

Review of the Research on the Influence of Interdisciplinary Learning on Innovation in Entrepreneurship Learning in Shandong Province, China

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Abstract—In the context of the knowledge economy and China's continuing entrepreneurship education reform, interdisciplinary learning has become a critical foundation for cultivating students' innovative and entrepreneurial capabilities in higher education. Innovation in entrepreneurship learning, as a vital outcome of university talent cultivation, largely depends on the extent to which students are exposed to knowledge, skills, and practices spanning multiple academic disciplines. Based on a review of domestic and international research, this paper systematically examines the connotation of interdisciplinary learning, the characteristics of innovation in entrepreneurship learning, and their theoretical connections. It focuses on analysing how interdisciplinary learning positively influences innovation in entrepreneurship learning through building domain-relevant knowledge and skills, enhancing student motivation, fostering collaborative and flexible learning environments, and bridging classroom learning with real-world entrepreneurial practice. Furthermore, by evaluating the current status of interdisciplinary and entrepreneurship education development in Shandong Province, the study identifies gaps in existing research regarding student-level psychological mechanisms, the mediating role of motivation and curriculum flexibility, and systematic provincial-level empirical analysis, particularly within the higher vocational undergraduate sector. The findings suggest that interdisciplinary learning plays a crucial supporting role in innovation in entrepreneurship learning, and future research should place greater emphasis on the specific mechanisms through which this relationship operates. These conclusions provide theoretical references for curriculum design and entrepreneurship education policy in Chinese higher vocational institutions.

Keywords— Interdisciplinary learning; entrepreneurship education; innovation in entrepreneurship learning; higher vocational education; Shandong Province universities.

I. INTRODUCTION

With the rapid development of the knowledge economy and the deepening of innovation-driven development strategies, higher education is undergoing a profound shift from discipline-bound, subject-based instruction toward integrated, cross-disciplinary models of learning. As a critical foundation for cultivating entrepreneurial talent and innovation capacity, interdisciplinary learning has become a key factor in

strengthening universities' contribution to regional and national innovation systems. Meanwhile, under China's continuing entrepreneurship education reform, students are no longer treated as passive recipients of business knowledge but are increasingly expected to become active, innovative agents capable of identifying opportunities and creating value across disciplinary boundaries. The role of interdisciplinary learning in shaping this capacity is becoming increasingly prominent.

As a leading province in China's higher vocational education sector, Shandong has experienced particularly rapid recent growth: by mid-2026, the Ministry of Education had approved 124 higher vocational undergraduate institutions nationwide, with more than 20 provinces, including Shandong, formally incorporating vocational undergraduate expansion into government policy (People's Daily, 2026). Shandong's institutions have correspondingly strengthened cross-disciplinary curriculum reform and innovation and entrepreneurship education platforms, providing students with richer opportunities for interdisciplinary entrepreneurial practice. However, existing research primarily examines how interdisciplinary learning affects general academic performance or skill development, while paying comparatively less attention to its specific influence on innovation in entrepreneurship learning. In particular, there is a notable lack of systematic, provincial-level studies addressing this issue within China's rapidly expanding higher vocational undergraduate sector.

Based on this, this paper reviews and comments on the related research concerning interdisciplinary learning's promotion of innovation in entrepreneurship learning within Shandong Province's higher education institutions. Drawing on a systematic review of domestic and international literature, it focuses on the connotation of interdisciplinary learning, the characteristics of innovation in entrepreneurship learning, and the theoretical and mechanistic pathways connecting the two.

II. DEFINITION OF CORE CONCEPTS

(1) Interdisciplinary Learning

Interdisciplinary learning is widely recognised as a pedagogical approach that integrates knowledge, methods, and perspectives from two or more academic disciplines to address problems that a single discipline cannot adequately resolve. The concept was institutionalised internationally through the Organisation for Economic Co-operation and Development's seminal 1972 report, which argued that the growing complexity of real-world problems demanded new methods of knowledge production connecting professional knowledge across disciplinary boundaries (OECD, 1972). In higher education contexts, interdisciplinary learning has evolved beyond simple curriculum combination to form a comprehensive pedagogical approach encompassing critical thinking, creative problem-solving, and cross-domain knowledge integration (International Studies Association, 2021). With the ongoing development of interdisciplinary centres and cross-faculty programmes in Chinese universities, interdisciplinary learning now exhibits distinct systemic and collaborative characteristics in its curricular design and implementation.

