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Cultivation of Talents with Excellent Innovative Ability Based on the "Science-education" Integration

Lu Lu*, Haifeng Yu, Congping Tan, Bo Cui*

School of Food Science and Engineering, Shandong Academy of Sciences, Qilu University of Technology, Jinan, Shandong, 250353, China
**Corresponding author: lulu@qlu.edu.cn, cuibopaper@163.com*

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Abstract: High-level innovative talents are the main force in the construction of an innovative country. The education on innovation is an important foundation for the development of talents innovation. How to improve the innovation ability of college students has become an urgent problem to be solved. "Science-education" integration is an important opportunity for cultivate talents by universities and enterprises. And their application and practice have become a hot issue. In this paper, the authors introduced the current situation of the innovation education for college students. The authors indicated the connotation of the "science-education" integration and its role for cultivating the innovation ability of college students. This study put forward the corresponding education reform approach and provided a reference for the training mode of high-quality innovative talents.

1. Introduction

Nowadays, the competition of national power is fierce, and the competition of talents has gradually become the focus and symbol of national power competition, and the core of talent competitiveness is the innovative ability. As the number of graduates increases every year, more and more attention is paid to the employment of college students. The employment of college students is not only related to the national economy and people's livelihood, but also closely related to the development of the country and society. At present, the innovation and entrepreneurship education of college students is facing unprecedented challenges and opportunities. And the innovation and entrepreneurship education of college students is still dominated by the traditional education mode of "emphasizing classroom and neglecting practice", which is difficult to cultivate students' competitive innovation and practice ability. Therefore, how to improve college students' innovation and entrepreneurship ability has become an urgent problem to be solved.

The concept of "science-education" integration has been put forward and widely practiced [1]. With the proposal and implementation of construction strategies such as "first-rate universities and disciplines" and "new engineering", the integration model of science and education has received more attention. However, the integration process, the integration effect and the safeguard measures still need to be studied and analyzed. This paper mainly analyzed and discussed the "science and education" integration from the aspects of innovative education, current situation analysis and "science and education" integration, combined with the discipline and major of the authors. The root of the

"science and education" integration to improve the innovative ability of college students was the driving force of high-quality education. Through the research on the practical experience and reasons of the "science and education" integration, new ideas and methods can be provided for the cultivation of college students' innovative ability, and the society's demand for innovative talents can be better met.

2. Analysis of current situation of innovative education for college students

2.1 Inadequate propagation of innovative education

Campus culture has a certain influence on college students [2]. Integrating innovative education knowledge into campus culture will have a subtle influence on college students, so as to cultivate their innovative ability. However, most colleges and universities pay attention to the ideological education of college students at present, and it is difficult to integrate innovative education knowledge with ideological education. It is difficult to affect the formation of innovative ability of college students. Moreover, college teachers and students pay more attention to the professional achievement of college students, often ignoring the importance of innovative education for the future development of college students.

2.2 Single innovative educational contents

At present, most college students are bored with innovative education. This is mainly because most of the innovative education is theoretical contents and lack of practice contents. It makes it difficult for college students to make use of the theoretical knowledge to stimulate their to learn innovative contents. Thus, a vicious circle has been formed. At the same time, when schools carry out innovative education for college students, most of them stay in technical education, which is difficult to change the thinking of college students. It is not conducive for them to form innovative ability.

2.3 The importance and significance of the innovative education for college students

In today's new era, college students are the most active and promising groups in the whole society. How to come out on top in the new era of abundant talents and realize the value of life? The answer is the outstanding and competitive innovative ability. From the perspective of college students themselves, they can make a difference in innovation by virtue of their new ideas, endless creativity, keen insight and unconstrained active thinking. Innovation is a rare experience in life, which can inspire college students to climb the mountain, and cultivate the courage and character of college students who are not afraid of difficulties and failures. These precious wealth are a solid foundation for college students to continue to grow and succeed in their careers. Therefore, cultivating the innovative ability of college students not only plays a powerful role in promoting the own growth of students, but also has great significance for the future innovation and development of the country.

