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Original Paper

Research on the Construction of Collaborative Education System for Innovation and Entrepreneurship of Computer Science College Students Under the Background of Internet Plus

Xunbing Wang[1]

[1] School of Computer Science and Communication Engineering, Jiangsu University, Zhenjiang, China

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Abstract

Under the background of "Internet plus", computer science students face both opportunities and challenges in innovation and entrepreneurship. This paper analyzes the impact of "Internet plus" on the innovation and entrepreneurship of computer science students, explores the current situation and problems of the collaborative education system within universities, between universities and enterprises, and between universities and society, and proposes a "full integration and collaboration" method and approach for the innovation and entrepreneurship education of computer science students. It constructs a collaborative education system for innovation and entrepreneurship of computer science students under the background of "Internet plus". In the future, it is necessary to deepen cooperation and promote the development of the collaborative education system towards intelligence, internationalization, and ecological orientation to adapt to the demand for innovative and entrepreneurial talents in the era.

Keywords

"Internet plus", Computer Science, Innovation and Entrepreneurship, Collaborative Education

1. Introduction

At a time when "Internet plus" is deeply reshaping the socio-economic structure and industrial development paradigm, computer technology, as the core driving force, has opened up vast development space for innovation and entrepreneurship activities. Computer science students, leveraging their professional knowledge advantages, are gradually becoming an important force in the field of innovation and entrepreneurship. However, current computer science innovation and entrepreneurship education in universities faces issues such as an imperfect system, lack of

collaborative mechanisms, and weak practical teaching. Building a collaborative education system for computer science students' innovation and entrepreneurship under the "Internet plus" background not only helps enrich the theoretical system of university innovation and entrepreneurship education, innovate collaborative education models for computer science majors, and provide new theoretical perspectives and support; it can also effectively integrate university, enterprise, and social resources, effectively enhance the innovation and entrepreneurship abilities of university students, provide practical guidance for university education reform, promote the deep integration of industry, academia, and research, and have important theoretical and practical value for cultivating high-quality innovation and entrepreneurship talents that meet the needs of the times.

2. The Relationship Between "Internet Plus" and Innovation and Entrepreneurship of Computer Science College Students

2.1 The Connotation and Characteristics of Internet Plus

The essence of "Internet plus" is the deep integration of the Internet with traditional industries, promoting industrial upgrading and economic development through technological and model innovation. Its core characteristics include openness, sharing, innovation, and integration. Openness is reflected in the Internet platform breaking the boundaries of physical space, achieving borderless connectivity; sharing is manifested in the efficient allocation and full utilization of resources; innovation is embodied in the continuous emergence and widespread application of new technologies; integration emphasizes the deep interweaving and collaborative development of the Internet and traditional industries.

2.2 The Impact of Internet Plus on Innovation and Entrepreneurship of Computer Science Students

In the era of vigorous development of the digital economy, the deep penetration of the "Internet plus" technological paradigm brings a complex situation where opportunities and challenges coexist for computer science students' innovation and entrepreneurship. From the perspective of opportunities, firstly, the digital ecosystem built by "Internet plus" breaks the constraints of traditional physical space. Leveraging the openness and globalization characteristics of online platforms, it provides convenient channels for student entrepreneurs to access global resources and connect with international markets. Secondly, cutting-edge technology clusters represented by big data, artificial intelligence, and cloud computing not only provide strong technical support for innovation and entrepreneurship projects but also drive the expansion and innovation of technology application scenarios. Furthermore, the industrial upgrading and consumption pattern changes driven by "Internet plus" have given rise to emerging market demands such as intelligent services and digital content creation, opening up vast entrepreneurial tracks for computer science students. However, the innovation and entrepreneurship practices in the "Internet plus" era also face many challenges. On the one hand, the high openness and low entry threshold of the internet market have intensified market competition, requiring computer science student entrepreneurs to face the pressure of homogenization competition from around the

world. On the other hand, the field of computer technology is showing an exponential iteration speed, requiring entrepreneurs to establish a continuous learning mechanism to dynamically adapt to new trends in technological development. Additionally, the market environment in the "Internet plus" era sets higher demands on business model innovation, as traditional business models struggle to meet user demands in the digital economy. Computer science student entrepreneurs urgently need to build innovative and sustainable business model systems to enhance the market competitiveness and commercial value of their projects.

