

Integration of Innovation and Entrepreneurship Education in Mechanical Specialty in Colleges and Universities

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Abstract: With the rapid development of economy and society and the continuous reform and updating of science and technology, the society demands more and more innovative and entrepreneurial talents, and universities are also the incubators of innovative and entrepreneurial talents. How to integrate innovation and entrepreneurship education into personnel training In the process, how to organically combine mechanical professional education with innovation and entrepreneurship education makes it even more important for university mechanical students to grow into applied talents with innovative thinking and pioneering capabilities in the new century. In order to meet the demand for talents in the modern machinery manufacturing industry, the paper integrates and reconstructs the mechanical curriculum system and teaching model from the aspects of curriculum setting, theoretical teaching and practical teaching model reform, students' innovation and entrepreneurship training, etc. To achieve the full integration of mechanical specialty and innovation and entrepreneurship education, and promote the healthy development of college mechanical specialty.

1. Introduction

Undergraduate science and technology innovation and entrepreneurship activities are a kind of science and technology academic activities that are independently developed by college students under the guidance of teachers and the relevant departments and schools of the country. It is an educational activity that helps college students cultivate innovative spirit, establish entrepreneurial aspiration, and develop entrepreneurial quality and entrepreneurial ability. Practice has shown that college student science and technology innovation activities that are closely integrated with the characteristics of students' professionalism are not only conducive to the promotion and improvement of college students' professional knowledge and skills, but also are conducive to the fostering of college students' teamwork spirit and beneficial to students to make full use of the talent cultivation resources of universities. And it helps create a good creative environment and

atmosphere. However, due to capital, equipment and other reasons, only some students can participate in it. Judging from the long-term significance of education development, only when innovation and entrepreneurship education is applied to all students and integrated into the entire process of talent cultivation can all students continuously improve their innovative spirit, entrepreneurial awareness and entrepreneurial ability. This article takes the mechanical specialty to carry out innovation and entrepreneurship education as an example to illustrate the measures to integrate the idea of innovation and entrepreneurship education in the process of talent cultivation to improve the practical ability and innovation and entrepreneurial ability of college students.

2. Problems and Causes of Carrying out Innovation and Entrepreneurship Education in the Past

From the perspective of previous innovation and entrepreneurship education, although there have been some achievements, there are also many problems.

2.1. Small Number of Participants, Small Scale, and Slow Growth

The initial stage of innovation and entrepreneurship education is a stage of exploration, lack of experience, and a small number of participants, but at the same time it has expanded its influence and pointed out the direction; The mid-term belongs to the stage of rapid growth. It has accumulated certain experience on the basis of the initial stage, fully mobilized the enthusiasm of the students and created a high enthusiasm. In the later period, it was a smooth transitional period. The number of students who could be tapped was limited. Some students lost their passion for creativity.

2.2. Only Pay Attention to Theoretical Study, and the Practice Is Weak

Many courses only pay attention to the study of basic theories, ignoring the practical aspects, so that students can't flexibly use the theoretical knowledge they learned to solve practical problems. In practice, students are only required to visit because of concerns about various factors, and there is little opportunity for hands-on operation. Just one-sided explanation of the basic theory, making many courses sound boring and hollow, resulting in students full of money, but only on paper, poor hands-on ability.

2.3. Obsolete Textbooks, Obsolete Contents of Some Courses

The teaching materials used have been updated too slowly. Some courses rarely touch on the frontiers of subject development, and few of the new content required for the development of the times are explained.

The content of teaching materials lacks modernity and novelty, and has not incorporated modern design methods and advanced manufacturing techniques into the teaching process of mechanical basic courses. The teaching content, methods, and practical aspects of some courses are fixed in the traditional teaching mode. For example, the teaching of mechanical principles and mechanical design courses still use traditional teaching materials, adopting the teaching style of teachers and students listening to the students, lack of teacher-student interaction, and lack of innovation and entrepreneurship for students' ability education.

