

Study on the Cultivation Models of Innovation and Entrepreneurship Ability of Engineering College Students under the College-Enterprise Integration

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ABSTRACT

With the globalization of the economy and rapid technological advancements, innovation and entrepreneurship have gradually become crucial indicators of a nation's competitiveness. Engineering students, serving as the vanguards of technical innovation and application, require enhanced training in innovation and entrepreneurship. Against this backdrop, this paper takes the perspective of College-Enterprise collaboration and explores how to enhance the innovation and entrepreneurship capabilities of engineering students through an integrated educational approach. We aim to provide valuable insights for scholars in related fields.

KEYWORDS

College-Enterprise collaboration; Integrated engineering education; Innovation; Entrepreneurship; Capability development

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1 Introduction

In the current economic new normal, higher education is facing unprecedented challenges as the talent development model shifts from knowledge dissemination to nurturing innovation capabilities. The innovation and entrepreneurship abilities of engineering students play a pivotal role in advancing China's engineering technology and industry upgrading. Hence, researching the paths for cultivating innovation and entrepreneurship capabilities in these university students is of paramount importance. In summary, achieving deep integration between universities and enterprises and promoting the alignment of educational models with practical industry experiences are gradually becoming the focal points in the current education landscape.

2 The Current State and Issues of College-Enterprise Collaboration Models

(1) Lack of depth in collaboration levels

A common issue in current College-Enterprise collaboration models is the lack of depth in collaboration levels. Most collaborations remain at a superficial level, primarily providing simple internships for university students or offering basic skill training. Overall, enterprises often serve as resource providers, lacking meaningful participation. Such superficial partnerships struggle to create substantial College-Enterprise interactions, making it challenging for students to assimilate

into corporate culture, comprehend core enterprise values, and, subsequently, fail to promote the development of students' entrepreneurial and innovative abilities.

(2) Insufficient focus on cultivating innovation and entrepreneurship capabilities

Presently, most College-Enterprise collaboration models concentrate on imparting technical skills while neglecting the cultivation of students' innovative thinking and entrepreneurial capabilities. While practical skills are essential, exclusively focusing on this aspect makes it difficult to nurture the well-rounded talent needed in today's society. These students may possess excellent technical skills, but without innovative thinking and entrepreneurial acumen, the application of their skills is limited to a narrow scope.

(3) Lack of a comprehensive collaboration effect assessment system

Although the current College-Enterprise collaboration models are relatively mature, they still lack an effective assessment system that comprehensively evaluates the impact of collaboration projects on enhancing students' innovation and entrepreneurship capabilities. Moreover, the absence of long-term tracking and evaluation of collaboration effectiveness can impede progress and optimization. This hinders the continuous improvement of collaboration projects and ultimately impedes the development of students' innovation and entrepreneurship capabilities.

3 Approaches to Cultivating Innovation and Entrepreneurship Capabilities in Engineering Students

(1) Establishing a multilevel college-enterprise collaboration system

At the strategic level of collaboration, it is imperative to establish a multilevel College-Enterprise collaboration system. The foundation of long-term strategic alliances between universities and enterprises should extend beyond project-based collaborations. These alliances should be based on a shared understanding of future industry trends and create a long-term collaborative plan. Under this alliance mechanism, universities can gain deeper insights into industry demands, and for enterprises, early involvement in guiding future employees during their training is of great significance. Specifically, regular College-Enterprise strategic dialogues can be conducted to continually assess alignment in talent development goals and methods.

Concerning curriculum development, to ensure that educational content satisfies both students' career needs and actual business requirements, both universities and enterprises should actively participate in curriculum design. In this process, the role of enterprises should extend beyond providing examples or case studies and include deeper involvement in curriculum design, implementation, and evaluation. For instance, industry experts can directly engage in teaching or even serve as visiting professors at universities, providing students with the latest industry insights and skill training.

