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Innovation and Entrepreneurship Education in Mechanical and Electronic Engineering

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Abstract: Since the implementation of national and province entrepreneurship in colleges and universities, it has played its due role in a certain scope and to a certain extent, but it also exposed the shortcomings of fewer participants, fewer achievements, fewer talents and achievements, and unsatisfactory level of talents, forming a culture short board. In order to make up for these shortcomings, the innovation and entrepreneurship education of college students was launched. Its purpose is to conform to the party's development strategy, education policy and employment policy, supplemented by the basic points, demonstrations, requirements, principles, support, guidance, support and other means. The practice is to transform the practical teaching with the face of innovative entrepreneurship training, so that everyone can participate in training and innovation. The function is conducive to the implementation and implementation of the party's development strategy, education policy and employment policy. Innovative education in colleges and universities is an important support for the implementation of the strategy of rejuvenating the country through science and education.

1. Introduction

Innovation and entrepreneurship education carried out by higher education institutions should also be able to directly or indirectly serve this major strategy. In order to do a good job in innovation and entrepreneurship education, the Ministry of Education stipulates: "Innovative entrepreneurship education should be open to all students." One of the purposes of innovative entrepreneurship education is to make college graduates “employed more fully”. Then, as an innovative and entrepreneurial training for college students in the practice stage of innovation and entrepreneurship education, they should take the lead and lead others. The concept and task of "innovation and entrepreneurship in colleges and universities" proposed by the university is a novel concept and action in this respect. It is very conducive to the implementation and implementation of the party's development strategy, education policy and employment policy. Integrating innovation and entrepreneurship education into the whole process of applying electronic engineering professional education is the need of economic and social development. To effectively integrate

innovation and entrepreneurship education into the application of electronic engineering professional education and cultural quality education, it is necessary to establish a platform for innovation and entrepreneurship education system based on experiments and practice. In the specific implementation process, we should start from the content system, curriculum setting and educational practice, in order to stimulate students' enthusiasm for self-learning and entrepreneurial confidence, and achieve the purpose of comprehensively improving students' comprehensive quality and self-employment ability.

2. The Status Quo and Deficiency of Domestic Electromechanical Professional Innovation Education

With the popularization of national college competitions such as the Challenge Cup and Robot Competition, the science and technology innovation activities of college students have become an important part of the education of higher education institutions. The innovation activities of electromechanicals occupy a large proportion. The school started from the interest group, gradually focused on guidance and training, and participated in the competitions of colleges, schools, provinces and national level. The prosperous and technological innovation activities of college students have promoted the development of scientific and technological innovation to a certain extent, but the lively scene cannot hide the problems. Through the summary of the status quo of mechanical and electrical engineering innovation activities, and the comparison with foreign countries, China's electromechanical professional science and technology innovation has certain deficiencies.

a) The concept of innovation and creation has not been fully implemented. From the perspective of students, participation in innovation activities often occurs like this. When they first started participating, they rushed to the top, with a large number of people, and their enthusiasm was high, but often, most of them don’t make a good end. According to one source, more than 300 people registered in the 1996 Mathematical Modeling Competition of a certain college in China, and after one holiday training, only 30 people insisted. In addition, many electromechanical students are engaged in extracurricular science and technology activities, and the starting point of scientific and technological activities is relatively low. Most students participate in extracurricular science and technology activities only by short-term assaults, pursue "short, flat, fast", lack clear learning objectives and correct attitudes, and fail to achieve the purpose of knowledge accumulation and practical experience summary. The Swiss Federal Institute in Lausanne conducted a survey of a technology innovation team of 14 teams of 54 students. The results showed that 75% of students' motivation for participation came from the desire for technology. This also shows the gap in innovation education in China. The concept of innovation has not been effectively implemented. The lack of learning goals and motivation of students indicates that our colleges lack strength in the implementation and cultivation of innovative ideas, and they are still not doing enough.

b) The level of innovative personnel is uneven. From the basic knowledge and practical ability of the students participating in the innovation activities, the current professional quality of mechanical and electrical engineering students also has a downward trend, mainly reflected in the following aspects:

(1) Students have insufficient design and drawing skills. The blind learning of students' basic theory leads to the lack of basic skills and the rejection of traditional mechanical knowledge. They advocate the so-called popular professions such as electronics, control and software;

(2) The application of new technologies, new methods and new methods is insufficient. Students

often only know that textbooks or teachers have taught classic design methods and cases, and new ideas and ideas in related fields are weak;

(3) Students have weak hands-on ability and poor experimental ability;

(4) The ability of students to solve problems using the knowledge they have learned is not strong.

