

The Construction of Innovation and Entrepreneurship Courses for College Students Majoring in Engineering Materials

Dejian Sun^{1*}, Ka Gao², Yang Gao¹

¹ School of Materials Science and Engineering, Zhengzhou University of Aeronautics, Zhengzhou, China

² School of Mechanical Engineering, University of Shanghai for Science and Technology, Shanghai, China

Email Address

sdjedu@zua.edu.cn (Dejian Sun)

*Correspondence: sdjedu@zua.edu.cn

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Abstract:

In China, innovation and entrepreneurship education has become an important content of cultivating talents in colleges and universities. In the engineering materials major, innovation ability is the core content. Therefore, it is an important direction to strengthen the educational effect of materials majors to deeply explore the construction of innovation and entrepreneurship courses for college students majoring in engineering materials. This paper explores the construction of engineering materials professional college students innovation entrepreneurship course, first discusses the importance of college students innovation entrepreneurship course construction, then from the training innovative entrepreneurial spirit, improve innovation entrepreneurial ability analyzes the engineering material professional college students' innovative entrepreneurship education goal, and stand in building business platform, build course system two angles of engineering materials professional college students' innovation entrepreneurship course construction optimization path of the research, finally the systematic summary, for reference.

Keywords:

Engineering, Materials Major, College Students' Innovation And Entrepreneurship; Curriculum Construction

1. Introduction

In his 20th plan, General Secretary Xi pointed out that we should implement the strategy of rejuvenating the country through science and education, strengthen the support of talents in the modernization construction, and emphasized the importance of improving the scientific and technological innovation system. For our country, in order to complete the overall construction of modernization, we must adhere to innovation and strengthen the strategic scientific and technological strength while

optimizing the allocation of innovation resources. In the engineering materials major, cultivating college students' innovation and entrepreneurship ability has become an important direction for the future development of universities. Therefore, it is urgent to cultivate college students' innovation and entrepreneurship ability and construct innovation and entrepreneurship courses.

2. The Importance of Innovation And Entrepreneurship Course Construction for College Students Majoring in Engineering Materials

In recent years, core literacy has become an important goal in the field of education, and most schools train students with employment as the core. For students, entrepreneurship is also a part of employment, and compared with regular employment, entrepreneurship itself has the advantages of innovation, and can make great contributions to the development of the field and social progress. Compared with foreign countries, China lacks technology-related talents and innovation-related talents in engineering materials majors, whether in material research and development or material industry optimization. At the same time, there are also problems such as insufficient conversion rate of innovation and entrepreneurship achievements and poor entrepreneurial skills, which need to be paid attention to by colleges and universities to give full play to the role of innovation and entrepreneurship courses. On this basis, it will help students to establish the innovative and entrepreneurial spirit, improve students' innovation and entrepreneurship ability, and then inject vitality into the engineering materials major, and lay a good foundation for the development of the field.

3. Innovation and Entrepreneurship Education Objectives of College Students Majoring in Engineering Materials

3.1. Cultivate the innovative and entrepreneurial spirit

The spirit of innovation itself is the quality and consciousness to break common sense and create new content or unique content. Entrepreneurship refers to the behavioral characteristics that emerge in the process of fully exerting creativity and writing innovative content into reality. Cultivating the innovative and entrepreneurial spirit of college students majoring in engineering materials can help students to integrate and utilize the existing resources, build new projects in the market, and then create value. At the same time, under the guidance of entrepreneurial spirit, college students can also build a good atmosphere for innovation, inject new vitality into national development and progress, set up the idea of breaking conventions, gradually make the impossible possible, overcome problems, and then realize innovation.