From a functional perspective, interdisciplinary learning in higher vocational institutions primarily manifests in three key areas: curriculum integration, collaborative project-based practice, and cross-disciplinary innovation platforms. Curriculum integration combines professional or technical knowledge with entrepreneurship-related content, allowing students to apply specialised knowledge to venture-oriented problems. Collaborative project-based practice brings together students from different programme clusters, such as business, technology and engineering, and design, to work on shared entrepreneurial challenges. Cross-disciplinary innovation platforms, including innovation and entrepreneurship centres and university-industry collaboration programmes, provide the institutional infrastructure through which these integrated learning experiences are delivered (Ferrerias-Garcia et al., 2021).

(2) Innovation in Entrepreneurship Learning

Innovation in entrepreneurship learning refers to the development of students' capacity to generate creative, original ideas and translate them into viable entrepreneurial outcomes, encompassing creativity, critical problem-solving, adaptability, and the practical ability to convert ideas into entrepreneurial action (Fishbach and Woolley, 2022). Unlike generic academic performance, innovation in entrepreneurship learning emphasises students' active role in identifying opportunities, integrating knowledge from multiple sources, and responding flexibly to the uncertainty inherent in entrepreneurial activity. Existing research suggests that within higher education innovation systems, this form of innovation helps transform students from passive knowledge recipients into capable entrepreneurial problem-solvers, serving as a crucial pathway for cultivating both innovative awareness and practical entrepreneurial competence (Bender-Salazar, 2023).

In concrete terms, innovation in entrepreneurship learning typically manifests through business plan competitions, student-led start-up projects, and interdisciplinary solutions to real-world commercial or social challenges. These activities

often transcend traditional disciplinary boundaries, requiring students to integrate technical, commercial, and creative knowledge simultaneously. Research indicates that innovation in entrepreneurship learning is shaped not only by students' access to interdisciplinary knowledge, but also by psychological factors, such as motivation, and structural factors, such as curriculum flexibility, that determine whether interdisciplinary exposure is successfully translated into entrepreneurial outcomes (Ryan and Deci, 2000; Demerouti et al., 2001).

III. THEORETICAL BASIS OF HOW INTERDISCIPLINARY LEARNING AFFECTS INNOVATION IN ENTREPRENEURSHIP LEARNING

(1) From the Perspective of Experiential Learning Theory

Experiential Learning Theory holds that learning occurs through a cyclical process of concrete experience, reflective observation, abstract conceptualisation, and active experimentation (Kolb, 1984). In higher vocational education, this theory underscores that interdisciplinary learning experiences, such as cross-disciplinary projects and collaborative practice, provide the concrete experiential basis from which students construct entrepreneurial understanding and skill. With the ongoing expansion of interdisciplinary curricula, experiential engagement across disciplines has evolved into a crucial vehicle for entrepreneurial skill formation, moving learning beyond passive knowledge transmission toward active, reflective practice.

Supported by interdisciplinary learning environments, students can more easily engage with real-world, ill-structured entrepreneurial problems that require the integration of knowledge from multiple fields, thereby continuously refining their creative and problem-solving capabilities through iterative practice. From the perspective of Experiential Learning Theory, interdisciplinary learning serves not merely as a curricular structure, but as a crucial experiential condition for entrepreneurial innovation to emerge.

(2) The Perspective of Self-Determination Theory

Self-Determination Theory distinguishes between autonomous motivation, which is intrinsically driven, and controlled motivation, which is driven by external rewards, and holds that motivation is shaped by the extent to which learning environments satisfy three basic psychological needs: autonomy, competence, and relatedness (Ryan and Deci, 2000). In higher vocational education, interdisciplinary and collaborative learning environments, by offering students greater choice, varied opportunities to build cross-domain competence, and structured peer interaction, are theorised to support the satisfaction of these needs, thereby fostering the autonomous, intrinsic motivation associated with sustained entrepreneurial engagement.

