

Research on the Reform Path of Innovation and Entrepreneurship Education in Applied Universities Based on the Integration of Science and Education

Wu Peng

Liaoning Communication University, Shenyang, 110136, China

Keywords: integration of science and education; Applied university; Innovation and entrepreneurship education; Reform Path

Abstract: This paper explores the reform path of innovation and entrepreneurship education in applied universities under the integration of science and education. It first reviews the development process of innovation and entrepreneurship education both domestically and internationally, identifying existing problems in China's applied universities such as unequal resource distribution, insufficient system construction, and lack of experienced teaching staff. Theoretical analysis and case studies demonstrate the significance of integrating science and education in improving teaching quality through knowledge updating, practical ability enhancement, and innovative thinking stimulation. Based on these findings, the paper proposes specific reform strategies including building diversified teaching models (case teaching, project-driven learning, interdisciplinary collaboration), strengthening faculty development (introducing industry experts, teacher training), and improving support service systems (entrepreneurship incubation platforms, industry-university cooperation mechanisms). Finally, it outlines implementation paths and safeguard measures at both government and school levels, emphasizing the importance of policy support and resource integration. The study aims to provide valuable references for enhancing the innovation and entrepreneurship education system in China's applied universities and cultivating high-quality talents with innovative spirit and practical abilities.

1. Introduction

With the intensification of global competition and rapid socio-economic development, innovation and entrepreneurship education has become one of the key focuses in the field of higher education. As an important base for cultivating talents with strong practical abilities and innovative spirit, applied universities play an important role in promoting innovation and entrepreneurship education reform under the background of integrating science and education. This article reviews the development process of innovation and entrepreneurship education in applied universities both domestically and internationally, and provides an in-depth analysis of the problems that exist in innovation and entrepreneurship education in applied universities in China. Drawing on successful experiences and cases of integrating science and education at home and abroad, this paper explores the significance of integrating science and education in innovation and entrepreneurship education in applied universities, and proposes corresponding reform paths. This article summarizes the role of the integration of science and education in the reform of innovation and entrepreneurship education in applied universities, and looks forward to future research directions and development trends, hoping to provide valuable references and suggestions for the improvement of the innovation and entrepreneurship education system in applied universities in China.

2. Analysis of the Current Situation of Innovation and Entrepreneurship Education in Applied Universities

2.1 Overview of Innovation and Entrepreneurship Education in Applied Universities at Home and Abroad

2.1.1 Introduction to typical innovation and entrepreneurship education models in applied universities abroad

In foreign countries, many applied universities have formed relatively mature innovation and entrepreneurship education systems. For example, Stanford University in the United States is renowned for its strong entrepreneurial ecosystem. By offering entrepreneurship courses, organizing entrepreneurship competitions, and setting up entrepreneurship incubators, the university has successfully combined theoretical knowledge with practice, providing students with abundant resources and support for innovation and entrepreneurship. The dual education system in Germany is also a typical model of integrating science and education. Through school enterprise cooperation, this system allows students to gain practical work experience during their school years, thereby better adapting to the needs of the workplace.

2.1.2 Development history and current situation of innovation and entrepreneurship education in applied universities in China

The innovation and entrepreneurship education in applied universities in China started relatively late, but has made significant progress in the past decade. In 2010, the Ministry of Education issued the "Implementation Opinions on Deepening the Reform of Innovation and Entrepreneurship Education in Higher Education Institutions", marking that innovation and entrepreneurship education has officially become an important component of China's higher education reform. Subsequently, universities across the country actively responded by establishing institutions such as innovation and entrepreneurship colleges and centers, and carrying out various forms of innovation and entrepreneurship education activities ^[1].

At present, innovation and entrepreneurship education in applied universities in China mainly focuses on the following aspects: curriculum system construction, offering basic courses on innovation and entrepreneurship, entrepreneurship management courses, etc., to cultivate students' basic knowledge and entrepreneurial thinking; Building practical platforms, establishing on campus incubators, co creation spaces, etc., to provide students with opportunities for entrepreneurial practice; Construction of teaching staff, introducing experts and successful entrepreneurs from the business community as part-time mentors to enhance the practical guidance ability of the teaching staff ^[2].

However, there are still some problems in the innovation and entrepreneurship education of applied universities in China, which constrain their further development.

