Available Online: 20 April 2026 DOI: 10.54254/2753-7102/2026.32923

Research on intelligent technology empowering innovation and entrepreneurship education in universities: practical dilemmas and development paths

Yilin Han*, Mengru Lei, Yao Zhou, Shirui Peng

Wuhan University of Technology, Wuhan, China

*Corresponding Author. Email: 905177906@qq.com

Abstract. The development of an intelligent society drives the upgrading of talent demand, and the misalignment between traditional innovation and entrepreneurship education in universities and social demand has become prominent, urgently calling for intelligent transformation. This study conducts an empirical exploration on this issue. Taking public undergraduate universities in Wuhan as the research objects, this study comprehensively adopts questionnaire survey, in-depth interview, case analysis and other methods, collecting 248 valid questionnaires and completing 25 person-times of interviews. The study finds that 92.1% of teachers and students recognize the importance of this education, but the satisfaction rate is only 35.0%. There are also problems such as empty practice teaching, superficial integration of intelligent technology, and insufficient interdisciplinary collaboration. Based on this, development paths are proposed from six dimensions including curriculum system and practice platform, providing practical references for the intelligent and high-quality development of innovation and entrepreneurship education in universities.

Keywords: intelligent technology, innovation and entrepreneurship education, practical dilemmas, development paths

1. Introduction

The rapid development and global penetration of new-generation intelligent technologies such as artificial intelligence, big data and cloud computing have pushed human society into a new stage of intelligent development. The adjustment of industrial structure, the reform of production mode and the upgrading of employment form have put forward new requirements for talent training in universities. Compound innovative and entrepreneurial talents with intelligent technology application ability, interdisciplinary knowledge integration ability and practical innovation ability have become the core strategic resources supporting the national innovation-driven development strategy and boosting industrial transformation and upgrading. As the main front of talent training, the development quality of innovation and entrepreneurship education in universities directly determines the supply level of innovative talents, and is a key link connecting higher education with social and economic development.

In recent years, China has continuously raised the importance attached to innovation and entrepreneurship education in universities, and issued supporting measures from multiple aspects such as top-level policy design, resource investment guarantee and practice platform construction. Universities have also gradually built an integrated training system of "curriculum teaching + practical training + competition incubation + guidance service". However, under the realistic background of the rapid development of an intelligent society, the structural problems of the traditional innovation and entrepreneurship education model have gradually become prominent: the update speed of the curriculum system lags behind the development pace of intelligent technology, the practice teaching links are disconnected from real industrial scenarios, the interdisciplinary collaborative education mechanism has not been effectively established, and the integration of intelligent technology with education and teaching only stays at the level of simple tool application, which eventually leads to an obvious misalignment between talent training and actual social demand.

Against this background, this study takes several public undergraduate universities in Wuhan as research samples, and systematically explores the core driving forces, practical development dilemmas and optimization improvement paths of innovation and entrepreneurship education in universities under the empowerment of intelligent technology through empirical research. It aims to construct an innovation and entrepreneurship education training system adapted to the development needs of an intelligent society, provide empirical evidence and implementable practical plans for universities to promote the intension-oriented development and realize intelligent transformation of innovation and entrepreneurship education, and also provide a reference for education administrative departments to formulate relevant policies.

2. Research design and data sources

2.1. Research objects

This study selects several public undergraduate universities in Wuhan, such as Wuhan University of Technology, Wuhan University of Science and Technology, and Hubei University, as the research scope. The research objects cover university students, full-time teachers of innovation and entrepreneurship education, managers of university entrepreneurship parks and representatives of local start-ups. The research samples cover multiple professional categories such as science and engineering, liberal arts, business and art, including student groups from freshman to senior year. Meanwhile, it takes into account full-time teachers with different teaching ages and industry practitioners in different fields to ensure the balance and representativeness of the sample structure, which can objectively reflect the overall development status of innovation and entrepreneurship education in universities in Wuhan.

