

Research on cultivating innovative practical ability of students majoring in computer science and technology under the background of integration of specialization and innovation

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Abstract. Based on the perspective of the integration of specialization and innovation, in order to improve students' innovative practical abilities, this paper innovates the talent cultivation mode of computer science and technology majors, proposes the "three carriers" co creation progressive talent cultivation mode, optimizes the curriculum system of specialization and innovation integration, scientific research and education projects, and scientific and technological innovation activities as carriers, and jointly cultivates students' innovative practical abilities at the hierarchical level of school enterprise and teacher-student collaboration. At the same time, from the curriculum system propose relevant strategies in terms of innovative practice platforms, diverse assessment standards for innovative talents, etc., to promote the cultivation of innovative applied talents in computer science and technology majors.

1 Introduction

In 2017, the Ministry of Education held a seminar on the construction of new engineering disciplines, which believed that universities should provide intellectual and talent support for China's industrial development and international competition, and cultivate innovative talents with innovative, outstanding, and diverse thinking.

Innovation is the soul of social progress, and entrepreneurship is an important way to promote economic and social development and improve people's livelihoods. Young college students are full of imagination and creativity, and are the driving force for innovation and entrepreneurship.

In the process of guiding policy documents and reforming innovation and entrepreneurship education, the higher education sector has innovatively proposed the establishment and improvement of a dual innovation and entrepreneurship curriculum

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system, while deeply integrating professional course education to promote a new model of teaching reform, aiming to cultivate high-quality, high skilled, and high-level talents.

Some scholars have mentioned that universities, as the cradle of cultivating national scientific and technological innovation human resources, must be guided by the "innovation driven development strategy" to promote the reform of the talent training system, "integrate innovation and entrepreneurship education throughout the entire process of talent training", and deeply explore new models and paths for the organic integration of professional education and innovation and entrepreneurship education (referred to as "specialized innovation integration"), in order to "cultivate a reserve of young scientific and technological talents with international competitiveness." In the continuous improvement of the national innovation system, computer technology plays an important supporting and leading role. At the same time, computer science and technology major college students are an important part of creating China's innovation system. With the rapid development of computer technology, the training of computer science and technology professionals pays more attention to the cultivation of practical and innovative abilities. "

2 Analysis of the current situation and existing problems of innovation and entrepreneurship education for college students under the background of integration of specialization and innovation

Integration of specialization and entrepreneurship refers to the collaborative cultivation of applied talents between professional education and innovation and entrepreneurship education. In the past, innovation and entrepreneurship education was integrated into the education system mainly focused on professional education to cultivate comprehensive applied talents with innovative consciousness, thinking, and ability. In the context of the new era, many universities are transforming towards application-oriented universities, focusing more on cultivating students' innovative and practical abilities. The integration of specialized and creative education is a favorable means to achieve the transformation of application-oriented universities. The implementation of the mechanism of integrating specialized and creative education in universities is beneficial for students to transform their professional knowledge system into practical applications, and can also promote their understanding and love for their majors, further improving the effectiveness of talent cultivation.

2.1 Analysis of the current situation of specialized and creative integrated education

On the path of exploring the teaching research and practice of the integration of specialization and innovation, domestic scholars generally believe that the deep organic integration of professional education and innovation and entrepreneurship education will "promote the comprehensive improvement of students' comprehensive qualities and abilities". Many scholars have proposed new paths and models for the integration of specialization and innovation based on the educational goals of our university. For example, Duan Huiqin (2020) and others have proposed paths, models, and methods for the integration of specialization and innovation in applied universities; Peng Huatao (2021) proposed a model and path for the deep integration of innovation and specialization in science and engineering universities under the background of "Double First Class" construction; Provide reference for similar universities to solve the problem of integrating undergraduate education with innovation. Scholars have also explored customized teaching

models for innovation and entrepreneurship that adhere to the concept of integration of specialization and innovation, taking into account various aspects such as educational objectives, disciplinary and professional characteristics, teacher expertise, and student needs. For example, Liu Na (2022) proposed a customized teaching model for entrepreneurship and entrepreneurship education based on integration of specialization and innovation. Scholars have also conducted numerous studies on the cultivation of innovative practical abilities among college students, such as Zou Beiji's proposal to enhance their practical and innovative abilities by constructing a "diversified and three-dimensional" practical teaching system and a three-dimensional experimental teaching system.