2.2 Existing Problems

2.2.1 Unequal distribution of educational resources

On the one hand, applied universities in first tier cities and developed areas have more financial support, more advanced facilities and equipment, and broader partnerships, while applied universities in remote and underdeveloped areas are relatively resource scarce. This imbalance is not only reflected in hardware facilities, but also in teacher resources, internship and training opportunities, and other aspects.

2.2.2 Insufficient Innovation and Entrepreneurship Education System

Currently, many applied universities have offered courses related to innovation and entrepreneurship, but these courses often lack systematicity and coherence, and are clearly disconnected from market demand. In addition, the lack of effective evaluation mechanisms is also an important factor leading to the imperfect education system.

2.2.3 Insufficient teaching staff and practical experience

Many applied universities have relatively weak faculty in the field of innovation and entrepreneurship education, lacking entrepreneurs or industry experts with rich practical experience to serve as full-time or part-time teachers. This not only affects the practicality and cutting-edge nature of the course content, but also limits students' opportunities to gain practical experience.

3. Theoretical basis and practical exploration of the integration of science and education

3.1 Definition and connotation of integration of science and education

3.1.1 Basic Concepts of Science and Education Integration

The integration of science and education refers to the process of closely integrating scientific research with education and teaching, aiming to drive teaching practice through scientific research, while utilizing teaching practice to promote scientific research, forming a virtuous cycle of mutual promotion and common development. The integration of science and education emphasizes the transformation of scientific research achievements into teaching content, as well as the feedback of problems generated in teaching activities to scientific research activities, achieving a close integration of theory and practice.

3.1.2 The Importance of Integrating Science and Education in Improving Teaching Quality

The integration of science and education is of great significance for improving the quality of teaching. Firstly, it can promote knowledge updating. Scientific research can timely reflect the latest technological developments, and integrating these research results into teaching content can help students master the most cutting-edge knowledge and technology. Secondly, it can enhance practical abilities. By participating in scientific research projects, students can gain valuable practical experience and improve their ability to solve practical problems. In addition, it can also stimulate innovative thinking, and the integration of science and education encourages students to participate in scientific research activities. Through practical activities such as experiments and research, students' innovative consciousness and critical thinking ability can be cultivated.

3.2 Case analysis of domestic and international integration of science and education

3.2.1 Specific Case Analysis

Stanford University in the United States. Stanford University is located in the Silicon Valley area of California, USA, and is a world-renowned private research university. The school has rich experience and successful practices in the integration of science and education. Including the transformation of scientific research achievements, Stanford University has promoted the effective transformation of scientific research achievements by establishing a technology transfer office. Tsinghua University. As one of the top research universities in China, Tsinghua University has also made many explorations in the integration of science and education.

3.2.2 Successful Experience and Inspiration

By analyzing the above cases, we can summarize the following successful experiences and inspirations:

Establish a mechanism for industry university research cooperation. Strengthen cooperation with enterprises and provide practical opportunities for students through co building laboratories, internship and training bases, and other forms. Strengthen the construction of the teaching staff. Encourage teachers to participate in scientific research projects, improve their research level and teaching ability; At the same time, hiring industry experts as part-time teachers to enrich teaching resources. Optimize course offerings. Continuously adjust and improve the curriculum system based on scientific research achievements and industry needs, ensuring that teaching content is closely integrated with practice. Create a favorable atmosphere for innovation and entrepreneurship. By organizing entrepreneurship competitions and providing entrepreneurial guidance, we aim to inspire

students' innovative spirit and entrepreneurial passion [3].

4. Innovation and Entrepreneurship Education Reform Strategies under the Integration of Science and Education in Applied Universities

4.1 Building a diversified teaching model

4.1.1 Case Teaching

Case teaching is an effective teaching method that involves students in the process of solving practical problems by introducing real business cases. This approach can help students understand the application of theoretical knowledge in practical situations and improve their analytical and problem-solving abilities. Implementing case teaching can establish a case library, including successful cases of domestic and foreign enterprises, lessons learned from entrepreneurial failures, etc., to ensure the diversity and timeliness of cases. University teaching departments or course instructors should organize students to have group discussions around specific cases, guiding them to apply their learned knowledge to analyze problems and propose solutions. The school's invitation teams or career development offices need to regularly invite successful entrepreneurs or industry experts to the school to share their experiences and deepen students' understanding and awareness through practical case studies.