2.2. Research methods

2.2.1. Literature research method

Through Chinese and foreign databases such as CNKI, Wanfang and Web of Science, this study systematically retrieves research results in related fields such as intelligent society, innovation and entrepreneurship education, talent training mode and education driving force, and sorts out more than 50 relevant literatures. Through the analysis of existing literatures, this study defines the connotation and extension of the core concepts of this research, constructs the theoretical analysis framework of the research, and clarifies the deficiencies of existing researches and the entry point of this study.

2.2.2. Questionnaire survey method

Combined with the research content, a Likert five-point scale questionnaire is designed, which includes four first-level dimensions: cognition of innovation and entrepreneurship education, satisfaction with current situation, perception of driving force and demand for improvement. Stratified sampling surveys are carried out through various methods such as online distribution in campus communities, offline on-site research and collaborative distribution in sister universities. A total of 300 questionnaires were distributed in this survey, 248 valid questionnaires were recovered, with an effective recovery rate of 82.7%, providing data support for the quantitative analysis of the research.

2.2.3. In-depth interview method

A semi-structured interview form is adopted, and an interview outline is designed around four themes: pain points in the development of innovation and entrepreneurship education, perception of driving forces of different groups, optimization suggestions for training mode, and actual demand for innovation and entrepreneurship resources. In-depth interviews are conducted with 25 university teachers, students, university managers and enterprise representatives. All interviews are recorded with the consent of the interviewees, and 18 interview recordings are transcribed into text to dig out deep-seated problems and practical demands that cannot be reflected by quantitative data.

2.2.4. Case analysis method and data analysis method

Typical cases of innovation and entrepreneurship education in 15 universities of different school-running types at home and abroad are sorted out, including comprehensive, science and engineering, and business universities, to extract practical experience and development paths of universities in carrying out innovation and entrepreneurship education, providing a reference for model innovation of the research. Excel and SPSS 26.0 software are used to conduct descriptive statistics and correlation analysis on questionnaire data, and manual coding is adopted to extract themes from interview texts. The mutual verification of quantitative research and qualitative research improves the scientificity and objectivity of research conclusions.

2.3. Sample characteristics

A total of 248 valid samples were obtained in this survey, including 206 college students, accounting for 83.1% of the total samples; 32 full-time teachers of innovation and entrepreneurship education, accounting for 12.9%; 10 managers of university entrepreneurship parks and representatives of local start-ups, accounting for 4.0%. In terms of professional distribution, there are 115 students and practitioners in science and engineering, accounting for 46.4%; 66 in liberal arts, accounting for 26.6%; 42 in business, accounting for 16.9%; and 25 in art, accounting for 10.1%. In terms of grade distribution, there are 53 freshmen, accounting for 21.4%; 69 sophomores, accounting for 27.8%; 72 juniors, accounting for 29.0%; and 54 seniors, accounting for 21.8%. The sample distribution of each grade is relatively balanced. On the whole, the research sample has a reasonable structure and wide coverage, which can truly reflect the development status of innovation and entrepreneurship education in universities in Wuhan.

3. Practical dilemmas of innovation and entrepreneurship education in universities

Combined with the survey data, it can be found that although the current innovation and entrepreneurship education in universities has been widely recognized at the conceptual level, there are still various problems in the actual operation process. These problems are not only reflected in the teaching implementation level, but

also reflect that the effective connection between education supply and students' demand has not been achieved.

3.1. Gap between cognitive level and actual experience

On the whole, the design of the current quality evaluation system of innovation and entrepreneurship education in higher vocational colleges often fails to fully take market demand as the guidance and students' sustainable development as the goal [1]. Most teachers and students have realized the importance of innovation and entrepreneurship education, but their specific experience has not achieved the expected effect. This phenomenon of "high recognition but low satisfaction" indicates that there are still deficiencies in the actual operation of the current education model.

