

Study on the Advantages of Multidisciplinary Integration in Cultivating College Students' Innovative Practice Ability

Xiaolei Song*, Xiaohong Yuan, Yonggui Li, Huizhen Ke

Clothing and Design Faculty, Minjiang University, Fuzhou, China

**Corresponding author. Email: 652755009@qq.com*

ABSTRACT

The penetration, integration and complementing of knowledge across multiple disciplines play a significant role in cultivating college students' innovation and overall scientific awareness, as well as their ability to think about and solve practical problems from a multidisciplinary perspective. Therefore, it has a certain favorable value for improving the innovative practice ability of college students, enabling them to serve the society with higher and better quality. In view of the problems existing in the concept and talent training measures of the current multidisciplinary integration, we should change this situation by changing educational concepts, rationally setting up a appropriate multidisciplinary theoretical curriculum system, building a scientific system of education management, creating platforms for multidisciplinary integration, and strengthening teachers' correct guidance in students' innovative practice activities.

Keywords: *students; innovative practical ability; multidisciplinary integration; ability cultivation*

1. INTRODUCTION

D. Price (1922-1983), an American science and information scientist, once put forward the concept of "big science", pointing out that with the continuous evolution and development of science and the society, science had gradually transformed from the "small science" era with single disciplines to the "big science" era with multidisciplinary integration. Because of this evolution, people with multidisciplinary backgrounds will eventually become the protagonists of the times [1]. The United States started quite early in cultivating innovative multidisciplinary talents, and has gradually formed a complete academic theoretical system. In the Classification of Instructional Programs (CIP) of American higher education, there are comprehensive disciplines and interdisciplinary disciplines, which cultivate high-quality comprehensive talents according to the needs of the society [2].

2. THE SIGNIFICANCE OF MULTIDISCIPLINARY INTEVATING COLLEGE STUDENTS' INNOVATIVE PRACTICAL ABILITY

The concept of multidisciplinary integration is divided into broad and narrow senses. What we usually call multidisciplinary integration refers to multidisciplinary integration in a broad sense. It is not only the integration of multidisciplinary knowledge, but also the penetration, intersection, overlap, transplantation and borrowing of concepts, [3] methods, paradigms, knowledge, and process technologies in different fields and industry field. However, the improvement and improvement of college students' innovative and practical ability is inseparable from new higher education ideas, advanced teaching staff with high creativity and practical guidance ability, rich and novel teaching content and innovative teaching methods. At the same time, it also requires a first-class disciplinary development mechanism, especially a multidisciplinary knowledge background. This will play a huge role in cultivating college students' innovative practical ability [4].

2.1. Interdisciplinary Penetration Can Help Improve the Innovative Practice Ability of College Students

Practical ability refers to the ability to solve practical problems that people cultivate and develop in practical activities. Innovation is the creative activity of people to change the objective reality. Innovative talents must have a solid theoretical foundation and a comprehensive knowledge structure. At present, it's difficult for the knowledge structure of a single discipline to solve the increasingly complex technological and practical problems. In contrast, multidisciplinary integration combines the research content, research methods and research laws [5] of two or more disciplines, etc. The cross and penetration between disciplines is conducive to laying a solid foundation for college students, familiarizing themselves with adjacent subject areas, forming a sound scientific overall consciousness, and improving college students' ability to analyze and solve problems from a multidisciplinary perspective, thus improving the innovative practice ability of college students.

2.2. The Integration and Complementation of Multi-disciplinary Integration Help to Cultivate the Innovative Practice Ability of College Students

To a large extent, multidisciplinary integration is to use the correlation and complementary nature between disciplines. In this way, knowledge of different disciplines is combined with each other, and knowledge innovation is promoted in the integration, interaction and multi-directional exchange of multiple disciplines. The connotation of college students' innovative practice ability is very rich. Among them, the cultivation of practical abilities such as autonomous learning ability, information acquisition ability, observation and analysis ability, experimental research ability, expression and communication ability, communication and cooperation ability requires more multidisciplinary knowledge. In the process of practice, if college students have a multidisciplinary education background, they can master the principles and methods of related disciplines, and abandon the simple and limited thinking mode [6], absorb new ways of thinking in other disciplines, and rationally integrate and complement them, thus promoting the cultivation of innovative talents. At the same time, the common interest, sense of cooperation and sense of identification with the group generated in the process of practice will also enhance the complementary performance of multidisciplinary college students in the process of practice.