In addition, from the perspective of graduate professional structure, mechanical and electrical engineering is a comprehensive discipline including mechanical, electronic, electrical and computer. At present, the graduate students of this major in domestic universities are generally from the mechanical profession, and the students have a single structure. In terms of the training of mechanical and electrical professionals, Germany, in addition to the mechanical profession itself, hopes to control professionals, computers and other professionals to enrich.

3. Mechanical and Electrical Engineering Professional Training Objectives

The construction of mechatronics engineering is to serve the training of talents in the later stage. It is one of the ways to realize the diversification of talent cultivation by formulating different training programs and training modes according to the different characteristics of talents.

3.1. Innovative Talent Training

The traditional specialty of the mechanical and electrical engineering profession has its own characteristics, but in the current development situation, the profession is advancing and developing in the direction of continuous innovation. Therefore, cultivating innovative talents is the inevitable development trend of electromechanical profession. The training mechanism for innovative talents needs support in hardware and software. In the implementation of quality education with innovation as the core, curriculum structure innovation is the foundation, and innovation of teaching methods and means is an essential link. Faced with the students' thinking about solving problems is limited by the status quo of textbooks, the focus of promoting innovation should be on the innovation of the teaching content system. An important feature of innovation is forward-looking and novelty. This requires teachers to map the latest scientific research results and scientific concepts to the teaching content in time, reflecting the characteristics of the times, openness, diversity and comprehensiveness. Help students build a concept of an objective material world that is developed rather than isolated and static, guiding them to explore new knowledge and cultivate their innovative spirit. Opening front-end lectures can be part of the teaching supplement. Through the cutting-edge lectures on professional knowledge, students can make up for the lack of innovative knowledge, and at the same time expand the space for students' thinking, so as not to be limited to boring books. To a certain extent, it can stimulate students' enthusiasm for innovation and realize the joy of learning.

3.2. Applied Talent Training

In the talent training mode of mechatronics engineering, the cultivation of applied talents is also an important way to cultivate them. This method should be adjusted and planned in the curriculum. Firstly, establish links with computer-related courses in the curriculum system, such as the addition of "computer control technology" and other courses, to play its role in the computer class series of induction and leadership. In the practice operation, the procurement and application of the simulation teaching system of FESTO logistics processing system enables students to use the

three-dimensional graphical simulation teaching system with the same physical object in the integrated software environment to complete the whole process of designing and debugging the system program. This solves the problem that the number of sets of experimental equipment is small, expensive and fragile. The design and procurement of PLC motion and temperature control test chambers were completed, which made the teaching content closer to the actual needs of the factory and solved the problem of closed-loop control and motion control vacancies in PLC practice teaching.

In this way, we can better cultivate the application-oriented talents that are needed for the enterprise and prepare for the school-enterprise talents.

3.3. Interdisciplinary Compound Talent Training

For the cultivation of talents, the selected goals and directions are the key. The disciplines involved in the field of mechatronics engineering are extensive, and most of them are interdisciplinary. Therefore, the cultivation of compound talents can be carried out through interdisciplinary methods. The following two basic characteristics are explored and cultivated.

(1) The characteristics of knowledge are embodied in the basic theoretical knowledge and basic skills of the mechanical and electrical disciplines, as well as the knowledge and skills of other relevant disciplines. Multidisciplinary knowledge crosses and merges to form new knowledge, which becomes the starting point of new ways of thinking and comprehensive ability. This helps solve the problems of electromechanical professional disciplines and is more likely to generate innovations.

(2) The ability characteristics are reflected in the broad foundation and the integration of multidisciplinary knowledge. They are not the simple addition of the abilities of each discipline, but the mutual complementarity of each other and the formation of comprehensive capabilities on the basis of multiple abilities. In practice, we broaden the foundation of knowledge and generosity, thus providing conditions for the integration of multidisciplinary knowledge and comprehensive functions for different professional knowledge. Compound talents can achieve the transcendence of original knowledge and ability through the integration of electromechanical profession and his subject knowledge and ability. That is, they can use a new way of thinking to think about the problems encountered and propose new solutions.

4. Investigation on the Current Situation of Mechatronics Innovation and Entrepreneurship

4.1. Research Plan and Questionnaire Design

In terms of the questionnaire content, this survey is mainly divided into three modules: the comprehensive situation of students' personal innovation and entrepreneurship, the education situation of innovation and entrepreneurship in the university, and the construction situation of big data in the university. A total of 23 questions are set including single choice, multiple choice, subjective questions and other types. Through the logical correlation design function of the questionnaire, respondents with different identities are asked to answer questions in different modules. Empirical investigation is conducted from the perspectives of educators and educatees to obtain more accurate statistical data, aiming at understanding the characteristics and innovation and entrepreneurship development of these innovative and entrepreneurial students majoring in mechanical electronics. And the current situation and existing problems of innovation and entrepreneurship education in domestic colleges and universities.

