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Construction and practice of international automobile professional innovation practice platform

Xince Yu[1,*], Peiyu Yang[2], and Jianming Li[1]

[1] China Automotive Technology and Research Center Co., Ltd., Tianjin, China
[2] China Auto Information Technology (Tianjin) Co., Ltd., Tianjin, China

[*] **Corresponding author**: Xince Yu

Abstract: In order to achieve the goal of cultivating innovative technical and skilled talents with international vision and international recognition, we have cooperated with overseas universities and relevant enterprises to explore and practice the international innovative technical and skilled personnel training system. The innovation practice platform proposes to explore a "results-oriented" innovation practice platform in accordance with the construction goal of "relying on competitions, combining production and education integration, results-oriented, and continuously improving the construction effect". We have established an "international" teacher team led by engineering practice, and formed a "systematic" institutional mechanism of school-enterprise collaborative education. After several years of research and practice, the quality of talent training has been comprehensively improved.

Keywords: Internationalization; Innovation practice platform; Excellent engineer; Engineering education.

1. Introduction

In recent years, China has vigorously carried out the engineering education reform with "excellent engineers" as the training goal and in line with the international advanced engineering education concept. The beneficial exploration and advanced achievements in the innovative practice of engineering education abroad should be valued under the current situation of promoting the practicality and innovation of engineering education [1-3]. Engineering education in Europe, America and other countries has gradually integrated technology orientation and science orientation, and began to attach importance to the practicality and innovation of engineering education. The focus of reform has shifted from science and engineering basic education to engineering practice; In terms of education methods, it has added training forms that encourage students to participate in innovative activities [4,5]. For example, the Lawrence University of Technology, which is jointly run with our school, has trained students' hands-on ability and rich creativity by encouraging students to participate in the China University Formula Car Race (FSC) and other ways; Our friendly school, Ulsan University of Korea, has actively carried out global overseas internship projects and student innovation practice curriculum development, and has cultivated a large number of high-quality talents with international vision and courage to explore.

In recent years, China's engineering education has increasingly emphasized the cultivation of engineering practice ability and innovation ability. In 2011, the vehicle engineering and automobile application engineering specialty of Shanghai University of Engineering and Technology was listed in the "Excellence Plan" by the Ministry of Education, and the exploration and practice of professional engineering education began. A relatively systematic practical teaching system has been formed in the professional training plan of these "excellence plans". On the basis of the excellent tradition of students' innovative practice and the two major advantages of extensive exchanges with overseas universities in the College of Automotive Engineering, our university should make some innovations in the construction of the international innovation practice platform, and make contributions to the cultivation of high-quality engineering education talents meeting the requirements of international standards.

2. The necessity of building an international automotive innovation practice platform

The experience and lessons of engineering education abroad for many years need to be learned in the process of exchange and cooperation. The requirements of engineering education for talents' international vision and the increasingly extensive globalization strategy of the automobile industry need a large number of excellent talents with solid theoretical basic knowledge, international vision and innovative practice to invest in it [6,7], Therefore, the construction of innovative practice platform for international automobile specialty conforms to the requirements of our school's "12th Five-Year Plan" construction for the construction of modern automobile application engineering and management discipline and high-level talent cultivation, that is, around the talent cultivation of modern transportation engineering and management discipline, build innovative talent cultivation platform in the form of industry-university cooperation education, and build "four systems" - industry-university cooperation specialty education and training system, comprehensive quality training system Employability training system and international talent training system, comprehensively improve the construction of modern transportation engineering disciplines, strengthen the ability of talent training and knowledge service, and form an open, interactive and shared innovative talent training mode. The problems to be solved by the platform are as follows.

First, integrate some automobile college students' discipline competition projects, gradually transform the innovative practice of the competition projects into

innovative experiments and innovation projects, and transform the original competition results more into the embodiment of the improvement of students' innovative ability.

Second, build an innovative practice platform for international automotive students, change the situation of lack of international exchange in the practice system, and actively carry out practical activities such as joint innovation projects and joint research and development of advanced technologies with foreign universities.

Third, summarize students' experience in overseas practice, establish various forms of overseas practice and practice, and gradually explore the exchange student model with innovative practice as its content.

Fourth, through the construction of the platform, learn the excellent cases and teacher training methods in the innovative practice education of engineering education in foreign universities, and establish a team of excellent innovative practice instructors with international vision and advanced concepts.