3. THE CURRENT SITUATION OF MULTIDISCIPLINARY INTEGRATION IN THE CULTIVATION OF COLLEGE STUDENTS' INNOVATIVE PRACTICAL ABILITY

In the cultivation of college students' innovative practical ability, the key is to realize the integration of multidisciplinary knowledge. This requires not only new ideas and strong policy support, but also a sound educational mechanism and a good academic atmosphere. At present, China's higher education still has many problems in the concept and implementation of multi-disciplinary integration, lacking sound systems and mechanisms.

3.1.A Biased Understanding of Multidisciplinary Integration

3.1.1. Equating disciplinary synthesis with multi-disciplinary integration

At present, many colleges and universities are comprehensive universities covering various disciplines such as liberal arts, science, engineering, medicine, agriculture, etc. At present, there is a misunderstanding: people think that as long as schools have a large number of disciplines at the same time and have complete and comprehensive discipline categories, they will naturally be able to cultivate complementary and integrated multidisciplinary talents. The root cause of such misunderstandings is that people do not accurately understand the connotation of multidisciplinary integration [7-8]. It is undeniable that a comprehensive university with a complete range of disciplines provides a platform for cultivating multidisciplinary talents. However, in the cultivation of college students' innovative practical ability, multidisciplinary integration is a very complex and systematic project. It involves macro-level issues such as school management system and education system, as well as micro-level issues in specific operations such as curriculum setting and teaching methods.

3.1.2. Misunderstanding "patchwork" of multidisciplinary knowledge as multidisciplinary integration

At present, many people's understanding of multidisciplinary integration is relatively one-sided. They believe that multi-disciplinary integration is a simple patchwork of multi-disciplinary knowledge, and that combining multiple professional courses in different disciplines is multi-disciplinary integration [9]. In fact, multidisciplinary integration is to allow multidisciplinary knowledge to integrate, interact, and penetrate each other, thus forming a theoretical

knowledge system dominated by a certain discipline and supplemented by related disciplines, so as to promote college students to tap their own potential and improve their thinking and problem-analyzing abilities. If we think that multidisciplinary integration only refers to the simple and mechanical patchwork of content between disciplines, in the absence of a systematic teaching and training program and training system, there is no close connection between the courses of various disciplines, and students cannot grasp the core knowledge chain of the major, which is not conducive to the sound development of higher education.

3.2. Insufficiency of Talent Cultivation in The Process of College Students' Innovative Practice

3.2.1. The cultivation objectives of talents with multidisciplinary background are not clear enough

The professional construction of higher education must be based on the core of the major, thoroughly implement the training objectives, and promote it in the direction of other disciplines in a targeted manner, thus realizing the organic integration of multiple disciplines. However, due to the large amount of content involved in interdisciplinary majors, the positioning of training goals is difficult. Taking fashion design and engineering as an example, although this major is a light industry major in science and engineering, it also involves multiple disciplines such as physics, economics, management, mathematics, chemistry, aesthetics and computer science, making it a comprehensive interdisciplinary major. Many colleges and universities have opened fashion design and engineering majors [10], but their major-running orientations are very inconsistent. Some schools adopt a major-running model based on pure clothing production and craftsmanship, and some schools adopt a major-running model based on clothing marketing and management. Some schools adopt a school-running model based on aesthetics and design. This makes it impossible for the education institutions to give a unified view and definition of the training objectives of fashion design and engineering.

