Exploring and Implementing the Cultivation of Innovative Technical Talents in Food Disciplines of Higher Vocational Education through the Integration of Science and Education

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Abstract. This paper delves into the connotation of science-education integration, analyzes the current situation and existing problems in cultivating innovative talents in the food major of higher vocational education from the perspective of science-education integration, and proposes strategies for cultivating innovative talents in the food major. It aims to provide talent support and intellectual backing for the rapid development of the food discipline.

Keywords: Science-education integration; Food major; Innovative talents; Talent cultivation

1 Introduction

In the rapidly evolving landscape of the food industry, the significance of fostering innovative technical talents who can cater to the industry's ever-growing demands has never been more pronounced. With food safety issues gaining prominent attention, the integration of science and education has emerged as a pivotal approach to nurturing such talents. This integration aims to bridge the gap between scientific research and educational practices, fostering an environment where knowledge and innovation converge seamlessly.

The concept of "science-education integration" has undergone substantial evolution, tracing its roots back to the early 19th century when the German scholar Humboldt advocated for the unity of teaching and research. Over the centuries, this idea has matured, culminating in recent initiatives by entities like the Chinese Academy of Sciences and the Ministry of Education, which jointly proposed the concept in 2012. The emphasis on science-education integration has been reinforced through various national policies and conferences, underscoring its role as a new direction for vocational education development.

Science-education integration in vocational education focuses on deepening the synergy between scientific and technological innovation and talent cultivation. It en-

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compasses a holistic approach where "science" encompasses research and technology, while "education" pertains to teaching and learning. The "integration" serves as the methodology, leading to a converged outcome where science and education develop in harmony. This integration is manifested through various avenues, including "research + education" and "science and technology + education," each promoting mutual reinforcement between scientific endeavors and educational practices.

Despite these advancements, the cultivation of innovative talents in the food major faces several challenges within the current science-education integration framework. Issues such as curriculum misalignment with industry needs, insufficient integration of innovative education, and a lack of high-level scientific and technological innovation platforms hinder the effective nurturing of these talents. Consequently, there is an urgent need to devise strategies that address these challenges head-on.

This paper delves into the strategies for cultivating innovative technical talents in the food major from the perspective of science-education integration. By examining the current landscape and identifying key areas for improvement, this study aims to provide actionable insights that can enhance the quality of talent cultivation in the food industry, ensuring that it aligns with the demands of industrial transformation and upgrading.

With the rapid development of the food industry and the increasingly prominent issue of food safety, it is of great significance to cultivate innovative technical talents who can meet the needs of the food industry. In the current context of science-education integration, how to effectively cultivate innovative technical talents in the food major has become an important issue faced by both universities and the food industry.

2 Connotation of Science Education Integration

The idea of "science-education integration" has evolved over more than two centuries. In 1809, the German scholar Humboldt proposed the idea of "unity of teaching and research." In 2012, the Chinese Academy of Sciences and the Ministry of Education jointly proposed a new concept of "science-education integration and joint talent cultivation." The report to the 20th National Congress of the Communist Party of China emphasizes the need to "promote the integration of vocational and general education, industry-education integration, and science-education integration." In December 2022, the General Office of the Central Committee of the Communist Party of China and the General Office of the State Council issued the Opinions on Deepening the Reform of the Modern Vocational Education System, emphasizing: "To advance vocational education with an emphasis on the integration of industry and education, the integration of vocational and general education as the key, and science-education integration as a new direction, and shape new growth drivers and advantages for development." In January 2023, the National Education Work Conference emphasized the urgent need to deeply understand the changes in education brought about by the technological revolution and industrial change, take the promotion of science-education integration as a new direction, and accelerate the construction of a

modern vocational education system. Science-education integration is the latest direction for the development of vocational education, with its core lying in the deep integration of scientific and technological innovation with talent cultivation. Science-education integration emphasizes the close connection between science and technology and education, promotes the innovation and optimization of educational and teaching models, realizes the reform and development of education modernization.

