"Technology-Innovation Convergence" Teaching System for the "Fundamentals of Innovation & Entrepreneurship" Course in Vocational Undergraduate Education

Ping Lin

Hainan Vocational University of Science and Technology, Haikou, Hainan Province, China 571126

Abstract: Vocational undergraduate education is centered on cultivating high-caliber technically skilled innovative talent. As a core course in general education, "Fundamentals of Innovation & Entrepreneurship" serves as a crucial vehicle for implementing technology-innovation education, band ridging professional education with Innovation & Entrepreneurship education. Currently, this course suffers from issues such as disconnection between teaching and technology-innovation practice, industry-misalignment content, and insufficient integration, failing to align with the core objectives of vocational undergraduate education. Grounded in the typological distinctiveness of vocational undergraduate education, oriented by "Technology-Innovation Convergence", and aligned with the technology-oriented and practice-oriented talent cultivation in vocational undergraduate education, this paper explores and constructs a quadrilateral teaching system with "philosophy leading - content re-engineering - method innovation - safeguard mechanism support", aiming to solve the pain points in course teaching, promote the deep integration of Innovation & Entrepreneurship education with both technology-innovation practice and professional skill cultivation, enhance the efficacy of course teaching, and provide practical reference for the "Fundamentals of Innovation & Entrepreneurship" course reform in vocational undergraduate education.

Keywords: Vocational Undergraduate Education; Fundamentals of Innovation & Entrepreneurship; Technology-Innovation Convergence; Teaching System

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1.Introduction

Under the background of the in-depth implementation of the innovation-driven development strategy, vocational undergraduate education, as the top form of vocational education, bears the important mission of cultivating transdisciplinary talent equipped with both technical skills and innovation capabilities. As a core component of general education in vocational undergraduate institutions, the "Fundamentals of Innovation & Entrepreneurship" course serves as not only an important approach to cultivate students' innovative thinking and entrepreneurial awareness, but also a crucial bond bridging technology-innovation practice with professional learning. Unlike the regular undergraduate education which focuses on theory innovation, the entrepreneurship & innovation education in vocational undergraduate institutions places greater emphasis on the integration of technological innovation and practical application. And "Technology-Innovation Convergence" is the core pathway to achieving this talent cultivation objective.

2.The Substantive Core and Necessity of "Technology-Innovation Convergence" for the "Fundamentals of Innovation & Entrepreneurship" Course in Vocational Undergraduate Education

The core trait of vocational undergraduate education is the organic unity of technical skills and innovation & practice. Its entrepreneurship and innovation education is not merely to impart entrepreneurial knowledge, but to prioritize the transformation of technological innovation achievements and the cultivation of entrepreneurship and innovation capabilities based on professional skills. "Technology-Innovation Convergence" serves as the core direction for the reform in the "Fundamentals of Innovation & Entrepreneurship" course. Its core essence lies in

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dismantling the barriers between the course and Technology-Innovation practice, as well as professional education, and integrating the Technology-Innovation concepts, Technology-Innovation methods, and Technology-Innovation practice throughout the entire process of course teaching, achieving a closed-loop cultivation ecosystem of "innovation awareness cultivation → Technology-Innovation capability training → entrepreneurial practice implementation", and designing courses with balanced duality: sustaining foundational innovation-entrepreneurship literacy while intensifying technology-anchored practice in applied bachelor's education [1].

It is of great necessity to implement the "Technology-Innovation Convergence" teaching system for the "Fundamentals of Innovation & Entrepreneurship" course in vocational undergraduate education. From the perspective of talent cultivation, the talent cultivation objectives in vocational undergraduate education are to cultivate innovative technical talent who can solve real-world technical problems and promote the transformation of technological achievements based on the industry demands. The "Technology-Innovation Convergence" can effectively articulate the course teaching with the talent cultivation objectives, and make up for the shortcomings of traditional courses that emphasize theory over practice, enabling students to enhance their Technology-Innovation practical competencies and technological achievement transformation capabilities while mastering the fundamental theories of Innovation & Entrepreneurship. From the perspective of curriculum reform, current "Fundamentals of Innovation & Entrepreneurship" course has prominent problems of homogenization and generalization, lacking the characteristics and specificity of vocational undergraduate education. "Technology-Innovation Convergence" can leverage the disciplinary advantages of vocational undergraduate education to explore industrial Technology-Innovation resources, make the course content more in line with the needs of professional positions, and enhance the practicality and seduction of the course. From the perspective of industrial evolution, the deep integration of industrial upgrading and technological innovation has raised higher requirements for the innovation capabilities and Technology-Innovation literacy of practitioners. The "Technology-Innovation" teaching system can align with industry demands in advance, cultivate students' Technology-Innovation mindset and practical competencies, and lay a solid foundation for students' future employment and career development [2].