3. Connotation of the "science-education" integration

In the early 19th century, Humboldt put forward the concept of "unity of scientific research and teaching", so that teaching and scientific research activities were combined and incorporated into the framework of scientific research [3]. Subsequently, the proposal of research learning standards and interdisciplinary education enriched the connotation of "science-education" integration [4]. The essence of the integration of science and education in graduate education proposed by scholars such as Ma Yonghong was the integration of science and education in a broad sense, which includes

traditional “science-education” integration, “industry-education” integration and integration of disciplines [5].

“Science-education” integration refers to the close combination of scientific research, education and teaching with industrial economy, through the cooperation of schools, enterprises and scientific research institutions, to jointly cultivate talents with innovation and entrepreneurship ability. This concept is proposed to break the traditional disciplinary boundaries and institutional barriers, promote the combination of knowledge and practice, and realize the organic integration of scientific research, education and teaching [6]. Scientific research has unique advantages in cultivating the critical thinking ability and rational temperament of students [7]. Therefore, the function of the “science-education” integration in college talent training is increasingly clear and important, and it has become an important content of the construction of “first-rate universities and disciplines”. The “science-education” integration takes scientific research as the means and personnel training as the purpose, and is a close combination between scientific research and education/teaching, which can promote teachers to carry out scientific research, achievement innovation and academic accumulation, and promote students to carry out innovative practice, so as to achieve common progress in all aspects.

4. The ways to cultivate the innovative ability of college students by the “science-education” integration

4.1 Formation of new concept and atmosphere for the “science-education” integration

In traditional higher education, both teachers and students believe that teachers only need to complete the knowledge explanation of courses and books, and complete the purpose of educating people through class-based theoretical teaching. In the new era where innovation ability is urgently needed, this teaching method cannot cultivate high-quality innovative talents. The “science-education” integration requires university teachers not only to carry out in-depth scientific research continuously, but also to integrate the high-level achievements of scientific research into teaching. To achieve the above goals, the idea of the “science-education” integration should be formed at all levels at the same time. Under the premise of common progress and collaborative development, teachers should be provided with a relaxed environment to conduct research according to their own scientific research interests, and support front-line scientific research teachers in all aspects. At the same time, students should be provided with a platform for innovative practice and encouragement policies. Students who involve in scientific research should be supported. Attitude determines everything, as long as the formation of a complete science and education integration of new thinking and new ideas at all levels, it will provide a strong backing for the cultivation of innovative ability of college students.

4.2 Formation a new model of “academic education”

In the process of long-term accumulation and precipitation, each university has condensed its own unique professional expertise and academic ideals. In the pursuit and realization of academic ideals, “academic education” has gradually become the characteristic of university education. The higher the academic level of a university, the more characteristic the academic background of a university, the higher the level of academic education [7]. The “science-education” integration is the introduction of scientific research into classroom teaching. The characteristics, advantages and positive academic accumulation of the university can provide subjects, teachers, funds and results for students' teaching, and can transform these advantages into the joint actions of the school, teachers and students. As a result, the popularity of “academic education” is reinforced and the innovative ability of students is improved.

4.3 Formation an evaluation system aiming at improving innovative ability

In today's era, high standards of the country for innovative talents let us deeply think: how can our students stand out from many universities through their own conditions and abilities? This is a problem that both colleges and students themselves should pay attention to and solve. At present, many clear measures have been put forward for the innovative education of college students. Among them, the integration of science and education is particularly important. To make good use of the integration strategy of science and education to improve the innovative ability of students, it is necessary to form a 'three-formation" evaluation system aiming at improving their innovative ability.

Firstly, the evaluation of innovative education needs the participation of schools, teachers and students. No matter from any perspective, the evaluation system should be "fair, just and unified standards" and should be student-centered and aimed at improving innovative ability of students. Secondly, with the continuous progress of students and the continuous improvement of the participation of teachers, the evaluation system should be continuously improved and developed to form the evaluation requirements of "adapting to the new era". The last but not the least, improving the innovative ability of students cannot be overcorrected. Learning basic theoretical knowledge should also be paid attention to, which is the premise of effective improvement of innovative ability of students. Therefore, the students have a deep grasp of professional knowledge to form a "combined with the actual" evaluation system.