2.4. Student Science and Technology Competition Works Reliability is Poor

Lacking of hardware resources such as practical venues and required computers, some of the extra-curricular design competitions conducted by students are often based on instructors. This greatly limits the students' active thinking. Insufficient funds for student activities often limit the completion and improvement of works due to financial problems, limiting the refinement of the works; Students' utilitarianism in participating in science and technology competitions is too strong, and their works may only be reluctant to compete on the field, thus winning the rankings. Some of the pre-game demonstrations were very good. They had problems during the competition and they were defeated. The reason is that on the one hand there are problems with the design plan and the reliability is poor; on the other hand, it is only for the sake of the competition to pass through, and the problem of lack of attention to design quality and operational reliability. Many design works lack continuity and do not pay attention to the extraction, conciseness, and summarization of design techniques and design essences. This results in the lack of continuous application of design ideas and techniques among students at all levels and the further sublimation of innovative thinking methods.

3. General Idea of Teaching Reform

Mechanical design is a design backbone technology basic course that is required for undergraduates majoring in engineering and mechanical engineering in engineering colleges. It is a highly practical course. It has a significant supporting role in cultivating students' ability to acquire new knowledge and self-study, problem analysis and problem solving, use of modern tools, engineering practice, innovation, and application development capabilities of mechanical products. In order to adapt to the requirements of mechanical professional cluster transformation reform and innovation and entrepreneurship education, and to cultivate applied and innovative practical talents, according to the teaching status quo of mechanical design courses, the author believes that the teaching reform of mechanical design courses should follow the following ideas.

a) Implementing the teaching ideology that has been applied to study and applied closely and closely linked with the actual situation of the project, teaching is based on the "training of engineering practice ability and innovation ability" as the main line.

b) Change single teaching method and means lag behind the status quo, based on the problem, case, project as a carrier, carry out tasks pull teaching mode, to make the students interested in learning, research and practice.

c) In accordance with the concepts of "theoretical teaching, experimental teaching, curriculum design, and the second class of a game of chess", we strengthened the practice link, paid attention to the guidance of students' independent learning and research exploration, and gradually and systematically increased the ability of engineering practice and innovation.

4. Experiment

4.1. Questionnaire Design

Questionnaire survey is a basic and commonly used research method to search information through the distribution and recovery of the questionnaire. For the purpose of this study, based on Johnson's language learning cognition and presentation questionnaire, the questionnaire of this paper is formulated. After revision and preliminary test, the questionnaire is determined to be the

formal questionnaire supporting this paper. The questionnaire is for 250 students from two universities, and the title is "Innovation and entrepreneurship education reform of mechanical specialty in Colleges and Universities". 300 questionnaires were distributed and 295 valid questionnaires were collected, with an effective rate of 98.3%.

4.2. Reliability Test of the Questionnaire

The so-called half-reliability is to divide the questionnaire into two halves, and then calculate their reliability coefficients separately. When the reliability coefficients of the two halves are the same, the Spearman-Brown formula is often used to obtain the reliability coefficient of the entire questionnaire.

$$r_{SB} = 2r_{SH} / (1 + r_{SH}) \quad (1)$$

When the coefficients of the two halves are not the same, the Lulun formula should be used for calculation.

$$r_{Lulon} = 1 - \frac{S_{a-b}^2}{S_t^2} \quad (2)$$

5. Discussion on Reform Plan of Innovation and Entrepreneurship in Mechanical Engineering

Table 1. Investigation on innovation and entrepreneurship reform scheme of Mechanical Engineering

	College A	College B
Perfecting the Institutional Construction of Innovation and Entrepreneurship in Colleges	28.1%	27.6%
Integrate Innovation and Entrepreneurship Education Concepts into the Entire Process of Talent Cultivation	24.3%	23.4%
Experiment Teaching Reform Integrates Idea of Innovation and Entrepreneurship	23.8%	25.1%
Give Play to the Role of Educating People in the Second Classroom and Strengthen Student Engineering Practice	23.8%	23.9%

