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Research on the Integration Strategy of Innovation and Entrepreneurship Education and Professional Education in Universities

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Abstract: *In the context of rapid technological change and innovation-driven development, universities are increasingly expected to cultivate graduates with strong innovation capability and practical competence. Under the normative framework of the United Nations Sustainable Development Goal 4 (SDG4), which emphasizes "quality education" and the enhancement of educational relevance and inclusiveness, improving the quality and social responsiveness of higher education has become a global consensus.Integrating innovation and entrepreneurship education with professional education has therefore become a central reform agenda in higher education. despite extensive policy support and institutional initiatives, such integration often remains fragmented and superficial. This study examines the integration of innovation and entrepreneurship education and professional education from a systemic and institutional perspective. This study employs a literature review and logical analysis to examine the structural conditions and institutional mechanisms that shape the integration of innovation and entrepreneurship education and professional education within university talent cultivation systems. Drawing on systems theory, resource dependence theory, and the Triple Helix framework as analytical lenses, the study reveals that persistent separation between the two forms of education reflects deep structural contradictions embedded in university talent cultivation systems, particularly the coexistence of heterogeneous subsystem logics, asymmetric resource allocation, and fragmented governance arrangements. Innovation and entrepreneurship education is frequently positioned as a peripheral subsystem with limited influence over core professional curricula. Based on these findings, the study conceptualizes integration as a conditional process of institutionalization achieved through structural embeddedness across value orientation, curriculum systems, faculty collaboration, practice platforms, and evaluation mechanisms. By shifting the analytical focus from pedagogical techniques to institutional coordination mechanisms, this study provides a system-level framework that offers theoretical guidance for sustainable integration and lays a foundation for future empirical research in higher education.*

Keywords: Innovation and Entrepreneurship Education; Professional Education; Integration of Specialization and Innovation; Talent Cultivation; SDG4

1. Introduction

In recent decades, rapid technological advancement and industrial transformation have profoundly reshaped global economic and social development(Chen et al., 2024). Innovation

has increasingly been recognized as a key driver of high-quality growth, leading governments worldwide to place growing expectations on higher education systems in cultivating innovative and adaptable talent(Zhao & Wang, 2022). In recent years, the core component of national strategies in China has been determined to be innovation-driven development, placing universities at a crucial position as the primary institutions for nurturing talents to enhance the country's capacity for independent innovation (Yang, 2024).

Abroad, these problems are close to the United Nations' 2030 Agenda for Sustainable Development. The United Nations' Sustainable Development Goal 4 (SDG4) calls for inclusive, equitable, and quality education, and the higher education system needs to enhance not only access but also relevance, effectiveness, and the capacity for lifelong learning. Under such a normative situation, it is expected that the improvement of universities in further fulfilling their fundamental duty of cultivating disciplinary knowledge will lead to enhanced abilities among college students for innovation, practical skills, and problem-solving at a combination point of multiple factors and uncertainty.In this study, SDG4 is employed as a normative evaluative framework rather than as an explanatory causal variable(Astuty et al., 2024).

professional education has formed the main body of talent cultivation in universities, organised according to disciplinary logic, and focused on the accumulation of systematic knowledge, academic strictness and professional specialisation. This model has helped maintain the depth and stability of the higher education system. However, in the face of rapid technological updates and increased demands for interdisciplinary capabilities, the deficiencies of a discipline-centred training model have become more pronounced; traditional professional education, if studied separately, is prone to deficiencies such as a lack of innovation capability among students, a weak sense of entrepreneurship, and an inability to solve practical problems of the real world using hands-on skills.

In response to these problems, innovative and entrepreneurial education has developed rapidly in universities across the country with the support of national policies and institutional arrangements(Huang et al., 2025). Emphasizing experiential learning, problem-oriented teaching, and the application of knowledge in real or simulated contexts, innovation and entrepreneurship education is widely regarded as a complementary approach capable of transforming disciplinary knowledge into innovative practice. From the perspective of SDG4, Accordingly, combining innovation and entrepreneurship instruction with discipline-specific education is anticipated to improve not only the applicability but also the comprehensive quality of higher education.

Although there is a conceptual consistency, empirical evidence from universities in China shows that innovation and entrepreneurship education remains institutionally separate from traditional discipline-based programs. Innovation and entrepreneurship education often takes the form of general courses, extracurricular activities, competitions, or short-term projects, which are peripheral to core professional curricula.(Saputra et al., 2023). At the institutional level, the two forms of education often operate under distinct management systems, curriculum structures, and evaluation standards. As a result, integration initiatives tend to remain fragmented and superficial rather than becoming embedded within university talent cultivation systems.