3.Current Challenges in the "Technology-Innovation Convergence" Teaching System for the "Fundamentals of Innovation & Entrepreneurship" Course in Vocational Undergraduate Education

3.1 Misaligned Teaching Philosophy, Ambiguous Positioning of Technology-Innovation Convergence

Certain vocational undergraduate institutions have insufficient understanding of the "Technology-Innovation Convergence" positioning in the "Fundamentals of Innovation & Entrepreneurship" course, and there is conceptual cognitive misalignment. On the one hand, some vocational undergraduate institutions simply equate the course with the entrepreneurship and innovation general education course in general undergraduate education, focusing on the imparting of theoretical knowledge such as entrepreneurial policies and entrepreneurial processes, while neglecting the cultivation of technological innovation and technological achievement transformation capabilities, failing to construct the teaching content based on the technical skills cultivation characteristics of vocational undergraduate education, resulting in Technology-Innovation Convergence being merely a formality. On the other hand, some vocational undergraduate institutions merely interpret "Technology-Innovation Convergence" as "course + Technology-Innovation competition", and achieve the Convergence merely by organizing students to participate in various Technology-Innovation competition, lacking the integration of Technology-Innovation throughout the entire process of course teaching, and failing to integrate the Technology-Innovation concepts and methods into all components of classroom teaching and practical training, resulting in the lack of systemic coherence and depth in the Technology-Innovation Convergence [3]. Furthermore, some teachers' teaching philosophy are outdated and they lack practical experience in Technology-Innovation Convergence. They still continue to use the traditional teaching model of "teacher lecturing + student listening", which makes them struggle to guide students to carry out

Technology-Innovation practice and innovation exploration.

3.2 Outdated Teaching Content, Lacking Occupation-Specific Relevance and Innovativeness

The teaching content is the core vehicle for "Technology-Innovation Convergence". Currently, there is a significant industry misalignment in the teaching content of the "Fundamentals of Innovation & Entrepreneurship" course in vocational undergraduate education. The first issue is that the course content is disconnected from the Technology-Innovation practice, mainly focusing on basic theories of Innovation & Entrepreneurship, as well as case studies, lacking systematic explanations of Technology-Innovation methods, innovative thinking, and the technological achievement transformation process, which make students struggle to acquire the core competencies necessary for conducting Technology-Innovation practice. The second issue is that the course content is disconnected from the professional education in vocational undergraduate institutions, failing to explore the Technology-Innovation Convergence points based on the technical characteristics and industry demands of different disciplines. The content is generalized and lacks specificity, failing to address discipline-specific innovation learning needs. The third issue is that the course content is not updated in a timely manner, failing to keep up with the technological evolution trends and industrial upgrading demands in the industry, lacking the integration of relevant Technology-Innovation cases of new technologies, new industries, and new business formats, resulting in a disconnect between the knowledge of students and the industry reality, which makes students struggle to meet the requirements for Technology-Innovation capabilities in the development of the industry. [4]

3.3 Monolithic Teaching Methods, Weak Technology-Innovation Practical Components

The innovation in teaching methods is the key to achieving "Technology-Innovation Convergence". Currently, in vocational undergraduate education, the teaching methods of the "Fundamentals of Innovation & Entrepreneurship" course are still relatively monolithic, failing to support the implementation of Technology-Innovation Convergence teaching. The traditional teaching model mainly focuses on theoretical instruction, lacking interactivity, practicality and innovativeness. Students merely passively receive knowledge. It fails to stimulate their innovative thinking and Technology-Innovation enthusiasm. Although some educational institutions have employed teaching methods such as case studies and group discussions, the cases they use are mostly ordinary entrepreneurial cases, lacking support from Technology-Innovation cases. Moreover, the group discussions often become merely a formality, failing to guide students to conduct in-depth Technology-Innovation exploration and practice. Furthermore, the weak Technology-Innovation practical components is a prominent issue. Most educational institutions lack a sound Technology-Innovation practice platform. The practice teaching mainly focuses on simulation practice, lacking authentic Technology-Innovation projects and industry scenarios as support, which make students struggle to apply the knowledge learned in class to real-world Technology-Innovation practice, and the cultivation of Technology-Innovation capabilities is merely superficial.