3.2. Improving our capacity for innovation and entrepreneurship

Innovation ability mainly refers to the ability to explore new inventions, new methods and new theories, which can constantly find new paths in the process of practice, and point out the direction for others while looking for the possibility of breaking through the current limitations. Entrepreneurial ability mainly refers to college students who use their own knowledge and ability to create or discover new fields, and effectively develop the field with the help of their own knowledge and ability. Improving students' innovation and entrepreneurship ability can effectively

strengthen students' thinking, and improve students' core qualities such as organizational ability, leadership ability and teamwork ability, so as to meet the purpose and needs of talent training and lay a good foundation for social development.

4. The Optimization Path of Innovation and Entrepreneurship Course Construction for College Students Majoring in Engineering Materials

4.1. Build an entrepreneurship platform

First of all, universities including engineering materials majors should properly open their laboratories, give full play to the resource advantages of materials majors, and share resources with the help of professional structure, so as to lay a good foundation for college students to follow-up innovation and entrepreneurship, and provide technical support. In the process of opening, a good plan should be made in advance, the opening time should be stipulated, the opening purpose and rules and regulations of the laboratory for college students, and the premise of ensuring safety to cultivate [1] the innovation and entrepreneurship ability of college students. At the same time, teachers can also carry out teaching through experiments to attract students' attention and cultivate students' innovative thinking and practical ability. With the help of the entrepreneurship platform, teachers can also construct the existing innovation and entrepreneurship courses, optimize the teaching effect, and cultivate students' innovative and entrepreneurial spirit and ability.

Secondly, universities including engineering majors should strengthen the construction of the existing entrepreneurial bases. To be specific, colleges and universities should make reasonable use of existing resources, build training and innovation demonstration bases, and set up supporting scientific and engineering research platforms, so as to form a complete and perfect talent training and innovation pilot area, and create an innovation and entrepreneurship base for college students. In this process, university administrators should connect with local enterprises, try to reach cooperation, sign university-enterprise cooperation agreements, and provide students with more opportunities for innovation and entrepreneurship. At the same time, cooperative enterprises also need to train students on innovation and entrepreneurship, help students understand innovative thinking, share entrepreneurial experience, and provide experience for future entrepreneurship.

Finally, universities with engineering majors should share the existing information and literature resources. At present, information technology has become the label of The Times. In the field of education, the cultivation of students' innovation and entrepreneurship ability and spirit is also inseparable from the help of information [2]. On the one hand, colleges and universities themselves need to build the Internet, build a sharing platform on the basis of the original library book information, and even build a database to provide students with diversified resources and lay a good foundation. On the other hand, colleges and universities also need to contact with local innovation and entrepreneurship education institutions, provide students' employment information for enterprises and institutions after students' consent, and find a reliable path for students to pursue innovation and entrepreneurship, so as to promote the construction of innovation and entrepreneurship courses.

4.2. Construct the curriculum system

First, integrate professional education and innovative education. First of all, colleges and universities need to understand the current objectives and requirements of innovation and entrepreneurship education in materials discipline, and clarify the positioning of talent training, and then effectively adjust the professional curriculum system on this basis, and integrate the existing innovation and entrepreneurship education and professional education [3]. Specifically, college materials majors can add new courses to general education, such as introduction to college students' innovation and entrepreneurship practice, career planning courses, materials social practice courses, etc. When the setting, mainly freshmen or sophomore students, by the entrepreneurship guidance center unified teaching. In the third stage, it is necessary to strengthen the practice course of science and technology innovation and professional skills training courses for college students, and insert the practical training link to strengthen students' innovation and entrepreneurship ability, help students understand the basic process of entrepreneurship, strengthen entrepreneurial awareness, and promote students' all-round development.

Second, we need to build a platform for scientific research projects. For engineering materials majors, scientific research projects are the basic content, and also a necessary prerequisite to drive students' innovation and entrepreneurship. At the same time, the scientific research project itself can also be regarded as an extension of professional courses, which can effectively improve students' comprehensive ability and independent thinking ability. When building a research project platform, universities should take into account both teachers' research projects and students' innovation and entrepreneurship projects. The teacher research project mainly focuses on the youth innovation training project and the horizontal cooperation project as the core, strengthens their own entrepreneurial experience through scientific research, explains the relevant content of innovation and entrepreneurship in the project, and sets a good example for students. Students' innovation and entrepreneurship projects are divided into teachers' guidance and independent problems. Through the projects, students' ability to find, analyze and solve problems is strengthened, so as to improve the ability of independent thinking and strengthen the spirit of innovation and entrepreneurship.