In science-education integration, "science" usually refers to science and technology, research, while "education" refers to teaching and learning. "Integration" is the means and method, and "convergence" is the result and effect. Science and education are highly integrated and coordinated development. Science-education integration refers to strengthening the interaction between scientific research, technology, and education and teaching, optimizing resource allocation, promoting the collaboration between scientific research and teaching, enhancing innovation capabilities, driving educational and teaching innovation with technology, improving the quality of talent cultivation, cultivating innovative talents, serving national strategies and the socio-economy, and promoting the high-quality development of vocational education [1].

Firstly, science-education integration in vocational education is embodied as "research + education," where scientific research and education and teaching support and promote each other, converting scientific research results into teaching resources and integrating teaching needs into research projects to achieve deep integration of scientific research and education and teaching. It emphasizes the conversion and innovation of scientific research results, as well as the concept of scientific research serving teaching and teaching empowering scientific research. While imparting knowledge and training skills, it focuses on the leading and supporting role of scientific research. In practice, it is necessary to strengthen the leading role of scientific research in education and teaching and use education and teaching as a practical platform for scientific research to promote deep integration and mutual promotion between the two. Secondly, science-education integration is embodied as "science and technology + education," emphasizing the integrated interaction between science and technology and education. Incorporating technological elements into vocational education promotes changes in the content and methods of education and teaching, improves quality and efficiency, and cultivates high-quality technical and skilled talents. In practice, it focuses on the application and innovation of technological means, actively exploring and applying new technological means such as artificial intelligence, big data, and cloud computing to promote the digitalization, intelligence, and personalization of education and teaching reform, facilitate the deep integration and mutual promotion of science and technology and education, and inject new impetus into the high-quality development of vocational education [2].

Science-education integration aims to cultivate people with virtue, strengthen the integration of science and technology and education, enhance the interactive relationship between science and technology and talent cultivation, and cultivate innovative technical and skilled talents. Through multi-agent collaborative education among science, education, and industry, it strengthens the interaction between science and

technology and talent cultivation to cultivate innovative technical and skilled talents. Its essence is a new model of collaborative education, serving innovation and driving economic and social development. The key to science-education integration is resource integration, achieving the integration of science, education, industry, and other aspects to improve the relevance and contribution of talent cultivation [3].

3 Problems In Cultivating Food Major Talents from the the Perspective of Science-Educatiom Integration

The development of innovative technical and skilled talents is a critical requirement driven by the needs of industrial transformation and upgrading. At present, several institutions have begun to explore the training of innovative talents in the food major through the approach of science-education integration. Deng Lili et al. [4] took the course of biological separation and purification technology as the starting point and conducted exploration and practice in terms of teaching content, teaching organization, practical training, and curriculum evaluation construction, effectively enhancing students' innovative thinking and abilities. Wang Mengya et al. [5] analyzed the current situation of science-education integration in the food professional group of higher vocational education under the background of the "1+X" certificate system and proposed feasible countermeasures and suggestions, exploring the path for the integration of talent cultivation, scientific research innovation, and industrial upgrading in the process of science-education integration.

However, in the current context of science-education integration, the situation of cultivating innovative talents in the food major has not yet fully formed, and there are mainly the following problems: the cultivation of food major talents is out of sync with the needs of the industry chain, and the traditional curriculum system does not match the demand for talents in the transformation and upgrading of industries; the integration of innovative education is not high, the cultivation of scientific and technological innovation literacy has not been integrated into the entire process of talent cultivation, and students' scientific and technological innovation abilities are not strong; scientific research and teaching are separated, and the conversion rate of scientific research results into teaching resources is not high; there is a lack of high-level scientific and technological innovation platforms, and industry-academia-research cooperation is not in-depth [6]. Therefore, how to cultivate innovative technical talents in the context of science-education integration to meet the demand for talents in industrial transformation and upgrading is a difficult and urgent task facing the cultivation of talents in the food major.

4 Strategies for Cultivating Innovative Talents in the Food Major from the Perspective of Science-Education Integration

4.1 Optimize Curriculum Teaching and Cultivate Scientific and Innovative Thinking

Based on the demand for talents in the transformation and upgrading of the food industry, optimize the curriculum system, update curriculum content, integrate scientific literacy into the curriculum, incorporate new technologies, processes, and norms in the food industry into teaching, and maintain the timeliness and cutting-edge nature of the curriculum. Design diversified scientific and innovative educational activities, strengthen students' dominant position in activities, enhance practical innovation abilities and scientific literacy, and ensure that talent cultivation adapts to new business forms, technological development, and social demands [7]. Increase courses on innovative thinking and methods in the curriculum design, infiltrate scientific research ideas and methods into the teaching process. At the same time, integrate the latest research trends and findings into teaching to cultivate students' scientific research thinking and innovation abilities.

