Exploring the Path of Cultivating College Students' "Innovation and Entrepreneurship" Ability under the Integration of Research and Teaching

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[**Abstract**] In higher education, research and teaching supplement and support each other. Under the trend of deep integration of the new round technological and industrial revolution, the transformation role of higher education in technological innovation and industrial development is becoming increasingly prominent. The integration of research and teaching is an important measure to solve the problem of separation and even contradiction between education and scientific and technological research. The dialectical and unified theoretical mechanism among education, technology, and talent can promote the integration of research and teaching from three aspects: education and teaching, technological innovation, and talent cultivation, in response to the problems and difficulties in the current "innovation and entrepreneurship" ability of college students. This can promote the improvement of college students' "innovation and entrepreneurship" ability.

[**Key words**] integration of research and teaching; innovation and entrepreneurship; college students; path

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1 Conceptual analysis

1.1 Conceptual analysis of the integration of research and teaching

The report of the 20th National Congress of the Communist Party of China emphasizes "the integration of vocational education and general education, industry and education, and research and teaching", and changes "fusion of research and teaching" to "integration of research and teaching". Integration of research and teaching refers to the organic integration and intersection of scientific and technological research with education and teaching. In higher education, research and teaching supplement and support each other. Scientific research achievements are often the forefront and latest developments of professional knowledge, which can broaden the scope of knowledge and the disciplinary perspective for teaching work, and help students apply similar knowledge to others. Teaching is a fundamental task in higher education, which involves basic knowledge, teacher-student interaction, and interdisciplinary perspectives, and provides research ideas and knowledge reserves for scientific research. The integration of research and teaching is an organic component of university governance. Science, technology, and innovation require universities to cultivate innovative talents and achievements, while higher education requires the contribution and resources of science and technology innovation to improve the quality and level of education.

The earliest integration of research and teaching can be traced back to the modern university education philosophy in Germany and the United States. In the early 19th century, German educator Wilhelm von Humboldt

proposed the concept of "combining research with teaching" and founded the University of Berlin on this basis. In the second half of the 19th century, American scholar Daniel Coine Gilman drew on Humboldt's experience and proposed the concept of "collaborative research and teaching". At the end of the 20th century, American educator Ernest L. Boyer proposed four types of academic activities that university teachers should have, viewing academia and teaching as an organic whole. The integration of research and teaching has gradually become an important educational philosophy in modern universities. Since the reform and opening up, China's higher education has begun to reform towards a direction that emphasizes both teaching and research. After experiencing processes such as separation of research and teaching, combination of research and teaching, and integration of research and teaching, the integration of research and teaching has become an important direction for higher education in China. Under the trend of deep integration of the new round technological and industrial revolution, the transformation role of higher education in technological innovation and industrial development is becoming increasingly prominent.

1.2 Conceptual analysis of college students' innovation and entrepreneurship ability

"Innovation and entrepreneurship" is the abbreviation of "widespread entrepreneurship and innovation". The innovation and entrepreneurship ability of college students refers to their quality and strength in innovation and entrepreneurship. In higher education in China, there are many types of "innovation and entrepreneurship" that college students participate in, such as three categories of training programs (also known as "innovation projects for college students"), which include innovation training programs, entrepreneurship training programs, and entrepreneurial practice programs, as well as "innovation and entrepreneurship" competitions. Among the competitions, there are Chinese College Students' "Internet+" Innovation and Entrepreneurship Competition, "Youth Creation" National Undergraduate Entrepreneurship Competition, "Challenge Cup" Chinese Undergraduate Entrepreneurship Plan Competition, Undergraduate Mechanical Innovation Design Competition, Undergraduate Energy Conservation and Emission Reduction Social Practice and Technology Competition, Undergraduate Program Design Competition, Undergraduate Mathematical Modeling Competition, etc. With the help of the above entrepreneurship and innovation projects and competitions, and the guidance of instructors, research projects, patent applications, and innovative achievements are achieved.