Further analysis shows that the reasons may be related to the untimely update of curriculum content, limited practical opportunities and insufficient resource support. When students find it difficult to obtain real gains in the learning process, they tend to have negative evaluations even if they recognize it conceptually. In the long run, this gap will affect students' participation enthusiasm and thus weaken the educational effect.

3.2. Obvious formalization tendency in practice links

Practice teaching should have been an important part of innovation and entrepreneurship education, but in practice, the practical activities of some universities still stay at a relatively superficial stage. For example, some projects are mainly simulation-based and lack support from real problems, making it difficult for students to form a complete practical cognition.

An important reason for this phenomenon is that the connection between universities and social resources is not close enough, resulting in practical content difficult to be close to real needs. In this case, students are more "completing tasks" rather than truly participating in problem-solving. This not only limits the improvement of abilities, but also affects their understanding of innovation and entrepreneurship to a certain extent.

3.3. Application of intelligent technology stays at the primary stage

With the development of digital technology, its introduction into innovation and entrepreneurship education has become a trend, but in reality, its application is still relatively limited. Universities are the main battlefield for carrying out innovation and entrepreneurship education and the main channel for learning theoretical knowledge [2]. Although some courses involve relevant content, they mostly stay at the level of tool use and lack integration with specific learning tasks.

On the one hand, this problem is related to the update speed of the curriculum system; on the other hand, it is also related to the differences in teachers' mastery of new technologies. When technology cannot be integrated into the actual problem-solving process, its role is difficult to be fully exerted, and it is difficult for students to form systematic application ability.

3.4. Insufficient interdisciplinary cooperation opportunities

The inheritance of experience in professional fields is an important link for cultural cultivation [3]. Innovation and entrepreneurship activities usually require the support of multi-field knowledge, but within universities, the communication between different majors is still relatively limited. Due to the relatively independent curriculum setting and management mode, students do not have many opportunities to participate in cross-major cooperation.

This situation easily leads to a single ability structure of students in projects, making it difficult to form effective division of labor and collaboration when facing complex problems.

From the perspective of training objectives, this training method lacking collaborative experience has a certain gap with real needs.

3.5. Unbalanced distribution of educational resources

In terms of resource allocation, some universities tend to concentrate resources on a few outstanding teams or projects, which improves the output of achievements to a certain extent but also brings new problems.

For example, some ordinary students find it difficult to obtain participation opportunities, thus reducing the overall participation. In the long run, this distribution method may affect educational equity and is not conducive to the popularization and development of innovation and entrepreneurship education.

3.6. Single evaluation method

At present, some higher vocational colleges still take theoretical assessment results as the main evaluation content, ignoring the inherent core literacy such as innovative spirit, teamwork ability and practical problem-solving ability shown by students in the practice of "innovation and entrepreneurship" [4], such as competition results or project outcomes, while paying insufficient attention to the learning process.

This evaluation method easily leads students to pay too much attention to the results themselves and ignore the gradual accumulation of abilities. At the same time, it is difficult to fully reflect the real performance of students in the practice process, thus affecting the accuracy of evaluation.

3.7. Insufficient response to differences in students' needs

Different students have obvious differences in motivation and goals when participating in innovation and entrepreneurship education, but the existing training mode is relatively unified and lacks pertinence. To reasonably implement the personalized teaching system of innovation and entrepreneurship education in universities, a careful implementation plan must be formulated and implemented from multiple dimensions [5].

When the teaching content cannot match the actual needs of students, their willingness to participate often decreases. This mismatch between supply and demand affects the efficiency of the use of educational resources to a certain extent and also limits the space for individual development.

4. Analysis of the causes of the problems

The emergence of the above problems is not accidental, but the result of the joint action of many factors. On the whole, there are both structural reasons within the education system and the influence of changes in the external environment. Therefore, it is necessary to analyze them from multiple perspectives.

4.1. Relatively lagging adjustment of the education system

Against the background of constantly changing social needs, the update speed of university curriculum systems is relatively slow, which affects the adaptability of teaching content to a certain extent. Especially in the context of the rapid development of intelligent technology, some courses still follow the traditional framework and are difficult to reflect new development trends in a timely manner.