4.1.2 Project driven learning

Project driven learning is a learning approach guided by solving practical problems, which enhances students' practical abilities and innovation awareness by participating in scientific research projects or corporate cooperation projects. School cooperation departments should establish cooperative relationships with enterprises, jointly develop projects, and provide students with opportunities to participate in real work environments. Students should also be encouraged to participate in teachers' research projects and enhance their research abilities through practical operations. School cooperation departments should support students to form entrepreneurial teams, carry out entrepreneurial practices, and exercise team collaboration and market response abilities through simulated or real entrepreneurial activities.

4.1.3 Interdisciplinary Collaboration

Interdisciplinary collaboration refers to breaking down traditional disciplinary boundaries, promoting communication and cooperation between different majors, and cultivating students' comprehensive abilities and innovative thinking. Course development teams should design and offer interdisciplinary courses, such as innovation and entrepreneurship foundation courses, to enable students to understand knowledge and skills in different fields. Academic affairs offices need to encourage students from different majors to form teams and work together to complete project tasks, promoting the cross-disciplinary integration of knowledge. Regular interdisciplinary seminars can also be held, inviting scholars and experts from different fields to exchange ideas and broaden students' horizons.

4.2 Strengthen the construction of the teaching staff

4.2.1 Introduction of industry experts

Applied universities should actively introduce industry experts, enrich their teaching staff, improve teaching quality and research level. University administrations should cooperate with industry-leading enterprises and hire entrepreneurs or senior managers with rich practical experience as part-time professors or consultants. Research and collaboration departments need to establish expert workstations to provide a good working environment and research conditions for experts, promoting industry-university research cooperation. Additionally, academic affairs offices should regularly organize exchange activities between teachers and industry experts to enhance mutual understanding and promote cooperation.

4.2.2 Teacher Training and Development

In order to improve the professional skills and teaching level of teachers, applied universities should attach importance to the training and development of teachers. University administrations should provide teachers with regular opportunities for further education, such as attending domestic and international academic conferences, short-term training courses, etc. Academic affairs offices need to encourage and support teachers to participate in high-level scientific research projects, enhancing their research abilities and academic influence. Additionally, teacher development centers should organize teachers to participate in training on modern teaching methods and tools, such as the use of online education platforms and blended learning design.

4.3 Improve the support service system

4.3.1 Entrepreneurship Incubation Platform

In order to support students' entrepreneurial activities, applied universities should establish a comprehensive entrepreneurship incubation platform. School administrations should establish entrepreneurship incubators within or around the school to provide students with office space, legal advice, financial management, and other services. Entrepreneurship education departments need to provide entrepreneurship guidance courses and training to help students master the basic knowledge and skills required for entrepreneurship. Additionally, the university or in collaboration with external investors should establish a startup fund to provide seed funding support for promising entrepreneurial projects.

4.3.2 Industry university research cooperation mechanism

In order to promote the transformation and application of scientific and technological achievements, applied universities should strengthen cooperation with enterprises and establish a mechanism for industry university research cooperation. Universities and enterprises should collaborate to establish research and development centers, and jointly carry out technology research and product development work. School management teams need to establish a resource sharing platform to enable students and teachers to access enterprise data resources, technical materials, etc. Additionally, universities should establish a technology transfer service center to provide technical support and services for the technological innovation of enterprises.

By implementing these reform strategies, applied universities can effectively promote the reform and development of innovation and entrepreneurship education in the context of the integration of science and education, provide more practical opportunities for students, and cultivate high-quality talents with innovative spirit and practical ability.

5. Implementation path and safeguard measures

5.1 Policy Support

5.1.1 Government level

At the government level, relevant policies can be introduced to provide strong support for innovation and entrepreneurship education in applied universities. The government can introduce policy guidance, formulate policies that are conducive to the integration of science and education and the development of innovation and entrepreneurship education, clarify development goals and key support areas. Financial subsidies can also be provided to applied universities to support their innovation and entrepreneurship education projects and activities^[4]. Government departments should provide tax incentives when necessary, offering certain tax incentives to enterprises participating in the integration of science and education, and policy-makers should encourage cooperation between enterprises and universities by formulating supportive policies. We also need to protect intellectual property rights, improve the intellectual property protection system, encourage teachers and students to engage in scientific research and innovation, and protect their innovative achievements. And international cooperation supports applied universities to collaborate with foreign universities and

research institutions, broadening their international perspectives.