3.2.2. The design of the current training program cannot meet the needs of multi-disciplinary integration in innovative practice

The integration of multidisciplinary knowledge structures has a positive effect on scientific development and the cultivation of personal comprehensive ability. However, students of various majors have few opportunities to contact professional knowledge in the

lower grades. In the senior year, they can only access the courses of this major, and it is difficult to know the information of other majors. Since most of the lower grade students are submerged in the study of a large number of basic theories and have little knowledge of the professional background, they do not know much about the knowledge system of this major and the specific applications in the future, and they seriously lack a sense of belonging and identity to this major [11]. There are even many students who regard college courses as a simple continuation of their high school studies. The setting of this classic four-year training program greatly inhibits the development of creativity of junior college students. In the Internet age, contemporary college students have a wide range of information acquisition channels, but students' broad subject-related knowledge still needs to be achieved through curriculum education [12]. At present, it is difficult to adjust the cultivation program of college students quickly and effectively. In addition, if more courses are added to students in order to broaden their knowledge of other disciplines, it will increase the load of students' study, which is not conducive to the cultivation of college students' creative practice ability.

3.3. There is a Lack of Teachers with Interdisciplinary Background Knowledge in the Cultivation of College Students' Innovative Practice Ability

The practical problems encountered by college students in the process of practice are often multidisciplinary and interdisciplinary. However, the college teachers with a single knowledge structure is also one of the urgent problems to be solved in the process of cultivating multidisciplinary talents. At the present time, most college teachers themselves do not have some multidisciplinary knowledge background. Teachers rely more on self-study and the accumulation of teaching experience to expand their knowledge. In this case, in the process of teaching, it is difficult for teachers to teach relevant courses according to the internal connection between the professional curriculum system and knowledge structure. In the process of building a teaching staff, colleges and universities should not only absorb talents with the top academic qualifications in this major, but also consider multi-disciplinary backgrounds, truly achieve interdisciplinary and complementary advantages [13], and actively explore a shortcut on how to train existing teachers, so as to meet the needs of multi-disciplinary integration in major construction and the cultivation of innovative practice talents.

In short, we should seriously study and explore the law of multidisciplinary professional talent cultivation, create an environment conducive to the growth of multidisciplinary talents, and establish a mechanism conducive to the cultivation of multidisciplinary

professional talents, so as to cultivate multidisciplinary innovative talents that meet the needs of society.

4. MAIN IDEAS OF ENHANCING MULTIDISCIPLINARY INTEGRATION IN THE CULTIVATION OF COLLEGE STUDENTS' INNOVATIVE PRACTICAL ABILITY

4.1. Correctly Understanding Multidisciplinary Integration

In terms of the traditional concepts, we should change our concepts and correctly understand the huge role of multidisciplinary integration in the cultivation of college students' innovative practical ability. The improvement of college students' innovative practical ability needs to rely on the stage of knowledge creation in colleges and universities. The cultivation of innovative consciousness is inseparable from the intersection and integration of multidisciplinary knowledge, which is the growth point of emerging disciplines, the development point of advantageous discipline groups, and the breakthrough point of major innovation. Therefore, colleges and universities should comprehensively emancipate their minds, establish the educational concept of big science, and correctly understand the importance and necessity of multidisciplinary knowledge background for cultivating college students' innovative practice ability [14]. As the main force of educational development, college students should have excellent active learning ability, have the courage to accept and challenge professional knowledge of different disciplines, and comprehensively improve their ability of innovative practice and social service.

4.2. Optimizing the Educational Model of Multi-disciplinary Integration and Improving Students' Innovative Practice Ability

Multidisciplinary integration is the inevitable trend of independent innovation, innovative thinking and innovative technology development. The formulation and update of the multidisciplinary integrated education model has become an urgent theme of the times. When recruiting students, colleges and universities need to break through the limitations of traditional majors and conduct "big discipline" enrollment according to the cultivation objectives of multi-disciplinary integrated education. In the context of big discipline, college students can choose their majors independently according to their own interests and advantages. Majors should be based on a certain major, supplemented by majors related to the major, so as to obtain one or more degree certificates based on their own learning ability

[15]. In addition, universities need to break the current academic year or credit system education model, allowing students to choose their own majors and courses, and to choose their own classes and schedule. This can mobilize students' active awareness and enthusiasm in learning, which can not only promote the adjustment and optimization of the professional structure, but also realize the sharing of teaching resources.