Collaboration on project research and development is one of the vital means to foster students' innovation and entrepreneurship capabilities. Therefore, students should be involved in real project R&D within companies, enhancing their problem-solving abilities, teamwork skills, and project management capabilities. In these collaborative efforts, it is essential not to restrict students to traditional internship models but instead empower them with more responsibilities and decision-making authority, ensuring each student actively participates in the entire project under the guidance

of industry mentors.

(2) Implementing integrated engineering education models

Seamless integration between the classroom and practical experiences is crucial. Therefore, integrated engineering education models should incorporate practical business experiences into the curriculum, allowing classroom teaching to closely mirror actual work processes. This enables students to apply theoretical knowledge in real work environments, enhancing their adaptability to future careers and laying the groundwork for their engineering practical capabilities.

As internships and practical training encompass not only simple hands-on exercises but also innovative practices involving problem discovery, solution design, experimental testing, and results analysis, educational institutions should establish more training facilities and innovation laboratories. These facilities offer students a wide array of practical and innovative opportunities. While participating in these training experiences, students can connect theoretical knowledge learned in the classroom to real-world problems, deepening their understanding of theoretical knowledge and improving their ability to solve complex issues.

(3) Integrating the entire entrepreneurial process into the educational journey

Innovation and entrepreneurship education should not be confined to a standalone module; it should permeate every aspect of education. Entrepreneurship education should be integrated into the curriculum, and teachers should not only focus on imparting professional knowledge but also consciously cultivate students' entrepreneurial capabilities. This can be achieved by introducing courses related to entrepreneurship, such as business model design, market analysis, and entrepreneurship legal knowledge, which enable students to gain a deeper understanding of their professional knowledge and acquire essential entrepreneurial skills.

To provide students with full support from ideation to finished products, universities should establish student entrepreneurship incubation centers. Beyond financial support, these platforms provide students with services related to law, finance, marketing, and even opportunities to connect with potential investors. Students can use these platforms to initiate their initial entrepreneurial endeavors. Simultaneously, the university can track and evaluate students' entrepreneurial projects through this platform, providing timely assistance and guidance as needed.

(4) Enhancing the evaluation system for cultivating innovation and entrepreneurship capabilities

Establishing an evaluation system ensures that innovation and entrepreneurship education meets its intended goals. Therefore, universities must refine this system. A comprehensive evaluation system should include assessments across multiple dimensions. It should not only evaluate students' innovative thinking and problem-solving abilities but also assess their teamwork and project management skills. Additionally, the ultimate outcomes of entrepreneurship efforts should be integrated into the assessment system, emphasizing that evaluating innovation and entrepreneurship capabilities is not only about assessing the process but also focusing on the results.

Furthermore, dynamic evaluation should be ensured, involving continuous monitoring of students' learning and entrepreneurial activities. This approach helps educators gain real-time insights into students' progress, difficulties, and challenges during the innovation and entrepreneurship process. By identifying this information, teachers can guide adjustments to their educational strategies, forming a student-centric teaching system based on their needs and actual capabilities, ultimately enhancing

their innovation and entrepreneurship capabilities.

4 Conclusion

In conclusion, the College-Enterprise collaboration and integrated engineering education model can effectively nurture the innovation and entrepreneurship capabilities of engineering students. However, both universities and enterprises need to continue their efforts collaboratively. They should establish multilevel collaborative systems, refine educational models and evaluation mechanisms, and provide full-process involvement in practical education. This way, more students can learn and gain experience in real corporate environments, laying the foundation for their innovative and entrepreneurial potential in their future careers. This research has certain limitations, and it represents an initial exploration of paths for cultivating innovation and entrepreneurship capabilities. The specific implementation process will require continuous optimization and adjustment, considering the unique circumstances of different schools and enterprises. Future research can expand its scope by exploring specific cases of collaboration between universities and enterprises in various industries and of different scales. This will enable the exploration of a more diverse and long-lasting mechanism for fostering innovation and entrepreneurship capabilities.

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