4.2 Build a Science-Education Integration Platform and Promote the Integration of Scientific Research and Education

Governments, schools, scientific research institutes, and food enterprises jointly construct a practice platform for science-education integration that integrates scientific research, technology development and promotion, scientific and technological achievement transformation, and talent cultivation [8]. By conducting in-depth investigations in food enterprises to understand the technical difficulties and needs in actual production, research projects are carried out based on enterprise demands, and these research projects are transformed into teaching cases through curricular adaptation. Through industry-academia-research project cooperation, resource sharing, and other methods, the transformation and application of scientific research achievements are promoted, enhancing students' practical and innovative abilities, fostering a deep integration of scientific research and education, and improving the quality of talent cultivation.

4.3 Strengthen Practical Teaching to Cultivate Scientific and Innovative Abilities

The school enriches on-campus scientific and technological innovation activities by encouraging the formation of technology clubs such as baking innovation and 3D printing, guiding students to participate in scientific research practices, and enhancing students' scientific and technological innovation abilities through these practices. Additionally, the construction of on- and off-campus training and teaching bases for

food majors is strengthened, allowing students to participate in practical activities such as food research and development, production and processing, and quality control through training and internships, thereby exercising their hands-on abilities and innovative thinking. Cooperation with leading food enterprises is strengthened to actively expand student practice opportunities and provide students with more internship and training opportunities. At the same time, students should be encouraged to actively participate in food design innovation competitions, the Challenge Cup, and the Tri-Innovation Competition to enhance their practical and innovative abilities.

4.4 Establish a Talent Cultivation Model that Integrates Science and Education

By conducting frontier lectures on food majors and organizing scientific research interest groups, students are guided to actively participate in scientific and technological innovation activities, stimulating their interest in scientific research and innovative thinking. Scientific research activities are integrated into the teaching process to achieve a deep integration of scientific research and education. Chen Yong et al. [2] proposed constructing a "research-training" integrated talent cultivation model for science-education integration, introducing industry-leading technologies and knowledge to ensure the timeliness and practicality of teaching content, strengthening practical teaching links, and enhancing students' practical operation abilities. At the same time, schools need to cooperate deeply with enterprises and scientific research institutes to jointly carry out practical teaching, technological innovation, and other activities. Diversified practice platforms are established to provide students with abundant practice opportunities and resources. Furthermore, teachers are encouraged to actively participate in scientific research projects to improve their own scientific research abilities and teaching levels, thereby cultivating high-quality technical and skilled talents with innovative spirits and practical abilities.

4.5 Fully Utilize Advanced Technology to Promote the Integration of Science and Education

By utilizing modern technological means such as cloud platforms and virtual laboratories, teaching resources are more widely shared and utilized to meet the learning needs of different students. At the same time, through interactive platforms, teaching interaction is enhanced, and teaching efficiency is improved. Furthermore, with the aid of advanced technologies such as big data and artificial intelligence, students' learning behaviors and grades are precisely analyzed to provide more personalized learning suggestions and resources, achieving personalized teaching and advancing the in-depth implementation of science-education integration [9].

5 Conclusion

The development of innovative talents in food-related majors at vocational colleges, from the perspective of science-education integration, is a long-term and challenging process that requires collaboration among schools, businesses, governments, and other relevant parties. By refining curriculum design, fostering scientific and innovative thinking, establishing platforms for science-education integration, promoting the fusion of scientific research and education, strengthening hands-on training to develop scientific and innovative skills, creating a talent development model that supports science-education integration, leveraging advanced technology to facilitate this integration, and enhancing the teaching staff, the quality of talent cultivation in food-related majors can be greatly improved. In the future, with the ongoing growth of the food industry and deeper implementation of the science-education integration concept, the cultivation of innovative talents in food majors at vocational colleges will yield even more notable outcomes.

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