Third, to hold the materials-related innovation skills competition. For college students, the material innovation skills competition is also an effective way to cultivate students' innovation and entrepreneurship ability. Material innovation skills competition itself belongs to a form of comprehensive education activities, teachers can guide students, from the topic analysis to design, to complete the defense, let the student process experience material innovation process, and in the process to guide students to establish the team spirit and firm spirit, strengthen the students' ability to [4]. When holding the innovation skills competition, the students need to choose the topic independently or under the guidance of the teacher, and then the teacher gives the course guidance to the students according to the content of the topic selection, so as to optimize the innovation and entrepreneurship courses.

Fourth, start the second classroom practice. The second classroom practice mainly refers to the second practice in addition to the routine practice classroom. In the course of materials professional innovation and entrepreneurship ability, the second classroom practice is also one of the most important ways. With the help of the second classroom practice, students can deeply explore the classroom knowledge and entrepreneurship related content, and integrate the existing resources, adjust the ideas of innovation and entrepreneurship, and then walk out of their own development path.

For example, some universities hold courses through alumni discussion activities, and invite well-known experts in the field to teach students, to help students to understand the most advanced research methods and science and technology in the field of materials, and broaden the innovation and entrepreneurship ideas for students [5]. At the same time, some courses also include practical links, so that students can find new optimization paths from the practice process, cultivate students' innovative and entrepreneurial thinking, and achieve their educational goals.

5. Conclusions

Material majors have high requirements for students' innovation ability and practical ability. Under the influence of the construction of innovation and entrepreneurship courses, college students majoring in engineering materials can further strengthen their practical level and innovation ability, and establish an innovative and entrepreneurial thinking mode to meet the core needs of talent training. In order to further speed up the speed of engineering materials professional college students' innovation entrepreneurship course construction, colleges and universities need to build business platform and build course system in two ways to optimize the course, give full play to the role of the innovative entrepreneurship course, and make course characteristics, further exploration of material talent training, contribute to the national development and progress.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Author Contributions

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References

- [1] Mei, D.; Zhu, S.J.; Guan, S.K. Practical exploration of improving the innovation ability of materials major undergraduates by carrying out the innovation and entrepreneurship training program for college students. *Modern Education Equipment in China*, 2022, 19, 143-145.
- [2] Dai, S.Y.; Qi, P.Y.; Wang, G. Research on the practical teaching reform of composite Materials Science and Engineering major based on the cultivation of innovation and entrepreneurship ability - Take the polymer chemistry course as an example. *Shandong Chemical Industry*, 2021, 50(03), 182-183.

- [3] Fan, P.F.; Xie, Y.; Xu, Q.H.; Zhong, R. Teaching reform and practice of professional courses based on the cultivation of innovation and entrepreneurship ability - Take the course of Synthetic Chemistry of Materials as an example. *Guangdong Chemical Industry*, 2021, 48(01), 198-199 + 212.
- [4] Xiao, Z.L.; Liang, T.X.; Jiang, H.H.; Wang, C.M.; Cao, X.X; Chen, J.Y. Research on the cultivation of core literacy of innovation and entrepreneurship among college students majoring in materials. *Theoretical Research and Practice of Innovation and Entrepreneurship*, 2020, 3(13), 66-67.
- [5] Zhan, L.; Liao, P.; Qin, X.G.; Ma, Z.; Lu, Y. Research on the path of innovation and entrepreneurship education into material Science and Engineering Talent Training under the background of new Engineering. *Teacher*, 2023, 12, 117-119.



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