3. Construction content of international automotive innovation practice platform

With the aim of improving undergraduate engineering practice ability, design ability and innovation ability as the starting point, build and implement a multi-level and open innovation practice training system for automobile majors through cross-school and school-enterprise cooperation at home and abroad. Based on the existing innovation practice teaching activities carried out by the College of Automotive Engineering and overseas colleges and universities, continue to explore new forms and new partners of overseas colleges and universities, and jointly participate in the training of innovation practice ability, To realize the talent cultivation strategy of "International Big Project", based on the excellent engineer program of vehicle engineering and the guiding spirit of the certification of various majors of the Automobile Academy, and in different majors, combined with the innovative practice projects and related discipline competitions of students in various majors, to develop new cooperation models between domestic and foreign tutors, projects and students, Promote the training requirements of the "12th Five-Year Plan" for the development of international innovative talents and high-level talents of national industry, university and research, and become one of the key platforms with distinctive characteristics in the field of transportation engineering of our university.

3.1. In-depth cooperation with Ulsan University of South Korea to explore the long-term mechanism of students' overseas practice and practical innovation training

Ulsan University of Korea and our university signed the International Cooperation and Exchange Agreement and the Student Exchange Project Cooperation Agreement in 2013. On this basis, the two sides carried out various forms of exchange activities. Ulsan University, as a famous university specializing in engineering in South Korea, has developed rapidly in the field of automotive engineering in recent years, relying on large enterprises such as Hyundai Group and taking advantage of its location in Ulsan, the most advantageous city in South Korea. Thanks to the long-term and stable cooperation mode with a large number of local auto enterprises and innovative talent training mechanism, graduates are generally praised by employers in the employment market.

Through the investigation, the innovative practical education carried out by the university among the students majoring in automobile engineering has certain characteristics. Including the combination of Capstone Course and innovative projects with considerable characteristics. Vertex course is a course offered by foreign colleges and universities that allows students to integrate, expand, criticize and apply the knowledge, skills and attitudes acquired in the study of subject areas. Vertex curriculum has the function of developing students' comprehensive quality and helping students transition from school to the workplace, so it is widely used in higher vocational and technical education in the United States. Vertex curriculum can also be used as an effective way to develop students' comprehensive quality and enhance their competitiveness and adaptability in the workplace. The two most prominent features of the Summit course are: the first is to provide students with the opportunity to integrate their acquired knowledge, skills and attitudes; The second feature is to prepare students for practice, that is, to provide students with opportunities to participate in practice by requiring them to complete some applied projects, such as service practice, so that students can apply the knowledge and skills they have learned previously to solve practical problems, and prepare students for entering the field of employment. There are three main functions of Vertex curriculum: first, to support students' deep learning; Second, it can be used as an effective evaluation tool; Third, help students transition from school to the workplace. Ulsan University has made many remarkable teaching achievements in the aspects of student racing production, innovation project development, etc. through the opening of Capstone Design, and its achievements have been widely recognized by the school and the community.

According to the agreement between our university and Ulsan University, the two sides have sent two groups of students to each other to carry out overseas internship projects in the automobile major since 2013. Especially between March and June 2014, the students in the automobile major of our university entered the internship project of Korean enterprises arranged by Ulsan University and achieved good results. After training, many students were selected by Ulsan University as candidates for postgraduate training programs or retained by Korean automobile enterprises due to their excellent internship results. On the basis of summarizing the experience of cooperation with it and maintaining the original development trend, it is of great practical significance to continue to carry out exploration and practice in the cultivation of students' innovative practice. Therefore, this project plans to explore in the following aspects.

First, each year, the two sides will determine an innovative project for cooperation with 3 to 5 students as the main content of their overseas internship activities to complement each other. It is expected that the project will benefit 15-25 students every year.

The second is to learn the advanced experience of Capstone Course of Ulsan University, and jointly offer two Capstone Course related courses with Ulsan University to enhance the competitiveness and adaptability of students in the workplace in the process of international cooperation.

Third, each year, a group of students are sent to Ulsan

University to study the advanced teaching models and engineering concepts of foreign universities by participating in relevant professor research projects as graduation projects. It is expected that the project will benefit 10-15 students every year.