At present, there is no clear concept of integration of specialization and innovation abroad, and in terms of professional education and innovation and entrepreneurship education, it is mainly represented by the United States and the United States. They focus on cooperation, both on campus and off campus, and use resources both on campus and off campus to promote science and technology parks and technology transformation. They provide entrepreneurship training programs for university teachers and students, and promote the development of entrepreneurial activities for college students.

2.2 Analysis of problems in the integration of specialized and creative education

Scholars have conducted research on various aspects of innovation and entrepreneurship education based on the integration of specialization and innovation. However, currently, the teaching research and practice of specialization and innovation integration in domestic universities are still in the initial exploration stage, and there is a serious "two-layer" phenomenon between professional education and entrepreneurship education. Innovation and entrepreneurship belong to comprehensive education with weak targeting for various fields and majors, and related theories and methods cannot be deeply integrated with specific disciplines and majors; Professional education focuses on a certain industry field with strong targeting, but lacks inspiration for innovative thinking and the cultivation of innovative practical abilities in the professional knowledge system, resulting in difficulties for students to integrate and integrate knowledge from the two systems, and a lack of innovation and entrepreneurship abilities oriented towards the professional field.

After research, it has been found that the current integration of innovation and entrepreneurship is simply adding some innovation and entrepreneurship courses to talent training programs. The course content system only revolves around innovation and entrepreneurship theory, and does not integrate high-quality education and teaching resources both inside and outside the school. It does not build targeted specialized knowledge systems and teaching models for specific disciplines and majors based on their characteristics and development, there is a lack of cultivation of innovative practical abilities for students majoring in disciplines.

2.3 Research meaning

This article combines the research of computer science and technology to cultivate the innovative practical ability of college students from the perspective of the integration of specialization and innovation, which has significant theoretical and practical significance. Firstly, it has certain theoretical significance. Starting from a certain theoretical height, this study sorts out relevant research on the cultivation of innovative practical abilities of college students in the perspective of integration of expertise and innovation. This will help further improve and optimize the concept and methods of innovation and entrepreneurship education, and provide theoretical reference for the development of innovation and

entrepreneurship education in current higher education in China. At the same time, with the cultivation of applied innovation and entrepreneurship talents as the core, and the integration mechanism of specialization and innovation, theoretical guidance is provided to solve some problems in cultivating students' innovation ability. Secondly, it has certain practical significance. Improving the practical and innovative abilities of undergraduate students has become an important figure in higher education reform. How to enhance the innovative and practical abilities of college students is an urgent problem that needs to be solved in China's higher education. Based on the integrated education model of specialization and creativity, with the integration of specialization and creativity curriculum system, practical teaching system, innovative practical platform, and talent evaluation mechanism as the entry point, the goal is to enhance the innovation and practical ability of college students, promote the cultivation of innovative and entrepreneurial talents, and have significant practical significance.

3 Research on strategies for cultivating innovative practice abilities of computer science and technology majors

The goal of talent cultivation in the field of computer science and technology is to cultivate excellent IT professionals for society. With the rapid development of computer technologies such as blockchain, cloud computing, big data, and artificial intelligence, IT professionals need to possess professional qualities, innovative thinking, and entrepreneurial spirit. Therefore, the cultivation of innovative practical abilities is crucial for the computer profession.

The cultivation of innovative practical ability has become an important part of talent cultivation in computer science and technology. On the one hand, computer majors themselves have strong practicality, providing more diverse choices and practicality for innovation and entrepreneurship. On the other hand, in recent years, school enterprise cooperation has been the main trend in improving the quality of applied talent cultivation. Based on the characteristics of the computer science and technology major and the advantages of school enterprise cooperation, this article proposes a "three carriers" co creation and progressive training model, which takes the integration of specialized and creative curriculum system, scientific research and education projects, and scientific and technological innovation activities as carriers, and adopts a school enterprise and teacher-student co creation model to gradually cultivate students' innovative practical abilities.