3.4 Undeveloped Safeguard Systems, Insufficient Supporting Force

The construction of the "Technology-Innovation Convergence" teaching system requires a sound safeguard system as underpin. Currently, vocational undergraduate institutions have obvious shortcomings in this regard. One issue is insufficient faculty safeguards. Most of the course instructors are full-time university teachers, lacking Technology-Innovation experience in the industry and practical experience in enterprises, failing to effectively carry out Technology-Innovation Convergence teaching and practical guidance. The construction of part-time teachers is lagging behind, lacking Technology-Innovation talent or technical experts from the industrial enterprises to engage in the course teaching, failing to make up for the shortcomings that university teachers lack Technology-Innovation practical experience. The second issue is inadequate resource safeguards. Most educational institutions lack dedicated space, equipment and financial support for Technology-Innovation practice. The incubation platforms for Technology-Innovation projects are not well-developed, failing to support students to carry out Technology-Innovation practice and project incubation. At the same time, they lack in-depth cooperation with

industrial enterprises and research institutions, which make them struggle to integrate external Technology-Innovation resources, failing to provide students with authentic Technology-Innovation practice scenarios and technical support. The third issue is undeveloped the evaluation systems. Current course evaluations mainly center on theoretical examinations and the completion of assignments, focusing on students' mastery of theoretical knowledge while neglecting the evaluation of students' Technology-Innovation mindset, practical competencies, and innovation achievements, which makes the evaluation system struggle to play its guiding role in the Technology-Innovation Convergence teaching.

4.Pathways for Constructing the "Technology-Innovation Convergence" Teaching System for the "Fundamentals of Innovation & Entrepreneurship" Course in Vocational Undergraduate Education

4.1 Updating Teaching Philosophy to Clearly Define the Positioning of Technology-Innovation Convergence

To establish a "Technology-Innovation Convergence" teaching system, the first step is to update teaching philosophy and clearly define the Technology-Innovation Convergence positioning in the course. Vocational undergraduate institutions should ground themselves in the technically skilled innovative talent cultivation objective of vocational undergraduate education to establish the "Technology-Innovation Convergence-led, practice-oriented, and discipline articulation" teaching philosophy, integrate scientific and technological innovation into the entire process of course teaching, and clearly define the core objective of the course as cultivating students' Technology-Innovation mindset, innovation capabilities, and technological achievement transformation capabilities, achieving the organic unity of "theory learning - Technology-Innovation practice - start-up implementation". On the one hand, they should strengthen the training of teachers' teaching philosophy, enhance teachers' Technology-Innovation awareness and Technology-Innovation teaching competencies, and guide teachers to change their traditional teaching philosophy, and proactively explore Technology-Innovation Convergence teaching methods through special lectures, Technology-Innovation practice training, and industry exchanges. On the other hand, they should clearly define the Technology-Innovation Convergence positioning in the course, distinguish it from the regular undergraduate Innovation & Entrepreneurship course, highlight the technical characteristics of vocational undergraduate education and closely combine Technology-Innovation Convergence with professional education as well as industry demands, avoiding Technology-Innovation Convergence becoming merely a formality.

4.2 Reengineering the Teaching Content to Enhance Innovativeness and Occupation-Specific Relevance

The reengineering of teaching content is the core for achieving Technology-Innovation Convergence. It should be based on the characteristics of vocational undergraduate education and construct a triune teaching content system featuring "fundamental module + Technology-Innovation module + transdisciplinary integration module". The fundamental module retains the basic theories of Innovation & Entrepreneurship, simplifies the redundant theoretical explanations, and focuses on explaining core content such as innovative thinking, entrepreneurial awareness, and entrepreneurial ethics, laying a theoretical foundation for Technology-Innovation Convergence. The Innovation & Entrepreneurship module serves as the core module, focusing on integrating content such as Technology-Innovation methods, Technology-Innovation mindset training, technological achievement transformation processes, and Technology-Innovation project design, which guides students to master the core capabilities for conducting Technology-Innovation practice through systematic explanations of Technology-Innovation-related knowledge. At the same time, it should incorporate industrial Technology-Innovation cases, select Technology-Innovation cases that are close to industry reality based on the disciplinary characteristics in vocational undergraduate education, so that students can understand the industry's technological innovation trends and technological achievement transformation pathways. The transdisciplinary integration module should align with the technical characteristics of different disciplines to explore the Technology-Innovation Convergence points in the professional fields, and customize differentiated teaching content to enable the deep integration of Technology-Innovation Convergence with

professional learning, satisfy the Technology-Innovation learning needs of students from different disciplines, and realize the organic integration of "fundamental of Innovation & Entrepreneurship + specialized Technology-Innovation".