5.1.2 School level

At the school level, specific implementation plans need to be developed to ensure the effective implementation of the reform measures for the integration of science and education and innovation and entrepreneurship education. Schools can establish specialized institutions, such as the Office of Science Education Integration and Innovation and Entrepreneurship Education, responsible for planning, coordinating, and supervising the implementation of various reform measures. We can also develop implementation plans, refine various reform strategies, clarify the division of responsibilities, timeline, and expected goals. University administrations should establish an evaluation mechanism, regularly check the progress and effectiveness of reforms, and make necessary adjustments based on feedback results. School leadership teams need to establish a reward system to commend and reward individuals or teams who have demonstrated outstanding performance in the integration of science and education and innovation and entrepreneurship education. Public relations departments and promotional teams should promote the concept and achievements of integrating science and education through various channels such as media and campus networks, to enhance the awareness and participation of teachers and students. ^[5].

5.2 Resource Integration

5.2.1 Capital investment

In order to support the development of science education integration and innovation and entrepreneurship education, it is necessary to increase funding investment. Schools can establish a special fund for science education integration and innovation and entrepreneurship education to support related projects and activities. Universities and colleges should encourage social capital, such as enterprises and foundations, to participate in investment and provide financial support for innovation and entrepreneurship projects. School management teams need to actively apply for funding projects from government departments at all levels and strive for more financial support. Alumni associations or development offices should encourage alumni to donate to support the school's integration of science and education, as well as innovation and entrepreneurship education.

5.2.2 Venue Facilities

Universities and colleges should optimize the campus environment and build spaces suitable for innovation and entrepreneurship activities. School administrations can establish entrepreneurship incubators within schools to provide students with the necessary physical space and hardware and software facilities for entrepreneurship. Laboratory management departments need to upgrade laboratory equipment to meet the needs of scientific research projects and innovation and entrepreneurship activities. Campus planning and design teams should establish multifunctional shared spaces, such as conference rooms, lecture halls, etc., to facilitate communication and event organization between teachers and students. Educational technology departments are responsible for developing online education platforms and virtual laboratories to support remote learning and virtual experiment operations. Schools in collaboration with enterprises can work together to establish internship and training bases, providing students with opportunities for internships and practical training.

6. Conclusion

This article explores in depth the effective path of innovation and entrepreneurship education reform in applied universities under the background of science and education integration, hoping to provide reference and suggestions for the improvement of the innovation and entrepreneurship education system in applied universities in China. The article analyzes the current situation and existing problems of innovation and entrepreneurship education in applied universities, proposes a series of reform strategies such as building diversified teaching models, strengthening the construction of teaching staff, and improving the support service system, and elaborates on the

implementation path and guarantee measures in detail.

The integration of science and education is an important way to promote the reform of innovation and entrepreneurship education in applied universities. By implementing effective reform strategies and guarantee measures, the quality of education and students' practical abilities can be significantly improved, and more talents with innovative spirit and practical ability can be cultivated for China's economic and social development.

Acknowledgement

2022 Annual Project of Liaoning Province's Education Science "14th Five Year Plan": Research on the Reform of Innovation and Entrepreneurship Education in Applied Universities Based on the Integration of Science and Education (subject number: JG22DB322)

References

- [1] Liu Honghai, Liu Yadong (2018). Research on Innovation and Entrepreneurship Education Model in Applied Undergraduate Colleges. *Education and Career*, (10), 104-108.
- [2] Li Hua (2018). Comparative Study on Innovation and Entrepreneurship Education in Applied Universities at Home and Abroad. *Comparative Education Research*, 41 (5), 67-73.
- [3] Zhang Li, Zhao Xiaofeng (2019). The Reform Path of Innovation and Entrepreneurship Education in Applied Universities Based on the Integration of Science and Education. *Chinese Higher Education*, (12), 78-83.
- [4] Yang Zhijun, Wu Xiaoming (2022). Analysis of Policy Support and Implementation Path for Innovation and Entrepreneurship Education in Higher Education Institutions. *China Vocational and Technical Education*, (2), 34-39.
- [5] Wang Zhimin (2020). Exploring the Cultivation Mode of Innovative and Entrepreneurial Talents under the Background of Integration of Science and Education in Universities. *Chinese Higher Education Research*, (6), 58-62.