is established, which is used to conduct engineering practice teaching for students in multi-stage and action oriented teaching methods, and plays an important role in the cultivation of applied undergraduate talents.

## 1. Introduction

At present, the traditional teaching mode of undergraduate colleges is mainly theoretical teaching and experimental teaching, supplemented by enterprise practice [1]. On the one hand, most of the theoretical and experimental teaching materials use the classic teaching materials published for many years, which are basically taught according to the process set by the teacher [2,3]. Most of the problems have fixed solutions, so it is difficult to improve the professional quality and innovation ability of students in the classroom. On the other hand, the time for students to practice in enterprises is generally short, and the ability of continuous innovation and teamwork is difficult to improve.

## 2. Implementation process

### 2.1 Established an innovation and practice platform centered on the FSC competition

In 2015, hang V fleet was established in our school. Since 2018, fuel vehicles and electric vehicles have been sent to participate in the FSC competition every year. There are about 100 students use their spare time to design two cars to compete.

### 2.2 Established a talent training model for the entire process

The whole process of practice teaching is divided into three stages: the cultivation of innovation consciousness, the cultivation of innovation basic ability and the cultivation of innovation practice ability. In the training stage of innovation awareness, the first grade students are mainly taught on the spot through the actual cases of car racing. In this stage, the backbone students of the higher grade give priority to the guidance of the lower grade students. Just like the master of the enterprise who leads the apprentice, they are more able to set an example and learn from the target. The training stage of innovation basic ability is to let the students of grade 2 and grade 3 be responsible for the design of some parts and systems, and to use the theory of professional courses in engineering practice at the same time to do some innovation projects in the form of project system to achieve the purpose of training innovation basic ability. In the stage of innovation practice ability training, the senior students, under the guidance of the instructor, take charge of innovation practice projects, and test the training results in the form of graduation thesis before graduation.

### 2.3 Established an action-oriented engineering practice teaching system

FSC competition requires high complexity and systematization of car design. The instructor decomposes the goal of listing car every year and assigns the goal to senior students. The senior backbone students then decompose the target tasks received in detail, decompose the development goals of each component and assign them to the junior students. The instructor regularly monitors and guides the whole process, so that every year's racing car will break down the small goals. Everyone uses action oriented teaching methods to carry out engineering practice according to the goals to achieve the effect of exercise. As shown in Fig.1.

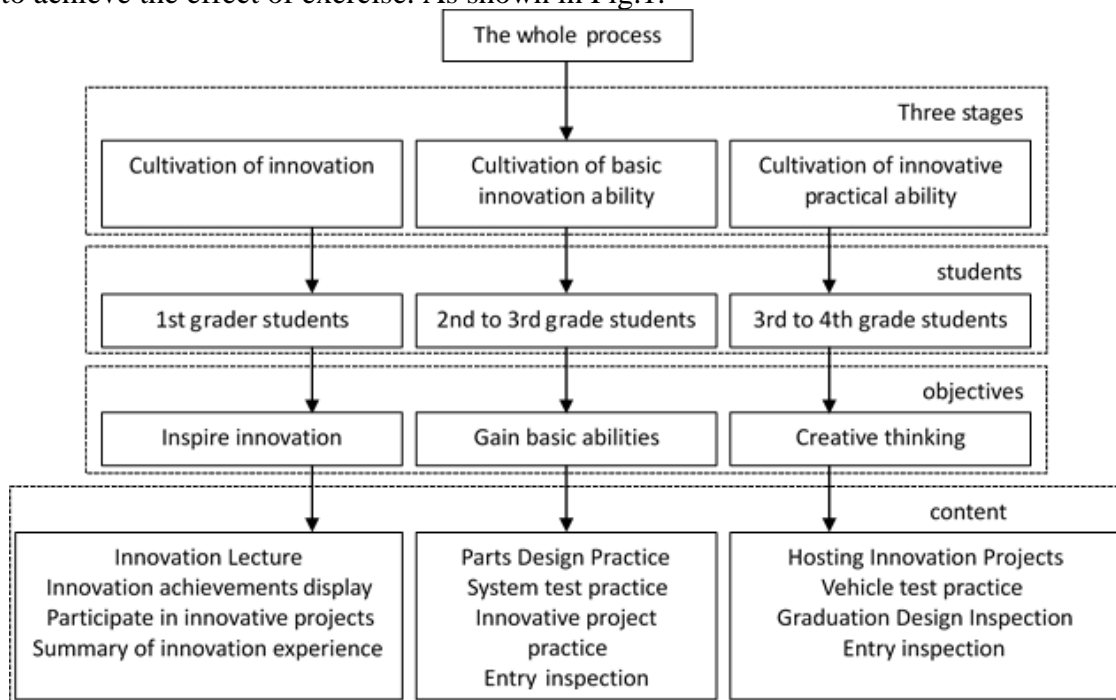


Fig 1. Whole process Multi-stage training mode

### 3. Innovation

#### 3.1 Improve students' initiative in learning

The application-oriented personnel training process of the automobile industry runs through the undergraduate education of college students. The innovation practice platform is the second classroom, and students are no longer doing experiments according to the prescribed process. The instructor is no longer the "brain" of the students, but guides the students to complete the practical projects according to the engineering thinking, which can better improve the students' initiative in learning, so as to achieve the goal of ability cultivation.

#### 3.2 Improve students' ability to apply theoretical knowledge

In the FSC competition project, there are not only racing dynamic events, but also design statics, cost reports and marketing reports. The theoretical knowledge learned in the course of automobile specialty is often various knowledge fragments, and the racing design process is the application of automobile theoretical knowledge. Through the action oriented training of FSC competition, the knowledge fragments can be connected better.

#### 3.3 Improve the openness of experimental teaching

Due to the design needs of FSC racing cars, many innovative time projects can be applied for. Students make full use of their spare time and holidays, independently propose experimental items, explore experimental methods independently, independently design experimental schemes, and independently summarize experimental rules. Innovative practice projects have a high degree of exploration and a long duration, which can effectively stimulate students' learning interest and improve students' innovative ability.

### **3.4 Enhance the ability of interdisciplinary synthesis**

First of all, the design process of racing cars requires the development and use of a large number of experimental equipment, so students will learn a lot of communications engineering and mechanical automation expertise. Secondly, the FSC competition project includes cost report and marketing report project competitions. The introduction of a large amount of interdisciplinary product development, project management, cost management, marketing and other knowledge can improve students' engineering literacy and comprehensive ability at the non-technical level.

### **4. The results of talent training**

Based on the FSC competition, our university has made a series of explorations in training the engineering practice ability of students majoring in vehicle engineering and automobile service engineering. After four years of practice, it has been proved that this mode can significantly improve the ability of students to use theoretical knowledge to analyze and solve practical engineering problems in the process of project implementation. Only in 2018 and 2019, there were 14 university students' innovation and entrepreneurship projects approved by Aviv team members, of which 3 were awarded national level projects. In 2017, he won the third place in China in the endurance race and the first prize in the overall performance. In the two dynamic projects of "8-word ring" and "efficiency test" in 2019, they respectively won the third place in China.

### **5. Summary**

The FSC competition innovation practice platform established by Guilin Institute of Aeronautics and Astronautics provides help for the undergraduate practical education of vehicle engineering and automobile service engineering. According to the various stages of students, action oriented practical teaching is adopted to improve students' initiative in learning and application ability of theoretical knowledge. It is of great significance in the education reform of automobile application talents.

### **Acknowledgments**

This research is carried out under the support of 2019 Guangxi higher education undergraduate teaching reform research topic. (NO.2019JG331).

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