2.3 Characteristics and Advantages of Innovation and Entrepreneurship for Computer Science Students

Computer science students' innovative and entrepreneurial activities have distinct characteristics and significant advantages. In terms of characteristics, firstly, projects often take technological innovation as the core driving force, focusing on frontier technology areas such as software development, algorithm optimization, and system construction, promoting project development through technological innovation; secondly, due to the complexity and systematic nature of computer science projects, team collaboration becomes a key element, requiring efficient division of labor and close cooperation among members, placing high demands on students' team collaboration skills; thirdly, projects are deeply integrated with Internet platforms, fully relying on the dissemination and interactivity of the Internet, with a strong Internet attribute. In terms of advantages, the systematic curriculum and practical training in computer science majors provide students with a solid foundation in professional knowledge, enabling them to quickly grasp and flexibly apply emerging technologies; this group maintains a high sensitivity to new technologies and trends, with the ability to quickly transform cutting-edge technologies into practical applications; in addition, the innovative and critical thinking cultivated during computer science education provides strong support for breaking through traditional frameworks and proposing novel solutions in innovative and entrepreneurial activities.

3. Analysis of the Current Status of the Collaborative Education System for Innovation and Entrepreneurship among Computer Science Students

3.1 Current Situation of Collaborative Education within Universities

Currently, universities have initially established a framework for collaborative innovation and entrepreneurship education among computer science students, but the collaborative efficiency remains to be improved. There is a clear gap between the School of Computer Science, as the core entity imparting professional knowledge, and the School of Innovation and Entrepreneurship, responsible for developing innovation and entrepreneurship courses and organizing related activities, in terms of educational resource integration and alignment of educational objectives. From a theoretical perspective, this fragmented state stems from deep-seated contradictions in multiple aspects: Firstly, the lack of an information exchange mechanism between departments makes it difficult to effectively share key information such as teaching plans and practical arrangements, hindering the systematic advancement of collaborative education efforts. Secondly, the lack of organic integration between the

professional curriculum system and innovation and entrepreneurship course modules fails to establish a complete educational chain from theoretical knowledge to practical innovation, making it difficult for students to develop the ability framework for knowledge transfer and comprehensive application. Thirdly, the demand for interdisciplinary knowledge integration in innovation and entrepreneurship education conflicts with the inherent pattern of decentralized and specialized faculty in universities. Teachers from various disciplines lack institutional guarantees and incentive mechanisms for collaborative teaching, making it difficult to unite educational efforts.

3.2 Current Status of Collaborative Education between Universities and Enterprises

Driven by the policy of industry-education integration, the modes of computer-related innovation and entrepreneurship education conducted by universities and enterprises in collaboration are becoming increasingly diversified. However, there are still significant deficiencies in the depth and sustainability of cooperation. Taking the joint construction of internship bases by universities and enterprises as an example, most collaborations only remain at the level of short-term internships for college students, failing to establish a long-term mechanism for deep integration of industry, academia, and research. Upon further investigation, the main reasons involve practical dilemmas in three dimensions: Firstly, the cooperation model lacks strategic planning, with most projects being primarily one-time and temporary activities. A deep cooperation mechanism based on technological research and development and achievement transformation has not yet been established. Secondly, enterprises have insufficient motivation to participate. Due to the imbalance between short-term investment and long-term benefits, enterprises often participate in a passive manner in response to policy requirements, lacking the inherent motivation to actively integrate into the university education system. Thirdly, there are institutional defects in the cooperation mechanism. Both universities and enterprises lack clear norms in key areas such as the definition of rights and responsibilities, benefit allocation, and risk sharing, leading to frequent issues such as resource mismatch and goal deviation during the cooperation process.