With the iteration of technological revolution and industrial transformation, the role of innovative talents and achievements in national development and social progress has become increasingly important. Innovation and entrepreneurship ability is an important indicator for evaluating the comprehensive quality of college students in the new era, and also an important reflection of the effectiveness of talent cultivation among college students in the context of the integration of research and teaching. The National Conference on Education Work held in January 2024 emphasized the need to deepen the integration of research and teaching, and fully leverage the role of universities as the main force in basic research. The conference also emphasized the need to strategically grasp the path of implementation, grasp the inherent regularity of integrating education, technology and talent, strengthen the linkage between research and teaching, industry and education, and talent cultivation, and strengthen the research on educational policies and laws of countries around the world. From this, it can be seen that the concept of integrating research and teaching in China emphasizes the development of a virtuous cycle between education, technology and talent.

2 Academic mechanism of the integration of research and teaching and college students' "innovation and entrepreneurship" ability

The report of the 20th National Congress of the Communist Party of China comprehensively deploys the three major strategies of education, technology, and talent for the first time. The report regards education, technology, and talent as the fundamental and strategic support for the comprehensive construction of a socialist modernized

country.

2.1 Academic mechanism of the integration of research and teaching and college students' "innovation and entrepreneurship" ability

The integration of research and teaching is the integration of the process of scientific and technological research in universities, education and teaching, and talent cultivation. It is an important measure to solve the problem of separation and even contradiction between education and scientific and technological research. Based on the dialectical unity between science and technology, education, and talent in the report of the 20th National Congress, the theoretical mechanism of integrating research and teaching with the "innovation and entrepreneurship" ability of college students can be analyzed as follows:

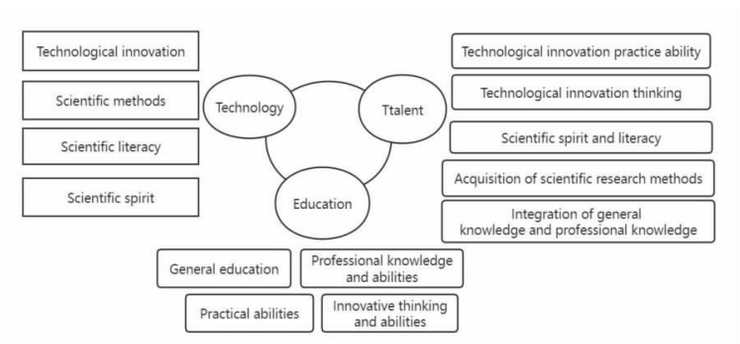

Figure 1. Academic mechanism of the integration of research and teaching and college students' "innovation and entrepreneurship" ability

Firstly, education is an important cornerstone of technological innovation and talent cultivation, playing a fundamental role in the dialectical unity of education, technology, and talent. It also plays a fundamental and global role in cultivating the "innovation and entrepreneurship" ability of college students. Education is an important carrier of knowledge, a raw material for technological development and talent cultivation, and an incubator for innovative thinking and abilities. Universities occupy a dominant position in the national education system and play an important bridging role in promoting the integration of research and teaching and cultivating the "innovation and entrepreneurship" abilities of college students. In higher education, universities formulate talent training programs and curriculum systems based on national science and technology innovation and talent strategies, as well as social needs, to provide general education, professional knowledge, and practical courses for college students. With the promotion of the "Double First-class" construction, universities actively explore practical platforms to guide students to actively participate in various innovation and entrepreneurship competitions, and establish collaborative education models with local governments, enterprises, and research institutes to break down barriers between industry, academia, and research. At the same time, universities provide guidance and services for students to form innovative thinking and abilities by constructing high-quality courses on innovation and entrepreneurship and enhancing the innovation and entrepreneurship education abilities of teachers.

Secondly, technology is the driving force for educational level and talent literacy, playing a "converter" role in education and talent. On the one hand, technological innovation originates from educational production and talent creation, and on the other hand, technological innovation has a strong counter effect on educational development and talent cultivation. Science and technology are the reproduction and practical application of general and professional knowledge, and cutting-edge technological achievements and talents are often the forefront knowledge points and leaders in education and teaching. Science and technology platforms are important carriers for cultivating innovative talents, and technology platforms or research and development centers play an important role in cultivating high-quality talents with scientific thinking, spirit, and methods. At the same time, technology plays a "converter" role between education and talent. Technology can transform theoretical knowledge and practical

abilities in education into practical and innovative abilities of talents, while also transforming the innovative achievements of high-quality talents into cutting-edge achievements in education. In higher education, universities have a large number of academic leaders, research projects, and research platforms, which can enable college students to actively participate in and enhance their research spirit, methods, and practical abilities, promote their participation in various levels of entrepreneurship projects and competitions, and grow into science and technology innovation talents.