4.2. Mathematical Statistics

In this paper, SPSS20.0 data statistics software was used to code and input the valid data obtained from the questionnaire, and further reliability and validity test, descriptive statistics, t-test, correlation analysis and regression analysis were carried out. The t-test formula used in this paper is as follows:

$$t = \frac{\overline{X} - \mu}{\frac{\sigma x}{\sqrt{n-1}}} \tag{1}$$

$$t = \frac{\overline{x_1} - \overline{x_2}}{\sqrt{\frac{\sigma_{x_1}^2 + \sigma_{x_2}^2 - 2\gamma\sigma_{X1}\sigma_{X2}}{n-1}}} \tag{2}$$

4.3. The Results of the Survey

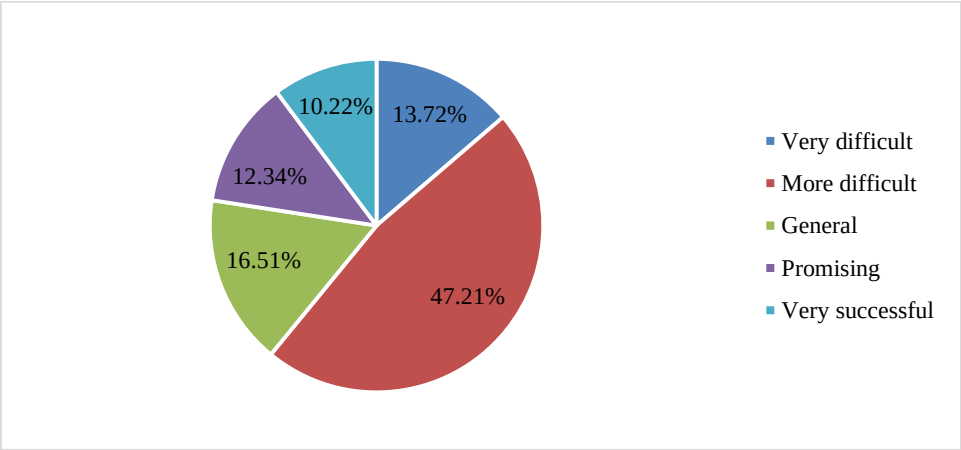

Figure 1. Survey results on the difficulty of innovation and entrepreneurship

As shown in Figure 1, according to the questionnaire statistics, 47.21% of the surveyed students think that the current situation of innovation and entrepreneurship of college students is "relatively difficult", 12.72% choose "very grim", 16.51% choose "general", 22.56% choose "more hopeful" and "highly successful". This shows that most entrepreneurial students are cautious about the current situation of innovation and entrepreneurship and can rationally evaluate and view the difficulties they face.

Table1. College innovation and entrepreneurship education in all aspects of satisfaction

	Great satisfaction	Satisfied	General	Not satisfied
Management services	21.05%	40.62%	28.76%	9.57%
Entrepreneurial platform	18.74%	36.82%	29.07%	15.37%
Resources to support	25.82%	30.15%	27.69%	16.34%
Incentive mechanism	24.73%	30.54%	29.81%	14.92%

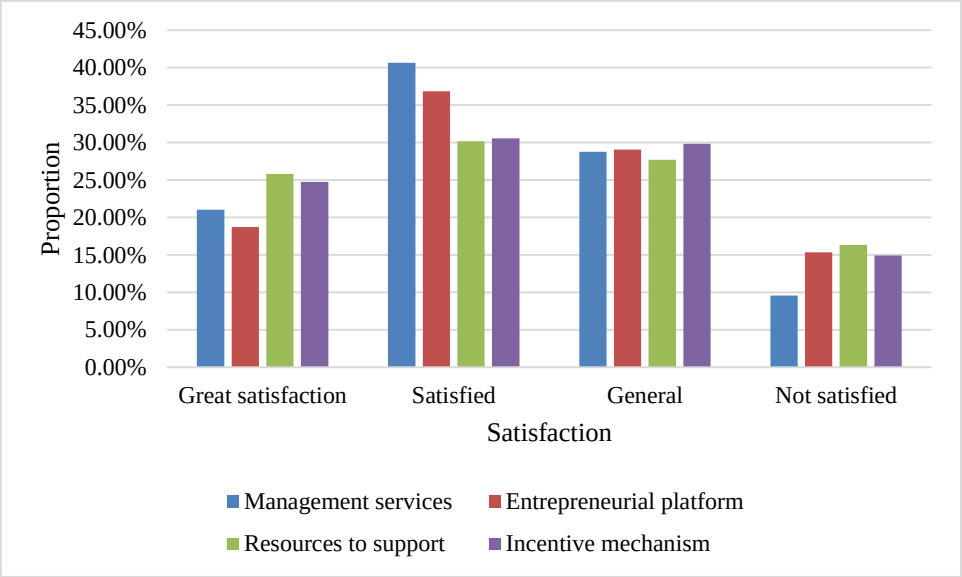

Figure 2. College innovation and entrepreneurship education in all aspects of satisfaction