3.3 Current Status of Collaborative Education between Universities and Society

With the increasing participation of social forces in the field of higher education, cooperation between universities and social organizations in computer-related innovation and entrepreneurship education has gradually begun to unfold, but the overall collaborative efficiency has not yet been fully unleashed. Taking the joint construction of innovation and entrepreneurship bases by universities and entrepreneurial incubators as an example, the breadth and depth of resource integration still need to be expanded. Upon analysis, the crux of this issue lies in the following: Firstly, there is an obstruction in policy implementation. The innovation and entrepreneurship support policies issued by the government, due to the lack of supporting implementation details and supervision mechanisms, make it difficult for policy dividends to be effectively transformed into educational resources during their implementation in universities and social organizations. Secondly, there is a lack of a systematic framework for social resource integration. Universities, industry associations, financial institutions, incubation platforms,

and other entities have not yet formed a collaborative network that facilitates resource complementarity and advantage overlay. Lastly, there are cognitive biases among various parties regarding educational goals. Universities emphasize the long-term effectiveness and academic nature of talent cultivation, while social organizations pay more attention to the commercial value and short-term benefits of projects. This difference in goals severely restricts the in-depth development of collaborative education efforts.

4. Research on the Construction of Collaborative Education System for Innovation and Entrepreneurship of Computer Science College Students Under the Background of "Internet Plus"

4.1 Innovative Entrepreneurial Education Method of "Full Integration and Collaboration"

4.1.1 Integration of In-Class and Out-of-Class Activities

Universities should fully leverage the main channel role of classroom teaching, organically integrate professional courses with innovation and entrepreneurship courses, and build a talent cultivation curriculum system that promotes the deep integration of computer-related professional education and innovation and entrepreneurship education. Vigorously promote the application of the "three classrooms" to help college students cultivate the mindset of creativity to innovation, and then the practical action ability from innovation to entrepreneurship. Among them, the "first classroom" is the specialized classroom teaching, which helps college students build a basic knowledge framework through general innovation and entrepreneurship courses; the "second classroom" includes community classrooms and distinguished teacher classrooms, aiming to explore and cultivate college students' interest in innovation and entrepreneurship, and fully utilize college students' autonomy and practicality through the methods of "competition-based teaching, integration of teaching and competition, and competition-driven learning"; the "third classroom" is the online classroom based on "Internet plus", which forms an online open course resource library by integrating demonstration courses, excellent cases, and advanced teaching resources to effectively supplement extracurricular innovation and entrepreneurship knowledge. At the same time, improve the credit recognition rules for extracurricular learning in the "third classroom", recognize the learning achievements of extracurricular learning resources and practical courses, and quantify them into corresponding course credits to achieve mutual recognition and interchangeability of in-class and extracurricular credits. In the practical application of the "three classrooms", enhance innovation and entrepreneurship knowledge ability through "integration of teaching and innovation", cultivate innovation and entrepreneurship application ability through "integration of competition and innovation", and enhance innovation and entrepreneurship practical ability through "integration of production and innovation".

4.1.2 Integration of Mentors and Counselors

Clarify the division of labor among teachers and fully leverage the role functions of mentors and counselors. Innovation and entrepreneurship mentors include both on-campus and off-campus mentors.