This lag leads to a deviation between what students learn and real needs, thus affecting the formation of their practical application ability.

4.2. Limited channels for obtaining practical resources

The improvement of practice teaching effect depends on stable resource support. However, in reality, the channels for universities to obtain external projects and enterprise resources are still limited, and the forms of cooperation are relatively single.

In the absence of support from real projects, practical activities are easy to become a mere formality, which is also one of the important reasons for the unsatisfactory effect of practice teaching.

4.3. Imperfect teachers' ability structure

In innovation and entrepreneurship education, teachers not only need to have a theoretical foundation, but also need to have certain practical experience. However, at present, some teachers still have deficiencies in practical project experience or technology application.

This limitation in ability structure makes it difficult to effectively guide students to complete complex tasks in the teaching process, and also affects the curriculum quality to a certain extent.

4.4. Unsmooth internal coordination mechanism

The lack of interdisciplinary cooperation is closely related to the internal operation mechanism of universities. Different colleges and departments are relatively independent in curriculum arrangement and resource use, lacking an effective coordination mechanism.

In this case, even if there is a demand for cooperation, it is difficult to promote smoothly, thus limiting the development of interdisciplinary teaching.

4.5. Deviated resource allocation orientation

When allocating resources, some universities tend to support projects that can produce direct results. This orientation helps to improve performance in the short term, but may ignore basic training.

When resources are excessively concentrated on a few projects, the overall participation will be affected, which is also an important reason for resource imbalance.

4.6. Single evaluation concept

In the current evaluation system, result orientation still dominates, while insufficient attention is paid to the learning process. This conceptual bias makes it difficult for the evaluation method to fully reflect students' abilities.

In the long run, if the evaluation standard does not change, the teaching method is difficult to achieve real transformation.

4.7. Insufficient matching between teaching supply and students' needs

With the diversification of students' backgrounds and development directions, the unified training mode has been difficult to meet all needs. However, in practice, the setting of courses and projects is still relatively fixed, lacking a flexible adjustment mechanism.

The contradiction between this supply mode and individual differences of students is also one of the important factors affecting the teaching effect.

5. Development paths of intelligent technology empowering innovation and entrepreneurship education in universities

Combined with the previous analysis of practical problems and their causes, it can be seen that the dilemmas faced by innovation and entrepreneurship education in universities are not caused by a single factor, but the joint action of curriculum setting, practice mode, resource allocation, evaluation mechanism and other aspects. Therefore, when exploring improvement paths, we should start from an overall perspective, focus on students' ability development, and systematically adjust and optimize the existing teaching system.

5.1. Reshape the interdisciplinary curriculum structure and highlight the ability training orientation

With the continuous development of intelligent technology, relying solely on single-disciplinary knowledge can no longer support complex innovative practical activities. The lack of innovation and entrepreneurship education in the curriculum setting makes students lack innovative thinking and entrepreneurial awareness in the learning process, making it difficult to adapt to the needs of modern society for innovative and entrepreneurial talents [6]. Therefore, universities should integrate and expand on the basis of the original curriculum system. It should be noted that this integration and expansion is not simply to increase the number of new courses, but to realize the organic integration of different knowledge.

Specifically, the university can design courses around three levels of "cognition-training-application": first, guide students to basically understand how intelligent technology is used in reality; then, help students master necessary tool use abilities through case analysis and practical tasks; finally, enable students to solve practical problems in teamwork through comprehensive projects. Such a progressive arrangement helps students connect and integrate knowledge, making the learning process more coherent.

In addition, the design of curriculum content needs to take into account students' different disciplinary backgrounds. For example, humanities majors can pay more attention to the combination of digital content and cultural industry, science and engineering majors can focus on technology implementation paths, and economics and management majors can emphasize market analysis and business model design. In short, the curriculum content design needs to be targeted.