Finally, talent is the main body for improving education level and technological innovation, playing a fundamental supporting role in education and technology. Talents are the core element of educational development. High-quality educational management and high-level teaching staff are the key to fostering a high-quality education system, cultivating high-quality talents with general and professional knowledge, scientific and technological innovation thinking and practical abilities. At the same time, talent is the mainstay of technological innovation, and innovation without talent is an empty talk. In higher education, universities have a team of teachers who possess both theoretical knowledge and practical experience through talent introduction and school-enterprise collaboration, as well as a team of full-time and part-time innovation and entrepreneurship guidance teachers, providing teaching resources for the improvement of students' innovation and entrepreneurship abilities.

2.2 Interactive status of the integration of research and teaching and college students' "innovation and entrepreneurship" ability

The report of the 20th National Congress of the Communist Party of China pointed out the need to "deeply implement the strategy of revitalizing the country through science and education, strengthening the country through talent, and driving development through innovation, open up new fields and tracks for development, and continuously shape new driving forces and advantages for development". The "innovation and entrepreneurship" education for college students in China has made significant progress, but there are also some development difficulties and practical problems.

Firstly, the main body of innovation and entrepreneurship education is undergraduate students, but there is a phenomenon of "emphasizing scientific research over teaching" in higher education, especially the neglect of general education and professional education for undergraduate students. In the absence of a solid foundational knowledge system, it is difficult for undergraduate students to seize opportunities in the integration of research and teaching and make innovative innovation and entrepreneurship issues. The phenomenon of "emphasizing scientific research over teaching" may make college students underestimate the importance of basic education, and have doubts about the integration of research and teaching and innovation and entrepreneurship education, thereby affecting the overall and fundamental role of education in technology and talent.

Secondly, there is a separation between education and research in the process of innovation and entrepreneurship education for college students. Professional course teachers, in the process of imparting professional knowledge and skills, overlook the connection between existing subject knowledge and innovative entrepreneurial thinking; guidance teachers often use traditional teaching methods or instill conservative knowledge systems in students based on their own preferences, or explain relevant policy concepts verbatim. Some students who participate in entrepreneurship and innovation projects and competitions, due to a lack of necessary and solid basic knowledge and scientific research thinking, rely on rote memorization or copying a large number of existing research results on the internet to create repetitive, ineffective, and less innovative entrepreneurship and innovation issues.

Thirdly, due to the different management methods of scientific research and teaching, and the different corresponding superior management departments, universities find it difficult to integrate and manage them. In innovation and entrepreneurship education, there are "two skins" between innovation and entrepreneurship courses and professional courses in universities. There is a deviation in the positioning and direction of talent cultivation in

universities, and there is a lack of institutional mechanisms for carrying out "innovation and entrepreneurship" education. It is difficult to integrate "innovation and entrepreneurship" education with professional education, and it is difficult to form a "school-enterprise cooperation, multi-dimensional interaction, and segmented and progressive" innovation and entrepreneurship talent cultivation system.

Finally, in the practice of innovation and entrepreneurship among college students, there is a utilitarian phenomenon of replacing "education" with "projects". For example, some universities have replaced "innovation and entrepreneurship education" with "innovation and entrepreneurship project practice", which is a highly simplified approach to innovation and entrepreneurship education and ignores the true function of "educating people" in university innovation and entrepreneurship education.

3 Path of cultivating college students' "innovation and entrepreneurship" ability under the integration of research and teaching

President Xi Jinping pointed out that, "High-level research-oriented universities should better combine the development of science and technology as the primary productive force, the cultivation of talents as the primary resource, and the enhancement of innovation as the primary driving force". They should leverage the advantages of deep basic research and interdisciplinary integration to become the main force of basic research and the new force of major scientific and technological breakthroughs. Disciplines are the soil for scientific and technological innovation, and scientific and technological innovation will enhance the development level of disciplines in turn.