On the one hand, strengthen the sense of responsibility of on-campus mentors, select specialized course instructors to form a fixed team of innovation and entrepreneurship mentors, and increase the proportion of full-time innovation and entrepreneurship teachers. On the other hand, optimize the appointment standards for off-campus mentors, selecting practical talents who have met the required working years in excellent enterprises, possess solid professional qualities, excel in comprehensive abilities, and have successful entrepreneurial experience. As life mentors and intimate friends in college students' learning and life, counselors have a comprehensive, in-depth, and objective understanding of students' various situations. By integrating the strength of counselors on the basis of the mentor system, personalized training programs can be formulated based on students' personality traits, family backgrounds, and other factors. With mentors and counselors as the main body, leading experts in computer science, well-known alumni, and other forces are united to form a faculty team that integrates professional and entrepreneurial knowledge. By enhancing the level of teachers, strengthening the professionalization and informatization literacy of the teaching team, leveraging the guiding role of leading experts in macro-level discipline and professional guidance, and utilizing the advantages of well-known alumni in sharing entrepreneurial experience, college students can systematically and intuitively understand innovation and entrepreneurship culture, knowledge, thinking, vision, and experience, thereby shaping their innovation and entrepreneurship abilities.

4.1.3 Integration of On-Campus and Off-Campus Activities

The deep integration of industry, academia, and research is a crucial path for promoting the development of universities and enterprises. Universities should fully leverage their platform construction advantages, effectively utilize enterprise resources, establish entrepreneurial training bases that cater to different computer-related majors, provide systematic innovation and entrepreneurship training for university students and new employees of enterprises, help university students master innovation and entrepreneurship knowledge, assist new employees in quickly adapting to internal mechanisms of enterprises, and provide internship and practical opportunities for university students. Build a comprehensive platform for industry, academia, and research between universities and enterprises to achieve system interconnection and resource sharing. Enterprise production and operation data can provide support for innovation and entrepreneurship scientific research in universities, while university research results can guide enterprise production, forming a complete closed loop of innovation and entrepreneurship education system, and building a new pattern of co-construction, sharing, and co-governance inside and outside the university. In the context of deep integration of industry, academia, and research, the goals of universities and enterprises gradually converge. Cultivating innovation and entrepreneurship talents is not only related to the effectiveness of university education but also directly affects the quality and efficiency of enterprise production. In addition, deep integration of industry, academia, and research can obtain financial support from national and local governments, attract more talents to participate, and provide strong human and financial support for the development of innovation and entrepreneurship education.

4.2 "Whole-Staff Integration and Collaboration" Approach to Innovation and Entrepreneurship Education

4.2.1 Collaborative Education between the Party Branch and the Innovation and Entrepreneurship Team

Party building work plays an important leading role in ideological and political education in universities. It is necessary to strengthen the guidance of party building work, create a good atmosphere for mass entrepreneurship and innovation education, and build a high-quality ecosystem for mass entrepreneurship and innovation. Leveraging new media platforms such as "two micros and one terminal" to publicize and report successful entrepreneurial cases of advanced party members in universities, fully utilizing the exemplary role of party members, and stimulating students' enthusiasm for innovation and entrepreneurship through the power of role models, forming a good entrepreneurial atmosphere. Inviting successful party members who are entrepreneurs to return to campus to give lectures, share entrepreneurial experiences, and integrate them into the teaching process, providing internship opportunities, and realizing the feedback of party members who are entrepreneurs to education. Strengthen the overall planning of party building work, improve the mass entrepreneurship and innovation education system, explore the new model of "Internet plus party building plus mass entrepreneurship and innovation". Unite the strength of party branches and mass entrepreneurship and innovation institutions, participate in mass entrepreneurship and innovation competitions through joint teams of party branches, integrate the guidance services of party members into the daily work of mass entrepreneurship and innovation teams, and open up the "last mile" of services for innovation and entrepreneurship.