5.2. Optimize the practice teaching mode and enhance the participation in real situations

At present, many practice teachings are mere formalities and ignore the core. The key to solving this problem is not to increase the number of activities, but to enhance the authenticity and depth of participation in practice. If our classroom simulation is not so closed and rigid, but places the learning process in a real environment, allowing students to feel with their eyes, hands and hearts, it will certainly help students understand the complexity of problems.

To achieve this effect, universities can establish cooperative relations with enterprises to introduce actual project resources, so that students can gain experience in the process of completing specific tasks. They can also build an open platform on campus to support students to form cross-major teams to carry out projects, and arrange teachers and industry professionals to provide joint guidance. The coordinated development of universities and enterprises is sustainable and systematic, requiring the establishment of a long-term cooperation mechanism [7].

5.3. Strengthen the depth of university-enterprise cooperation and promote the normalization of collaborative mechanism

Undoubtedly, university-enterprise cooperation plays an important role in innovation and entrepreneurship education, but its actual effect is often determined by two factors: the stability of cooperation and the degree of participation. Compared with short-term activity-based cooperation, establishing a long-term and sustainable cooperative relationship is more conducive to achieving the goal of talent training.

Specifically, universities and enterprises should clarify their respective responsibilities. The main task of enterprises is to provide project resources and practical experience, while universities are responsible for teaching organization and theoretical support. This division of labor can improve the cooperation efficiency to a certain extent.

At the same time, more stable forms of cooperation can be explored to enable enterprise resources to be integrated into the teaching process for a long time. In addition, the introduction of the "dual-tutor mode" in which on-campus teachers and enterprise tutors jointly guide students also helps students understand problems from different perspectives. The establishment of a regular feedback mechanism enables enterprises to understand students' achievements and participate in evaluation, which also helps to enhance their participation motivation and form a relatively stable cooperative relationship.

5.4. Adjust the resource allocation method and expand the scope of participation

At present, there is a certain tilt in the allocation of innovation and entrepreneurship education resources, which limits the participation opportunities of ordinary students to a certain extent. Therefore, it is necessary to make appropriate adjustments in resource allocation so that more students can access relevant activities. Specifically, the participation threshold can be lowered, such as opening basic training courses or sharing practical space, so that students at different levels can participate. At the same time, in terms of funding support, appropriate attention can also be paid to projects in the initial stage, rather than only focusing on teams with existing achievements.

In addition, building an information sharing platform to integrate information on tutors, equipment and projects can help students choose according to their own needs, thus improving the efficiency of resource use. This method not only helps alleviate the shortage of resources, but also reduces the imbalance in opportunity distribution to a certain extent.

5.5. Improve the evaluation mechanism and attach equal importance to process and ability

The evaluation method greatly affects students' learning behavior. If too much emphasis is placed on the final results, students often pay more attention to short-term performance and ignore the long-term accumulation of abilities. Therefore, it is necessary to adjust the existing evaluation system.

In practice, the evaluation can be divided into two parts: process and result. The former mainly focuses on students' investment degree, problem analysis process and teamwork in the project, while the latter focuses on the quality and innovation of results. The combination of the two can more comprehensively reflect students' performance.

At the same time, introducing multi-party participation in evaluation is also a feasible way. In addition to teachers, enterprise tutors and team members can also be involved in the evaluation to provide feedback from multiple perspectives. This multi-dimensional evaluation method helps to reduce the limitations brought by a single standard and enhance the reference value of evaluation results.

5.6. Strengthen the construction of teachers' ability and improve the level of practical guidance

In the process of innovation and entrepreneurship education, teachers not only undertake the role of knowledge imparting, but also need to guide students in practical links. To ensure the good implementation of this project and promote its deeper development, the construction of a high-level teaching team is the key [8].

On the one hand, teachers can be helped to master basic intelligent technology application methods through training, so that they can make reasonable use of them in teaching. On the other hand, teachers can also be encouraged to participate in actual projects or enterprise practices, so as to deepen their understanding of the industrial environment.