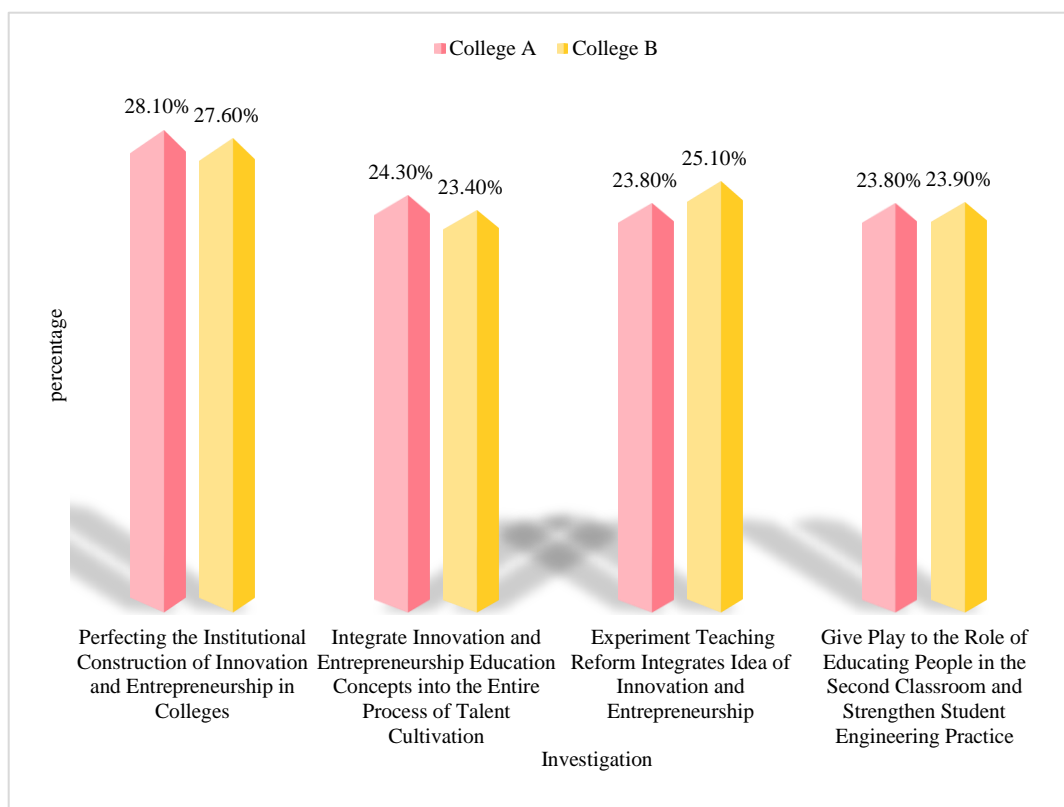


Figure 1. Investigation on innovation and entrepreneurship reform scheme of Mechanical Engineering

According to the data obtained from the survey of two colleges and universities, as shown in Table 1 and Figure 1, the innovation and entrepreneurship teaching reform strategies can be summarized as follows.

5.1. Perfecting the Institutional Construction of Innovation and Entrepreneurship in Colleges

According to the relevant documents of the school's innovation and entrepreneurship work, combined with the actual work of our college, we will formulate an effective incentive system for college students' innovation and entrepreneurship, and form a document to ensure implementation. The rules and regulations should have the following content.

(1) College Innovation and Entrepreneurship Leading Group Members and Division of Labor

College innovation and entrepreneurial work should become the top job of the college. It should be composed of the dean or the secretary of the college as the team leader, vice president and deputy secretary of the teaching team as the deputy leader, the college's director of the teaching and research office and the student work office staff as the leading group, responsible for The comprehensive development of the college's innovation and entrepreneurial work.

(2) College Innovation and Entrepreneurship Workflow

The development of a detailed and full working process not only ensures that the special competition participates in the project's high quality and good results, but also can effectively carry out daily activities and increase the breadth and depth of innovation and entrepreneurial work.

(3) Give rewards

In conjunction with the relevant regulations of the school, we will formulate incentives for teachers and students who have performed outstandingly well in the innovation and entrepreneurial activities. Teachers' incentives: teachers in the current year to guide the innovation and entrepreneurship project awards and colleges and universities two-level appraisal award linked to the college funding under the conditions of material or financial incentives; Students' incentive methods: Students participate in innovation and entrepreneurship projects during the year or their awards are linked with honors and credits such as two-pronged, two-pronged, and first-class honors, and become integral credits for students' comprehensive quality.