Existing research has generally recognized the necessity of integrating innovation and entrepreneurship education into professional education. Numerous studies have proposed

methods to address issues from curricular reforms, construction of interdisciplinary teaching teams, and provision of practice platforms to establish an institutional guarantee. However, much of the existing literature remains predominantly normative. While it outlines desirable directions and reform principles, it pays relatively limited attention to the systemic and institutional mechanisms that shape integration outcomes.

From a systems perspective, the convergence of innovation and entrepreneurship education with professional programs should not be interpreted as merely appending additional courses or isolated activities. ("Research on the Integration of Subject Competition and Professional Course Teaching Mode Based on OBE Concept," 2022). It is embedded in a complex system of talent cultivation at universities, which consists of multiple interrelated subsystems: educational objectives, course arrangement, faculty organization, practice bases, and evaluation mechanisms. These subsystems are not in line, resulting in a fragmented structure and an inability to carry out an integrated system.

2. Research Objectives

This study aims to examine the integration of innovation and entrepreneurship education and professional education within the overall structure of university talent cultivation systems. Based on a systematic review and logical analysis of existing research, the problems with the structure of current integration practices are identified as follows: unclear educational orientations, disordered curriculum structures, weak coordination in teaching implementation, and inconsistent evaluation mechanisms. By analyzing how these problems arise and develop in the current institutional framework, this paper aims to reveal the systematization factors that limit integration under the background of enhancing educational quality and relevance. At the system level, based on synthesizing the core traits and institutional prerequisites for integration among innovation and entrepreneurship education, professional education, etc., to construct an analysis framework linking institutional change to the quality-oriented philosophy of SDG4 and lay down a theoretical foundation for subsequent research.

3. Theoretical Foundations

a) Perspective of Systems Theory

Systems theory holds that a system works well only when its parts connect and support each other. Higher education talent training functions as a complex system(Zhao & Wang, 2022). This system includes training goals, course structures, teaching staff, practice platforms, and evaluation methods. These elements do not work in isolation. Their interaction shapes the overall quality of talent development.

From this view, according to this view, specialization education and innovation and entrepreneurship education are two key subsystems of the university's talent cultivation system. Although each subsystem plays a different role, they need to work together. Specialized education offers organized disciplinary knowledge. This knowledge serves as the foundation for innovation and entrepreneurship. Innovative and entrepreneurial education is focused on practice and application. It helps students to apply and transform what they have learned from the professional courses. If these two subsystems lack coordination, the overall talent training system becomes less effective.

b) Resource Dependence Theory

Resource dependence theory explains how organizations rely on external and internal resources to operate and grow. Universities also face this reality(Hu et al., 2024). When universities attempt to integrate innovation and entrepreneurship education with specialized education, they will have to handle numerous types of resources.These resources include course content, faculty expertise, funding, policy support, and industry participation.

Therefore, many integration issues are related to limits on resource access and allocation. Innovation and entrepreneurship education requires teachers who have interdisciplinary backgrounds. It also requires practice areas and assistance from outside partners. However, universities are not always equally accessible to these resources. Because of different funds, policies, industries, and other factors among all kinds of entities, the integration will be difficult.

c) Triple Helix Theory

Triple Helix Theory focuses on the interaction among universities, governments, and industries(Wang & Ding, 2023). This theory views innovation as a result of cooperation across these three actors. From this angle, integrating innovation and entrepreneurship education with specialized education goes beyond internal teaching reform. It also depends on public policy support and industry involvement.

This perspective can help explain why the university cannot work independently. The government affects education by formulating policies and providing funds. Industries provide a practical environment and real problems. Only when all three parties successfully integrate can it be completed. If there is no such joint effort, efforts to incorporate discipline-based education into innovation and entrepreneurship training will be restricted.

4. Analysis of Integration of Innovation and Entrepreneurship Education and Professional Education in Colleges and Universities

Innovation has become an essential force driving the development of the economy and society from a broad perspective on society. Higher education has thus become an essential component of the national innovation system. Therefore, the general public expects college students to be proficient in their studies and have abilities such as creativity and hands-on experience. The change presents a problem for the traditional talent cultivation model that focuses solely on specialized education; professional education provides students with systematic disciplinary knowledge and an excellent foundation for their education. Innovation and entrepreneurship education center around problem-based and practice-oriented learning. Help students use professional knowledge to solve practical problems in real or complex environments. Both forms of education have distinct functions, yet they work together. Their combination can transform the university training mode, which is based on the center of knowledge, into one that aims at all-round ability development.