The fourth is to invite the excellent innovation practice training instructor of Yushan University to our school for exchange and visit, to offer lectures on cutting-edge courses for junior students, to stimulate students' innovation awareness, and to teach teachers new methods of innovation practice teaching. It is expected that the project will benefit 100 to 150 students every year.

3.2. Establish a joint cooperation mode with overseas universities to participate in relevant international large-scale discipline competitions

The School of Automotive Engineering of our university has always followed the operation mode of "interest driven, process focused, and independent management" in student innovation practice activities. In recent years, it has continuously achieved excellent results in automobile competitions such as FSC, HONDA Energy Conservation Competition, and has also cultivated a large number of innovative talents who are "diligent in practice and good at thinking" by participating in such projects. In order to better mobilize the innovative enthusiasm of more students with different interests, participating in domestic and foreign automobile competitive competitions with certain influence can create conditions for innovative practice to cover more students. At the same time, in order to solve the shortage of funds and experience in participating in such competitions, we can kill two birds with one stone by cooperating with overseas universities to learn from each other. The project plans to explore the following aspects.

One is to participate in the design and production of the intelligent driverless car competition with Ulsan University to improve students' ability in electronic control and automation. It is expected that this project will benefit 15-25 students every year.

The second is to jointly participate in the Shell Energy-saving Vehicle International Challenge with Ulsan University, develop energy-saving racing cars with advanced concepts and levels, give full play to the advantages of both sides in engine energy conservation and emission control and body design, so that more students can get the training of international practice. It is expected that this project will benefit 15-25 students every year.

Third, we will jointly participate in innovative automobile design and production competitions such as FSC Formula Racing, HONDA Energy-saving Competitive Racing, Engineering Training Contest, Carbon Free Car, 3D Modeling Contest, etc., to gain more advanced experience and innovative ideas, so that more students' engineering practice ability can be improved through the implementation of the project.

3.3. Study the whole process innovative practice teaching mode of Ulsan University to form an innovative practice teaching mode with its own characteristics

Through personal observation and study, we learned that Ulsan University has implemented a teaching mode called "full program" in the practical teaching of cultivating college students' innovative ability, that is, the cultivation of college students' innovative ability runs through the whole process of university education. It can only be formed by implementing a continuous, multi-directional, step-by-step and complete practice process in the whole process of university education, in accordance with the abilities and characteristics of students in different periods. The whole process divides innovation practice into three stages: the cultivation of innovation awareness, the cultivation of basic innovation ability and the cultivation of innovation practice ability. See Figure 1 for details.

4. Construction effect of international automobile innovation practice platform

Through the construction of this platform, it not only caters to the innovative requirements of engineering education for international engineering and technical talents, but also adds elements related to international innovation practice activities, gradually forms a set of "full process" innovative practice training mode that conforms to the characteristics of our school, and gradually forms a radiation effect from our school to the whole school. The construction of the platform has gradually formed a complete innovation training system from the lower grades to the higher grades.

In the cultivation stage of innovation awareness, lectures on overseas practice and practical activities will be held, and relevant foreign experts will be invited to introduce the latest international innovative technologies and design concepts, attracting more students to participate in them.

In the innovation ability training stage, according to the requirements of engineering education, the professional ability of the students will be evaluated, and the students with strong professional ability will be selected to apply for relevant projects, and the relevant professional training links will be feedback and improved at the same time. Lectures on the methods of innovation project establishment will be held to introduce the ideas and methods of innovation practice and prepare for overseas practice activities (such as language, ability, etc.).

In the training stage of innovative practical ability, students are selected to participate in innovative practical activities such as racing production, encouraged to go abroad for practice and exercise, and excellent students are selected to enter overseas universities for master's or doctoral degrees.

5. Conclusion

The platform is based on the relevant overseas internship program projects of Shanghai Municipal Education Commission and the new requirements of our university for engineering education, and the inter-school cooperation agreement is the blueprint. It makes full use of the platform of the "Innovation and Entrepreneurship Base for College Students" that has been built by our university to provide good practical teaching conditions for the implementation of the project. The "first-class undergraduate specialty construction project" provides a good software environment for project implementation. The construction of the platform fully reflects the "three strategic" development measures of the university. Through establishing a good strategic partnership with overseas universities and multinational enterprises, and with the help of the two national engineering

practice education centers jointly built by universities and enterprises, the construction of the platform is of great value for improving the cultivation level of students' innovation ability and achieving the shaping of engineering innovation literacy with international vision.

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