In addition, the introduction of external tutors with practical experience also helps to make up for the deficiencies of on-campus teachers in practice. The construction of a diversified teaching team can provide more abundant guidance for students.

In terms of evaluation mechanism, incorporating practical guidance achievements into the teacher assessment system can also enhance their participation enthusiasm to a certain extent, thus promoting the sustainable development of innovation and entrepreneurship education.

6. Conclusion

Against the background of the continuous development of digital technology, innovation and entrepreneurship education in universities is in a process of gradual adjustment. Combined with the previous analysis, it can be seen that there are still some typical problems in curriculum setting, practice links, resource allocation and other aspects. Although these problems have different manifestations, they are often intertwined in actual operation and affect the teaching effect to a certain extent.

Further, these deficiencies are not only deviations in a certain link, but also related to the overall training mode. On the one hand, the original teaching system has a certain lag in responding to changes in new technologies; on the other hand, students' needs themselves are constantly changing, which makes the originally relatively fixed teaching mode gradually difficult to adapt to new situations. Therefore, if only local adjustments are made, it is often difficult to achieve obvious effects.

Based on the above situation, this paper sorts out possible improvement paths from the perspectives of curriculum structure, practice mode and university-enterprise collaboration. It should be noted that these ideas are more exploratory directions put forward in combination with the current actual situation, and their role is not to provide a "standard answer", but to provide some reference entry points for subsequent optimization. More important than the specific measures themselves is the continuous adjustment and improvement in practice.

Of course, this study still has certain limitations. For example, the research scope is relatively limited, and the attention to the differences between different types of universities is not in-depth enough. Follow-up research can further combine specific cases for analysis on the basis of expanding samples, so as to form a more detailed understanding of relevant issues.

On the whole, the improvement of innovation and entrepreneurship education is not a short-term work, but a process that needs to be gradually promoted in practice. Rather than pursuing formal perfection, what is more worthy of attention is whether students have truly achieved ability improvement in the process of participation. This may be a more critical criterion for evaluating its effectiveness.

References

[1] Yang, J., Tao, L., & Zhao, Y. (2026). Research on the construction of the quality evaluation system of innovation and entrepreneurship education in higher vocational colleges under the background of digital transformation. *Science and Education Culture Collection*, (6), 144–147.

[2] Chen, X., & Ji, J. (2026). Dilemmas and solutions to the "integration of competition and innovation" in innovation and entrepreneurship education in agricultural universities. *Journal of Shandong University of Technology (Social Sciences Edition), 42*(2), 74–80.

[3] Qin, S., & Shen, B. (2026). An analysis of the integration path of innovation and entrepreneurship education and professional discipline education in universities. *Sichuan Labor and Social Security*, (2), 106–107.

[4] Huang, P., Lai, K., Huang, X., & Wu, Y. (2026). Construction and practical research on the value-added evaluation system of innovation and entrepreneurship education courses. *Theory and Practice of Innovation and Entrepreneurship, 9*(4), 4–6.

[5] Guo, Y., Wei, W., & Wang, Q. (2025). Research on the personalized teaching mode of innovation and entrepreneurship education in universities in the digital era. *Contemporary Research on Teaching Methods, 11*(6), 37–41.

[6] Zhu, L., & Zhu, Z. (2024). On the integration of innovative and entrepreneurial talent training and English major courses. *Seeking Talents*, (12), 39–41.

[7] Wu, Y., Wan, H., & Liu, Y. (2025). Exploration of innovative and entrepreneurial talent training mode under the background of university-enterprise cooperation. In *Proceedings of the 6th Academic Symposium on Innovation and Development of Educational Information Technology* (pp. 907–909). Jiangxi University of Water Resources and Electric Power.

[8] Liang, Y., & Yan, X. (2016). Analysis on the problems and countermeasures in the construction of teachers for innovation and entrepreneurship education in universities. *University (Research Edition)*, (6), 41–45.