Research shows that many universities have tried to connect innovation and entrepreneurship education with professional programs and have included such efforts in their institutional arrangements. However, the level of integration is still low. At the conceptual level, innovation and entrepreneurship education is often seen as an additional part instead of a core element of talent training. At the institutional level, related courses often run alongside professional courses, and their goals, content, and teaching plans do not match well. In practice, several problems limit integration. Faculty cooperation is weak. There are not enough teachers who

have both strong disciplinary backgrounds and practical innovation or entrepreneurial experience. Practice platforms do not always match professional training goals. Evaluation systems still focus mainly on disciplinary knowledge rather than innovation outcomes. Existing studies suggest solutions such as curriculum reform, interdisciplinary teams, and institutional support, but most of them stay at a general level and do not clearly explain how to achieve coordinated integration in practice.

5. Findings

This study finds that the long-term separation between innovation and entrepreneurship education and professional education in universities is an institutional issue, not a short-term implementation problem. The fragmentation seen in practice reflects deep structural tensions in the university talent training system. Professional education and innovation and entrepreneurship education follow different subsystem logics. Professional education is based on disciplinary logic. It stresses stable curricula, complete knowledge systems, and standardized assessment. Innovation and entrepreneurship education is based on the logic of practice. Flexibility, experience-based learning, and problem-solving are emphasized more in this teaching mode. When these different logics coexist without a strong sense of integration, the resulting policy implementation is merely symbolic; even with supportive policies and institutions, there may be no actual effect.

A resource-dependent entity can coordinate its own internal resources more flexibly during integration and may perform better on the whole, but it is not yet clear how other external factors such as government regulations and social perceptions impact this process. In the current governance structure, innovation and entrepreneurship education are less likely to obtain resources and make decisions. Key resources, including interdisciplinary faculty, curriculum design authority, stable funding, and practice platforms, are not distributed equally. Professional education maintains priority control with the main sub-system. Innovation and entrepreneurship education, on the other hand, typically relies on short-term projects or individual efforts. This makes it difficult to exert a significant effect on the primary professional curricula. At the same time, the coordination among universities, the government, and enterprises is weak. The policy documents support innovation and entrepreneurship, but the evaluation system and industry cooperation mechanism do not align with that goal, this reduces the process of institutionalization.

Sustainable integration needs alignment at three levels: normative, structural, and operational. It cannot be achieved through single reforms or short-term actions. At the normative level, SDG4 provides a framework that defines educational quality as including relevance, adaptability, and inclusiveness, not only disciplinary achievement. At the structural level, curricula, faculty organization, practice platforms, and evaluation systems need joint redesign to reduce fragmentation. At the operational level, universities, governments, and industries need stable and long-term cooperation to coordinate incentives and ensure steady resource support.

6. Pathways for Integrating Innovation and Entrepreneurship Education with Professional Education in Universities

a) Reconstructing Value Orientation and Training Objectives through a Collaborative Talent Cultivation Approach

In terms of basic requirements, universities should achieve the consistency of values in innovation and entrepreneurship education with those in professional education for talent cultivation goals. Previous analysis shows that one of the main barriers to integration is the separation of educational goals, and innovation and entrepreneurship education is usually seen as an additional part outside professional education. To address this problem, innovation capability, practical competence, and professional literacy need to be included as a whole in the talent cultivation objectives, thereby clarifying the internal role of innovation and entrepreneurship education in the professional training system.

At the same time, Sustainable Development Goal 4 (SDG4) focuses on "quality education" and offers normative reference. In terms of the meaning defined in SDG4, educational quality refers to an overall result with multi-dimensionality, which not only includes knowledge acquisition but also skill improvement and socialization adaptation. This framework prompts universities to shift from a single focus on disciplinary success to a more all-encompassing approach in nurturing students. Within this value system, innovation and entrepreneurship education are no longer seen as an extra form of training but rather as an essential guarantee for the high-quality goals of professional education to be achieved; therefore, a stable value base has been established for the combination.

b) Promoting Structural Embeddedness through Curriculum-Centered Integration

The course system is an essential entity that nurtures talent at universities and a critical stage in the implementation of the integration of general education and specialization. Previous studies show that in many universities, the innovation and entrepreneurship courses and professional courses run separately, leading to surface-level integration. Therefore, one of the primary ways is to transform innovation and entrepreneurship education from a separate course system into an element that is structurally integrated into professional curricula.