As shown in Table 1 and Figure 2, the degree of satisfaction of the entrepreneurial students in the specific survey on innovation and entrepreneurship education in their colleges and universities is relatively high in terms of "management services" and "very satisfied" and "relatively satisfied" students both exceeds 60%. The satisfaction of "resource support" and "incentive mechanism" is relatively low, "unsatisfied" students accounted for about 30%; "Entrepreneurship platform" and other aspects of the overall evaluation is relatively general. This partly reflects the domestic arts colleges all aspects of the creative education, the development status of students surveyed in "management services", the school is relative, in the "" business platform", etc, also need to further efforts, particularly in the "resource support", "incentive mechanism" and so on, is the weak link of the entrepreneurship education of innovation, There's a lot of room for improvement.

5. The Integration of Innovation and Entrepreneurship Education In Mechatronics

5.1. Use Innovative Courses to Strengthen Theoretical Guidance and Use Cutting-Edge Lectures to Stimulate Innovation Interest

Invention and innovation are a theory, and theory is the basis for guiding practice. It is widely believed that innovative thinking comes from a sudden spark of thought, which is caused by accidental epiphany. This is an intuitive idea for people. The former Soviets created the "inventive problem solving theory". After decades of evolutionary revision, it has become the best tool for innovation in Europe, America, Korea and Japan. It is even called one of the three theories of human evolution. Mr. Zhang Wucheng, a creative scholar and an adjunct professor at Tsinghua University, pointed out that innovation theory education is indispensable.

5.2. Create an Innovative and Entrepreneurial Education Faculty Team

Education is grand and teacher-oriented. If teachers' innovation and entrepreneurship are not strong, it is impossible to achieve strong innovation and entrepreneurship. It can be seen that a high-quality teaching team is the key to developing innovative entrepreneurship education.

Therefore, applied universities should strengthen the construction of teachers and train a group of "double-type" teachers with both professional knowledge and practical ability. On the one hand, to cultivate teachers' innovative spirit and entrepreneurial awareness, we can strengthen the school's cooperation with local governments, industry associations, and enterprises. The electromechanical profession has repeatedly assigned teachers to the company for internship exercise, increasing teachers' social experience and improving practical ability. On the other hand, optimize innovation and entrepreneurship education institutions. The mechanical and electrical profession introduced two enterprise engineers and senior technicians to serve as professional instructors. It also hired successful entrepreneurs and previous alumni as part-time teachers to carry out innovative and entrepreneurial activities in the form of regular lectures. A team of "double-skilled" teachers has been built.

5.3. Open Laboratory as A Practice Platform

The electromechanical profession is a multidisciplinary specialty that combines mechanical engineering, electronic engineering, and automatic control. The connotation of innovation and entrepreneurship education is also the intersection of disciplines and technology. Therefore, the experimental sites and experimental instruments required for the innovation and entrepreneurship education practice activities are inseparable from the professional laboratories of multiple disciplines. The MCU training laboratory, the mechatronics laboratory, and the mechanical innovation design laboratory are open to students during the extracurricular time of learning, as a platform for the practice platform of innovation and entrepreneurship education. It not only promotes the implementation of innovation and entrepreneurship education practice activities, but also saves experimental resources in the school and improves the utilization rate of experimental equipment.

6. Summary

Through the teaching reform, research and exploration of the mechanical and electrical engineering profession, the quality of education and teaching can be effectively improved. The continuous updating of the concept of education and teaching can make the electromechanical professional curriculum system, teaching content, teaching methods and teaching methods have obvious improvement. Realize the organic integration of classroom theory teaching and practical teaching, and achieve the engineering practicality, systemicity and extensibility requirements of teaching content. The curriculum construction and teaching reform of electromechanical majors is a long-term systematic project. Combining the cultivation of talents with the current social situation, and continuously exerting the role of applied and innovative talents in the development of professional disciplines, professional teachers need to make unremitting efforts to complete them. It will also be a work that is persevering, deepening, and advancing with the times.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this

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Conflict of Interest

The author states that this article has no conflict of interest.

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