Firstly, in terms of education, universities should actively cultivate "innovation and entrepreneurship" guidance teachers' ability of integrating research and teaching. By organizing training, visiting and observing, and pursuing academic advancement, we aim to enhance the scientific literacy of teachers, break down barriers to the integration of research and teaching both inside and outside education, encourage university teachers to engage in extensive exchanges and cooperation with high-end research institutes, large scientific facilities, high-tech enterprises, and enhance their ability to conduct scientific research and feedback teaching. Promote the placement of guidance teachers for entrepreneurship and innovation in universities in science and technology innovation enterprises, and promote the two-way flow and amphibious development of enterprise management talents and university teachers. In administrative management, the concept of integrating research and teaching should be integrated into the comprehensive reform plan of schools, promoting the optimization of academic governance structure, adjustment of disciplinary layout and professional structure in universities, and establishing a sound performance evaluation mechanism with talent cultivation as the core.

Secondly, in terms of scientific research innovation, universities should promote the transformation of scientific research achievements into professional teaching. Universities actively collaborate with research institutions and enterprises to establish collaborative research and development centers, promote cross-department, cross-industry, and cross-disciplinary collaborative innovation, and improve the mechanism for transforming scientific and technological achievements into teaching resources. Research institutions or enterprise engineers can be introduced into the teaching team, promoting cutting-edge technology and application technology into the teaching classroom, and enhancing students' "problem awareness" and research innovation ability. Based on the new round of technological and industrial revolution, we can promote the updating and iteration of professional courses, and widely integrate intelligent technology and digital technology into professional curriculum education.

Thirdly, in terms of talent cultivation, universities should mobilize the learning and innovation enthusiasm of college students. For a long time, Chinese universities have shown a trend of being eager for quick success and instant benefits in talent cultivation models. Talent cultivation models often follow an "employment-oriented" approach, often setting courses, majors, and training plans based on the current socio-economic structure, lacking strategic vision and innovative thinking. In the teaching process of universities, most of them adopt textbook-based

rigid teaching, which has a certain gap with the current trend of technological and industrial revolution. Universities should establish incentive measures to encourage teachers to absorb new technological achievements and strengthen the training of students in operating new technologies in practical teaching. At the same time, the concept of integrating research and teaching should be implemented in the training plan, curriculum design, textbook system, teaching mode, etc., to cultivate students' interdisciplinary and cross-disciplinary knowledge perspectives, and to stimulate their enthusiasm for learning and innovation.

Last but not least, in terms of policies, publicity, guidance, supervision, and evaluation should be strengthened. The integration of research and teaching and innovation and entrepreneurship in universities should be strengthened, creating a favorable environment for promoting the integration of research and teaching. Collection, publicity, and promotion of typical cases should be strengthened, enhancing the demonstration and leading effect of typical cases, and expanding the scope of influence and benefits. The integration of research and teaching and the cultivation of "innovation and entrepreneurship" abilities should be promoted into the assessment and evaluation mechanism, and the development level of the integration of research and teaching should be regarded as an important indicator of the development level of "innovation and entrepreneurship" in departments. A sound reward mechanism for college students should be established to increase their emphasis on the integration of research and teaching in the process of entrepreneurship and innovation, and shape their innovative thinking and practical abilities.

4 Conclusion

Under the background of "Double First-class" construction, higher education urgently needs to promote the integration of research and teaching, organically combine scientific research and teaching work, and further strengthen the important role of cultivating innovative talents. To achieve the great rejuvenation of the Chinese nation, technology is the key, talent is the basis, and education is the foundation. The three complement each other and are dialectically unified. Universities shoulder the dual mission of "providing high-end talents" and "scientific and technological innovation". They should actively utilize resources and opportunities in education, technology, and talent, rely on the integration of research and teaching to enhance the "innovation and entrepreneurship" ability of college students, and cultivate high-quality talents with innovative abilities.

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