In terms of structure, the content of innovation and entrepreneurship education should be reorganized according to the goals of professional training and integrate the cultivation of innovative awareness and the development of problem-solving skills into disciplinary course content. Through project-based, contextualized, and task-oriented teaching models, innovation and entrepreneurship education will become an inevitable part of professional learning rather than an additional burden for students to learn. Based on professional education for curriculum integration, it can solve the problem of fragmented curricula and enhance the link between the acquisition of professional knowledge and innovative practice.

c) Strengthening Professional Foundations through Faculty Collaboration

Faculty capacity constitutes a critical guarantee for the effective implementation of integration. Research findings indicate that a lack of faculty diversity and insufficient collaboration significantly constrain the deepening of integration practices. On the one hand, professional faculty members often demonstrate limited engagement in innovation and entrepreneurship education; on the other hand, instructors specializing in innovation and entrepreneurship frequently lack sufficient influence within professional curriculum systems, making it difficult to establish stable integration mechanisms.

From a pathway perspective, institutional arrangements should promote collaboration between professional faculty and innovation and entrepreneurship educators, thereby constructing a composite faculty support system. Such collaboration should not be limited to simple role aggregation, but rather involve joint participation in curriculum design, instructional implementation, and assessment processes. This cooperative model—grounded in professional learning and oriented toward innovative practice—can enhance both the professionalism and sustainability of integrated teaching.

d) Enhancing Contextual Support through Practice Platforms

Practice platforms function as an essential bridge connecting professional knowledge with innovation and entrepreneurship capabilities. Previous analysis indicates that misalignment between practice platforms and professional training objectives undermines the effectiveness of integrated talent cultivation. Consequently, integration pathways should emphasize the structural optimization of practice platforms to better serve professional education goals.

In practice, this can be realized by integrating on-campus experimental and training resources with off-campus industry-university-research platforms and incorporating practical activities into the overall design of professional training systems. Through the practice scenario of real problem solving, students can apply what they have learned in their studies to an innovative exploration, thereby promoting both professional learning and innovation capabilities at the same time. Such practice-based integration paths help enhance the overall coherence of the talent cultivation system.

e) Advancing Institutionalization through Systemic Safeguard Mechanisms

Institutional mechanisms are essential conditions for achieving integration in the long term and steadily. Based on research findings, the main reasons for failure to achieve institutionalization in integration are an imbalanced evaluation direction and uneven distribution of resources. Therefore, the Integration Pathways should also be supported by corresponding institutional adjustments, especially improvement of the evaluation mechanism and arrangement of resource allocation.

In terms of assessment, more attention should be paid to the students' innovative ability, practical ability, and process ability; ensure that the evaluation system is consistent with the integration-oriented talent cultivation objective. In terms of resource allocation, institutional arrangements should ensure that adequate support is provided for the innovation and entrepreneurship education in curriculum development, faculty training, and practice platform construction to address its structurally weaker position in universities. Through the perfection of institutional mechanisms, integration can be promoted from a state of reliance on individual projects or personal involvement to a systematic and regularized operating model.

7. Conclusion

This study shows that the integration of innovation and entrepreneurship education into professional education at universities is to be regarded as a systematic change and institutional reform, rather than just a technical problem or a task of educational innovation and reform. The ongoing separation in practice is not only due to weak enforcement. Underlying problems in the talent cultivation system at universities. The problems that arise from the coexistence of different subsystem logics, particularly the contradiction between disciplinary logic and practical logic, as well as from uneven resource allocation and fragmented governance structures. Explain the structural limitations to shift the focus of this research from policy

implementation and teaching forms to the internal coordination mechanism of higher education institutions.

Based on the structural analysis above, this article will also examine the impact of resource dependence and external coordination on integration results. Unequal access to curriculum management rights, faculty resources, stable funds, and practical training bases restricts the effectiveness of innovation and entrepreneurship education in main professional courses. Meanwhile, through the SDG4 framework for norms, the integration process is regarded as a condition-oriented transformation from values and institutions to operations. expands the connotation of educational quality to include relevance, adaptability, and inclusiveness, and provides a value foundation for promoting the institutionalization of integration.

8. Limitations

This research is based on existing research and policy documents. It does not adopt an empirical method, such as a questionnaire or single-case research. Due to this reason, the study is unable to reflect the different focuses that various types of universities may place on specialized education and innovation education in their integration.

In addition, the analysis focuses more on system-level and institutional issues. It pays less attention to how integration works in specific teaching settings. Detailed operational practices in classrooms and programs remain areas for future research.

9. Future Research

Future studies can extend this work by using empirical methods to examine how integration affects higher education outcomes. Researchers can apply quantitative approaches to assess links between integration practices and students' innovation abilities and employment results. also conduct comparative studies across different types of universities and academic fields. Case studies of representative institutions can show how integration works in varied contexts. Such research can strengthen both practical understanding and theoretical development in the study of innovation and entrepreneurship education in higher education.

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Conflict of Interest Statement
The authors declare that there is no conflict of interest regarding the publication of this study.

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