5.2. Integrate Innovation and Entrepreneurship Education Concepts into the Entire Process of Talent Cultivation

Course Design Teaching Reform Curriculum Design is an important way to enhance students' awareness of innovation, develop analytical skills and solve practical problems, and improve their ability to work independently. It is recommended that the "mechanical design course design" and "mechanical principle course design" "through the same topic" be integrated into the mechanical basic comprehensive course design. In this way, it is possible to combine the design of the actuators of mechanical products, the design of motion scales, the analysis of motion and dynamics, the design of transmission systems, and the structural design of parts, so as to ensure the integrity, systematization and comprehensiveness of the design process. Being closer to the actual situation of the project, students can more fully exercise their engineering practice ability, innovation ability and application development ability of mechanical products.

Course design topics can be given and self-made. The design topic should have practical significance and theoretical value, and promote the integration of engineering practice. Project practical problems, scientific research projects, mechanical innovation competition projects, innovation experiment programs for college students at all levels, and innovation and entrepreneurship training program projects can be integrated into the curriculum design, closely integrated with the actual production and technological development.

5.3. Experiment Teaching Reform Integrates Idea of Innovation and Entrepreneurship

The experiment is an important method for verifying the theory and cultivating students' innovative consciousness, practical ability and engineering quality. It is a training method to improve students' experimental skills and lay the foundation for the future innovation and entrepreneurship practice. It is a field practice based on students' subjective initiative. In the mechanical design experiment teaching, in addition to retaining some important traditional experimental items, an advanced experimental platform should be introduced to provide enough comprehensive, design, and innovative experimental items.

In the experimental process, it is necessary to change the original teaching experiment to the experimental teaching state, to integrate experiments and teaching, to understand and perceive theoretical teaching content in experiments, and to obtain experimental evidence in theoretical teaching. In the comprehensive, design, and innovative experiments, some optional open experiments are set up to provide students with a choice of experimental content. The implementation of the laboratory opening system provides students with a choice of experimental time.

5.4. Give Play to the Role of Educating People in the Second Classroom and Strengthen Student Engineering Practice

Ability and innovation ability to cultivate mechanical design curriculum teaching reform, we must not only focus on updating the contents of experimental teaching, curriculum design for engineering, but also to combine curriculum teaching with extracurricular science and technology innovation practice activities to make up for the lack of theoretical hands-on practice. Extend curriculum content to extracurricular innovative design practices, train students' design concepts and design skills, and further develop students' engineering practice, innovation and scientific research capabilities. The typical scientific research results have been transformed into teaching cases, experimental projects, and curriculum design topics through proper extraction and processing, and serve as high-quality resources for mechanical design teaching.

Scientific research and training is an effective way to cultivate students' independent research ability. While cultivating students' sense of innovation, training innovative thinking, and improving their innovation ability, they can effectively help students master the frontier knowledge of science and technology and industry background knowledge. Local colleges and universities must provide students with the necessary conditions for participation in scientific research training. Organize students to participate in teachers' scientific research projects, early-entry topics, early-entry labs, and early-entry teams. Promote and encourage students to acquire new knowledge by participating in scientific research projects. Study in the study, improve the academic realm, enhance the adaptability to social needs through scientific research training.

6. Summary

In promoting innovation and entrepreneurship education, the mechanical specialty needs to integrate the idea of innovation and entrepreneurship education into the entire process of personnel training. It is necessary to correctly grasp the relationship between innovation and entrepreneurship education and professional education. Innovation and entrepreneurship education is by no means a skill training activity outside of professional education. In a sense, innovation and entrepreneurship education in institutions of higher learning cannot be judged by the number of simple college student innovation projects, the level of winning awards, and the number of entrepreneurial entities. We should use college students to accept the innovative qualities of innovation and entrepreneurship education as the core. Promote and evaluate the quality of higher education talents fostered by professionalism.

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Data Availability

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

Conflict of Interest

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

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