4.3 Innovating Teaching Methods to Strengthen the Technology-Innovation Practical Components

Vocational undergraduate institutions should align with the teaching demands of "Technology-Innovation Convergence", to innovate teaching methods and establish a diversified teaching model featuring "theoretical instruction + Technology-Innovation practice + project incubation". Firstly, they should implement project-driven teaching, use authentic Technology-Innovation projects as the vehicle to guide students to carry out Technology-Innovation project design, research, and practice in groups, enabling students to master Technology-Innovation methods and enhance their Technology-Innovation capabilities through these projects, select projects aligning with the industry demands and disciplinary characteristics, encourage students to explore Technology-Innovation demands in their surroundings, and design practical and innovative Technology-Innovation projects. Secondly, they should employ case-based teaching and situational teaching, select Technology-Innovation cases that conform to the disciplinary characteristics in vocational undergraduate education and the industry reality, guide students to deeply think about Technology-Innovation issues, and stimulate their innovative thinking through case analysis, situational simulation, etc. At the same time, they should simulate scenarios, such as the incubation of Technology-Innovation projects and the transformation of technological achievements, enabling students to immerse themselves in the entire process of Technology-Innovation practice. Thirdly, they should strengthen the Technology-Innovation practical components, and establish a dual practice system of "on-campus practice and off-campus practice". On campus, they should rely on Technology-Innovation incubation platforms and professional laboratories to provide students with practice venues and equipment support. Off campus, they should strengthen cooperation with industrial enterprises and research institutions, establish off-campus Technology-Innovation practice bases, and organize students to participate in authentic Technology-Innovation projects, technology R&D, and other activities, thereby enhancing students' Technology-Innovation practical competencies and technological achievement transformation capabilities.

4.4 Refining the Safeguard Systems to Strengthen the Supporting Force

A sound safeguard system is the key to the smooth implementation of the "Technology-Innovation Convergence" teaching system. Therefore, it is necessary to construct a comprehensive safeguard system across three aspects: teachers, resources, and evaluations. The first is to strengthen the construction of faculty teams, and establish a dual-mentor teaching team consisting of "university full-time teachers and external part-time teachers". The full-time teachers enhance their Technology-Innovation practical competencies and teaching skills through Technology-Innovation research and studies, enterprise practice, and other methods. External part-time teachers, who are Technology-Innovation talent and technical experts from industrial enterprises, participate in course teaching, practical guidance and project incubation to compensate for the shortcoming that university teachers lack Technology-Innovation experience. The second is to strengthen resource safeguards, increase investment in Technology-Innovation practice, build dedicated Technology-Innovation venues and incubation platforms, equip them with complete Technology-Innovation equipment, enhance in-depth cooperation with industrial enterprises and research institutions, integrate external Technology-Innovation resources, and introduce authentic Technology-Innovation projects, technical support and incubation services to provide strong support for students to carry out Technology-Innovation practice. The third is to reform the evaluation systems, establish a diversified evaluation system that combines "process-oriented evaluation" and "outcome-oriented evaluation". The process-oriented evaluation focuses on students' performance in classroom learning, Technology-Innovation practice, and project research, and pays attention to the improvement of students' Technology-Innovation mindset and practical competencies.

5.Conclusion

The construction of the "Fundamentals of Innovation & Entrepreneurship" course and the "Technology-Innovation Convergence" teaching system in vocational undergraduate education serves as an important initiative to align with the innovation-driven development strategy and realize the cultivation objectives in vocational undergraduate education, and constitutes a key pathway to solve the problems of homogenization and generalization in course teaching. Based on the technically skilled innovative talent cultivation characteristics of vocational undergraduate education, by updating teaching philosophy, reengineering teaching content, innovating teaching methods, and refining the safeguard systems, vocational undergraduate institutions can effectively promote the deep integration of Innovation & Entrepreneurship education with both technology-innovation practice and professional education, enhance the teaching efficacy of the "Fundamentals of Innovation & Entrepreneurship" course, and cultivate students' technology-innovation mindset, technology-innovation capabilities, and technology transformation capabilities. Currently, the construction of the "Technology-Innovation Convergence" teaching system remains still in the exploratory stage. It is necessary to continuously optimize and refine the teaching system based on the school-running reality of vocational undergraduate institutions, industry demands, and student characteristics in order to address new problems and challenges that arise during the teaching process.

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