5. Status and measures of innovative ability of students in food major in Qilu University of Technology (Shandong Academy of Sciences)

The outline of the "Healthy China 2030" plan makes it clear that health is an inevitable requirement for promoting all-round human development and the basis for economic development. The steady and rapid development of the food industry plays a key role in implementing the important spirit of healthy China [8]. There are two undergraduate majors in College of Food Science and Engineering of Qilu University of Technology (Shandong Academy of Sciences): Food Science and Engineering and Food Quality and safety, which have been approved as national "first-class majors" in 2019 and 2021, respectively. The college attaches great importance to the innovative education of students, and fully combines discipline construction, talent training and scientific research. By combining theory with practice and integrating scientific research with education, we have cultivated a large number of innovative applied professionals for the country and society. As the country has increasingly higher requirements for innovative talents, the college also has problems in the innovative education of college students, such as weak student foundation, single innovative practice education methods and imperfect innovation platform construction, etc. It is necessary to combine the new educational mechanism and educational concept to constantly improve innovative education and cultivate more excellent food talents.

The steady and rapid development of the food industry plays a key role in the implementation of the important spirit of "healthy China". As an applied discipline, food talents with innovative spirit can make important industry contributions to the country's food industry. The Department of Food Science and Engineering of Qilu University of Technology (Shandong Academy of Sciences) is composed of the College of Food Science and Engineering and the Shandong Food Fermentation Industry Research and Design Institute. The merger of the College of Food and Fermentation Institute is in line with the development of the "science and education" integration. The faculty attaches great importance to the innovative education of students and fully combines discipline construction, talent training and scientific research.

Firstly, a regular expatiation of the innovation theory and the concept of the "science-education" integration has been held, so that teachers and students can realize the importance of innovative

education, master the theory and method of the “science-education” integration. This measure has encouraged teachers to actively participate in the integration of scientific research and teaching, and encouraged students to actively participate in the learning of innovative practice and discipline competitions (see Table 1).

Table 1: Learning contents of the “science-education” integration and innovative education for teachers and students

Participants	Concept of “science-education” integration	Current situation and development of innovative education
Teachers	The connotation and policy evolution of the “science-education” integration to educate students [9]	Connotation of innovative education (goal, essence) [11]
	The practical significance and urgency of “science-education” integration [10]	The importance of guiding students to participate in innovation competitions [11]
Students	The importance of participation in scientific research for personal enhancement	The importance of participating in discipline competitions for the improvement of personal ability
	Current research status and development direction in food field	Popular subject competitions and entry process in Food Science

Secondly, form a typical case of "academic education" and introduce it to teachers in the form of cases, so that teachers can learn from innovative mentors around them and improve their own education ability and level.

Thirdly, construct an evaluation system aiming at improving the innovative ability of the college students. The evaluation system of innovative ability includes innovative thinking ability, knowledge acquisition ability and practical ability. The relationship between evaluation indicators is shown in Figure 1.

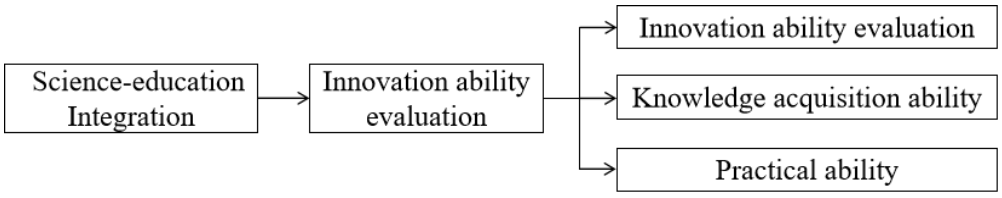

Figure 1: Evaluation system for innovation ability improvement for students

6. Summary

High-quality innovative talents are the new force of an innovative country. The preliminary practice of the “science-education” integration driving the cultivation of college students' innovation ability shows that the “science-education” integration is very important to the improvement of college students’ knowledge innovation practical ability. At present, we are standing at the starting point of the “14th Five-Year Plan” to train high-quality innovative talents with the concept of the “science-education” integration, so as to train high-level college students with ideals, ethics, culture and discipline.

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