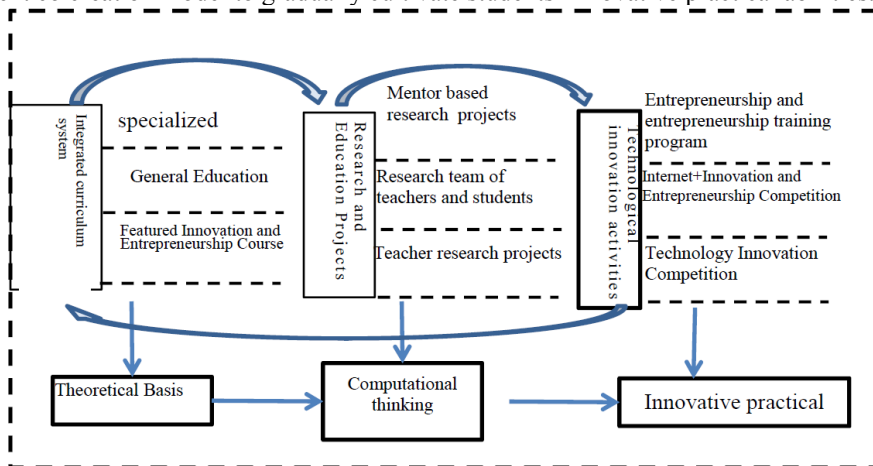


Fig. 1. The "three carriers" of innovative practice ability co creation and progressive training model.

The integrated curriculum system of innovation and entrepreneurship includes computer science and technology courses, general education courses, and characteristic innovation and entrepreneurship courses. Innovation and entrepreneurship courses are integrated into the professional curriculum system to form an innovation and entrepreneurship credit system. The establishment of innovation and entrepreneurship courses at the school and college levels improves the quality of the curriculum, and creates a school level entrepreneurship theory course combined with a distinctive specialized innovation integration course. The content of the featured specialty innovation integration course covers the introduction of the latest technologies, applications, and development prospects in the IT field such as artificial intelligence, big data, and cloud computing, as well as professional innovation methods. It provides students with an innovative practice platform, while also covering enterprise business models and entrepreneurial investment methods in the IT field, laying a foundation for students to start their own businesses.

Taking scientific research education projects as a carrier, in order to play the role of scientific research in improving the quality of talent cultivation, promoting knowledge innovation, leading and supporting discipline construction, Shandong University of Political Science and Law has established a "Scientific Research Education" special project. Teachers lead students to form research teams for application, allowing students to join the teacher's research team and laboratory project team, participate in actual scientific research projects, and implement a mentor system. Students are involved in various tasks, including project topic selection, project application, project research, project conclusion, and achievement application. Through scientific research training, students can apply for research and education projects with the background of new technologies and development prospects in the IT field. This enables them to further understand new technologies and opportunities in the IT industry, cultivate their professional qualities, exercise their innovative and computational thinking, and enhance their innovation abilities.

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The hierarchical progression from theoretical foundation to computational thinking, innovation ability to innovative practical ability is carried out through the curriculum system, scientific research and education projects, and scientific and technological innovation activities. The three rely on and promote each other. Through competition to promote education, and the achievements of scientific and technological innovation activities to promote the optimization of the integrated curriculum system, they complement each other to achieve the goal of cultivating the innovative practical ability of students in their respective majors.

4 Conclusion

In the era of "mass innovation and entrepreneurship", higher education is advancing the pace of professional education and innovation and entrepreneurship education, and the integration of expertise and innovation has become a trend in talent cultivation in higher education. The computer science and technology major keeps up with the forefront of the times, and related technologies are updated rapidly. It is very necessary for students in this major to have innovative practical abilities. The integration of professional education and innovation and entrepreneurship education provides a favorable premise for improving the innovation literacy, awareness, and practical ability of students in the computer science and technology major. The paper designs a talent cultivation model, with schools, enterprises, teachers, and students working together, and conducts strategic research on the integration of specialized and creative curriculum system, innovative practice platform, and diversified assessment standards for innovative talents. It proposes a "three carriers" co creation progressive talent cultivation model. The relevant achievements obtained in the process of cultivating innovative practical abilities can provide reference and value for other disciplines and majors.

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