4.2.2 Collaborative Management between Mentors and Dual-Innovation Teams

Universities should focus on building a team of dual-innovation and entrepreneurship mentors who possess both innovative and entrepreneurial awareness and rich entrepreneurial experience, achieving collaborative management and complementary advantages between on-campus and off-campus mentors. On the one hand, we should build an on-campus dual-innovation and entrepreneurship mentor team, vigorously cultivating and introducing innovative and entrepreneurial teaching resources. On the other hand, we should build an off-campus dual-innovation and entrepreneurship mentor team, hiring successful entrepreneurial alumni, professional and technical personnel from enterprises and institutions, corporate executives, and other talents with rich entrepreneurial experience to serve as off-campus mentors. We should strengthen the dual-mentor responsibility system, clarifying that on-campus mentors are responsible for teaching and academic competitions, while off-campus mentors are responsible for practical training and project implementation. Mentors should follow up on teaching, competitions, practical training, and project progress throughout the entire process, promptly identifying problems and providing targeted guidance to help dual-innovation and entrepreneurship teams deeply analyze issues and develop effective solutions.

4.2.3 Collaborative Services between Colleges and Dual-Innovation Teams

The focus of collaborative services in colleges lies in the selection of collaborative partners and modes. Collaborative partners encompass governments, enterprises, institutions, research institutions, venture capital firms, etc. When selecting collaborative partners, colleges need to comprehensively consider factors such as educational philosophy, regional location, financial technology, and equipment conditions to ensure good cooperation outcomes. By rigorously screening collaborative partners, colleges can enhance the sense of learning and satisfaction of students in practical training, internships, and projects, thereby attracting more students to join the innovation and entrepreneurship teams. In terms of collaborative mode selection, emphasis is placed on the interconnectivity of course systems across colleges. The innovation and entrepreneurship services in universities are driven by collaboration among multiple colleges, and the interdisciplinary integration of different colleges is a key focus for innovation and entrepreneurship teams. Colleges should combine their own characteristics, integrate the development advantages of different disciplines, share entrepreneurial resources, and cultivate more composite entrepreneurial talents.

5. Conclusion and Outlook

5.1 Research Conclusion

This study is based on the technological transformation and educational demands in the era of “Internet plus”, systematically exploring the construction path of the collaborative education system for innovation and entrepreneurship among computer science students. Through multi-dimensional analysis of the current situation, it is found that there are issues such as fragmented collaboration mechanisms and disconnected curriculum systems within universities. School-enterprise cooperation faces the dilemma of insufficient depth and lack of motivation, and school-community collaboration is constrained by policy implementation obstacles and inefficient resource integration. The study proposes a “full integration and collaboration” approach for cultivating innovation and entrepreneurship among college students, as well as the development of a network collaborative innovation learning guidance platform. This collaborative education system integrates professional educational resources from universities, practical resources from enterprises, and social service resources, forming a multi-party collaborative innovation talent cultivation ecosystem. It has important theoretical value and practical guidance significance for enhancing the innovation and entrepreneurship abilities of computer science students and promoting the supply of high-quality talents in the era of “Internet plus”.

5.2 Future Outlook

In the context of accelerated iteration of new technologies such as artificial intelligence, big data, and blockchain, the “Internet plus” innovation and entrepreneurship education ecosystem will undergo profound changes. On the one hand, the application of new technologies will give rise to more diversified innovation and entrepreneurship scenarios, injecting new development momentum into the collaborative education system; on the other hand, the adjustment of industrial structure and changes in

talent demand brought about by technological development also pose higher requirements for the existing education model. Future research can be deepened in the following directions: first, constructing a dynamic evaluation model for collaborative education based on big data and artificial intelligence, through a quantitative indicator system and intelligent analysis technology, to achieve precise monitoring and optimization of the education process and its effects; second, exploring the application paths of new technologies such as the metaverse and virtual simulation in innovation and entrepreneurship practical teaching, innovating practical teaching models; third, studying the cross-border collaborative education mechanism in the context of the global digital economy, expanding the vision of international talent cultivation. Universities need to continuously deepen strategic cooperation with enterprises and social organizations, promoting the collaborative education system towards intelligent, international, and ecological development, to adapt to the dynamic demand for innovation and entrepreneurship talents in the "Internet plus" era, providing solid talent support for the national innovation-driven development strategy.

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