Specifically, students exposed to interdisciplinary learning are more likely to experience a sense of competence as they successfully integrate knowledge across fields, and a sense of relatedness through collaborative, cross-disciplinary teamwork. Research indicates that this form of autonomous motivation plays a mediating role in translating

interdisciplinary learning experiences into innovative entrepreneurial behaviour (Vallerand et al., 1992). Thus, Self-Determination Theory provides a crucial psychological mechanism explaining how interdisciplinary learning affects innovation in entrepreneurship learning.

(3) From the Perspective of the Componential Theory of Creativity

The Componential Theory of Creativity holds that creative output arises from the confluence of domain-relevant skills, creativity-relevant processes, task motivation, and a supportive surrounding environment (Amabile, 1983, 1996). From this theoretical perspective, interdisciplinary learning directly builds the domain-relevant skills, such as technical and commercial knowledge drawn from multiple fields, and the creativity-relevant processes, such as flexible, cross-domain thinking, that this theory identifies as necessary preconditions for creative entrepreneurial output.

Interdisciplinary projects, collaborative practice, and flexible curricula provide students with the varied knowledge base and supportive learning environment through which creative entrepreneurial ideas can be generated and refined. Research indicates that learning environments integrating multiple disciplines enhance students' capacity to combine knowledge in novel ways, a core mechanism through which innovation is produced (Fishbach and Woolley, 2022). From the perspective of the Componential Theory of Creativity, interdisciplinary learning provides essential environmental and cognitive support for students' transition from knowledge recipients to innovative entrepreneurial practitioners.

IV. THE ROLE MECHANISM OF INTERDISCIPLINARY LEARNING IN PROMOTING INNOVATION IN ENTREPRENEURSHIP LEARNING

(1) Building Domain-Relevant Knowledge and Cross-Disciplinary Skills

Interdisciplinary learning provides students with a broader and more integrated knowledge base than single-discipline instruction, combining technical, commercial, and creative knowledge that entrepreneurial activity typically requires. By engaging with problems that draw on multiple fields simultaneously, students develop the cross-disciplinary skill set that underpins innovative entrepreneurial solutions, reducing the structural knowledge barriers that often limit students' ability to identify and act on entrepreneurial opportunities (Ferreras-Garcia et al., 2021).

(2) Enhancing Student Motivation Through Autonomy-Supportive Learning

Interdisciplinary and collaborative learning environments, by offering greater choice, variety, and peer interaction, support the psychological needs for autonomy, competence, and relatedness central to Self-Determination Theory. This fosters the autonomous, intrinsic motivation that sustains students' engagement in entrepreneurial exploration, even in the face of the uncertainty and setbacks characteristic of entrepreneurial activity (Ryan and Deci, 2000).

(3) Fostering Collaborative and Flexible Learning Environments

Interdisciplinary learning is frequently delivered through collaborative, project-based formats and flexible curricular structures, such as customised learning pathways and entrepreneurship-integrated content. These structural resources reduce the rigidity that otherwise constrains students' ability to pursue entrepreneurial ideas, functioning as study resources that enable students to convert interdisciplinary knowledge into innovative outcomes (Demerouti et al., 2001).

(4) Bridging Interdisciplinary Learning with Real-World Entrepreneurial Practice

Through interdisciplinary innovation and entrepreneurship platforms, such as business plan competitions and innovation training programmes, universities connect students, teachers, and industry resources, providing a practical bridge between classroom-based interdisciplinary learning and authentic entrepreneurial practice. This connective role helps translate theoretical interdisciplinary knowledge into demonstrable entrepreneurial capability.

V. REVIEW OF THE CURRENT STATUS OF RESEARCH ON HIGHER VOCATIONAL INSTITUTIONS IN SHANDONG PROVINCE

Current research indicates that Shandong's higher vocational institutions have made significant recent progress in expanding interdisciplinary and entrepreneurship-oriented education. As part of China's broader "New Engineering" (新工科) reform, the Ministry of Education approved 612 pilot cross-disciplinary engineering research and practice projects nationally in 2018 and established a National New Engineering Education Innovation Centre in 2019 to coordinate this reform (China Education and Research Network, 2020). This has since extended into a broader "four new" disciplinary reform agenda spanning engineering, medicine, agriculture, and the humanities (China Online Education Network, 2024). Studies demonstrate that Shandong's institutions have progressively developed innovation and entrepreneurship platforms alongside this curricular reform, providing an increasingly robust foundation for student entrepreneurial activity.

The current literature predominantly examines how interdisciplinary and entrepreneurship-related policies affect institutional-level outcomes, such as curriculum coverage, competition participation rates, or graduate employment statistics. For instance, national data show that the 2023 China International College Students' Innovation and Entrepreneurship Competition attracted 4.21 million projects and approximately 17.09 million participant entries from 5,296 institutions (China Online Education Network, 2024), illustrating the scale of state-supported entrepreneurial activity. In contrast, research on the specific, student-level psychological and structural mechanisms through which interdisciplinary learning translates into innovation in entrepreneurship learning remains limited. Existing studies often provide general descriptions of participation or curriculum coverage, lacking in-depth analysis of the underlying processes and mechanisms.

A recent study of China's vocational education and training system found that current academic debate on related issues focuses predominantly on macro-level, institutional explanations, such as insufficient synergy between educational institutions and industry, while paying comparatively little attention to the micro-level processes through which individual students actually develop their skills and innovative capacity (Song and Xu, 2024). This points to a clear need for research conducted at the level of the individual student's learning experience. Additionally, systematic reviews examining the relationship between interdisciplinary learning and innovation in entrepreneurship learning at the provincial level, and specifically within Shandong's rapidly expanding higher vocational undergraduate sector, remain scarce. The lack of a unified analytical framework addressing the mediating roles of student motivation and curriculum flexibility has, to some extent, limited the generalisability and explanatory power of existing research conclusions.

VI. RESEARCH IMPLICATIONS AND FUTURE RESEARCH DIRECTIONS

Current research indicates that interdisciplinary learning has emerged as a crucial enabler of innovation in entrepreneurship learning, providing both the knowledge base and the motivational and structural conditions necessary for entrepreneurial innovation. Interdisciplinary curricula, collaborative project-based practice, and cross-disciplinary innovation platforms collectively contribute to enhancing students' domain-relevant skills, supporting autonomous motivation, and facilitating engagement in authentic entrepreneurial practice. Despite the growing attention to interdisciplinary education in China's higher vocational sector, existing studies have primarily focused on curricular coverage and institutional participation statistics, with comparatively fewer investigations systematically examining the psychological and structural mechanisms through which interdisciplinary learning influences innovation in entrepreneurship learning (Song and Xu, 2024).

Moving forward, higher vocational institutions should explicitly recognise and prioritise interdisciplinary learning as a mechanism for cultivating entrepreneurial innovation, rather than treating it solely as a curricular reform target. This requires a strategic shift toward explicitly designing for the motivational and structural conditions, such as student autonomy and curriculum flexibility, that mediate the translation of interdisciplinary knowledge into innovative entrepreneurial outcomes. From a theoretical perspective, future research should aim to strengthen conceptual frameworks that explain innovation in entrepreneurship learning within China's higher vocational education context, particularly focusing on the mediating pathways, such as student motivation and curriculum flexibility, through which interdisciplinary learning affects student innovation.

Furthermore, empirical studies incorporating diverse higher vocational institution types, programme clusters, and regional characteristics within Shandong Province are likely to provide more nuanced insights into how contextual factors interact with interdisciplinary learning to shape innovation

outcomes. Such investigations could enrich theoretical understanding and inform practical strategies for integrating interdisciplinary curricular reform with innovation-oriented entrepreneurship education, ultimately supporting the development of high-quality, student-centred innovation ecosystems within Shandong's higher vocational undergraduate institutions.

VII. CONCLUSION

In conclusion, existing research generally indicates that interdisciplinary learning positively influences innovation in entrepreneurship learning. By building domain-relevant knowledge and skills, enhancing student motivation, fostering collaborative and flexible learning environments, and bridging classroom learning with real-world entrepreneurial practice, interdisciplinary learning provides crucial support for students' entrepreneurial innovation. Shandong Province's higher vocational institutions have established a growing foundation for interdisciplinary and entrepreneurship-oriented education, and it is essential to further strengthen the empirical understanding of the specific mechanisms, particularly student motivation and curriculum flexibility, through which this relationship operates. The review presented in this paper provides theoretical references for relevant empirical research and for curriculum and policy development within Shandong's higher vocational undergraduate sector.

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