4.3. Creating Platforms for Multi-disciplinary Integration to Improve Students' Innovative Practice Ability

Many major achievements in the development of contemporary science and technology have occurred in the intersection and fusion of adjacent disciplines. The infiltration, intersection and integration of disciplines have become an important force in promoting discipline construction, promoting scientific development, and realizing scientific and technological innovation in current times [16]. In fact, some colleges and universities are already trying to share some resources, realizing the sharing of resources in terms of experimental materials, experimental equipment, experimental methods, teachers, educational methods, market analysis, etc. This provides the necessary conditions for multi-disciplinary integration to enhance the innovative practice ability of college students.

4.4. Strengthening Teachers' Correct Guidance in Students' Innovative Practice Activities

Innovative college students must have multidisciplinary expertise, innovative thinking, strong perseverance and advanced research methods, etc. College teachers are the first responsible in the cultivation of students' innovative consciousness and practical ability. In daily innovative practice activities, teachers should correctly guide and establish the scientific spirit of "seeking truth and being pragmatic, pioneering and innovative", and cultivate students' down-to-earth academic ethics. At the same time, schools should have a complete teacher training mechanism and corresponding reward and punishment system to ensure the continuous updating of teachers' own theoretical knowledge to meet the needs of cultivating college students' practical innovation ability. After the text edit has been completed, the paper is ready for the template. Duplicate the template file by using the Save As command, and use the naming convention prescribed by your conference for the name of your paper. In this newly created file, highlight all of the contents and import your prepared text file. You are now ready to style your paper; use the scroll down window on the left of the MS Word Formatting toolbar.

5. CONCLUSION

The purpose of university education is to promote the all-round development of every college student, especially the cultivation of innovative practice ability. This requires the process of college education to realize the intersection, integration and complementation of knowledge structures among various disciplines. In view of the current situation of multidisciplinary integration in terms of concepts and personnel training, we need to change the concept of university education and set up a multidisciplinary curriculum system reasonably, build a scientific education management system, create platforms for multi-disciplinary integration, and strengthen teachers' correct guidance in students' innovative practice activities to change this situation. Multi-disciplinary integration is conducive to cultivating the overall scientific awareness of college students and the ability to analyze and solve problems from a multi-disciplinary perspective, thus improving their innovative practice ability and helping them serve the society with higher quality.

ACKNOWLEDGMENT

We gratefully acknowledge the financial supports from the second batch of the new engineering research and practice projects of the Ministry of Education. "Upgrading and practice of textile engineering specialty with industry-education integration based on serving local industry" No. (E-HJFZQG20202421) and the Education Reform Project of Minjiang University. "Reform and practice of textile engineering specialty construction under the new engineering background." No. (MJU2020B020).

REFERENCES

- [1] D. Price, "Small Science, Big Science," Beijing: World Science Publishing House, America, 1982, pp.87-89.
- [2] J. Lin, "The construction of emerging engineering disciplines with multi-disciplinary integration," Res. Adv. Engin Edu. Wuhan, vol. 1, pp. 32-35, August 2018.
- [3] Y. Lu, and Q. S. Pang, "A study on factors affecting the formation of top-class disciplines in the world," Sci. College Edu., Changsha, vol. 2, pp. 89-94, February 2018.
- [4] L. I. Jiang, "The construction and practice of five integration' engineering training system in local colleges and universities on the basis of establishing emerging engineering education," Edu. Teach. Forum., vol. 50, pp. 175-177, December 2019.
- [5] D. Zhang, "Practice of innovation mode of college physics experiment teaching based on 'Internet+'," Wireless Internet Tech., vol. 15, pp. 99-100, August 2018.
- [6] Z. Zhao, "The reform and practice of education mode in multi-disciplinary joint graduation design," Proce. Enginee., vol. 15, pp. 4168-4172, December 2011.
- [7] P. L. Wang, L. H. Jiang, and Y. F. Jiang, "Study and practice on engineering training system of multi-disciplinary integration," Res. Explor.n in Lab., vol. 29, pp. 170-172, October 2010.
- [8] D. Liu, "Construction and practice of multi-level and multi-disciplinary innovative practice platform for undergraduate," Jour. Archi. Edu. Institut. Higher Learning, vol. 24, pp. 123-126, January 2015.
- [9] L. Fan, "On construction of multi-disciplinary competition platform for cultivating practical innovative talents," Jour. South. China Normal Univer., vol. 41, pp. 178-182, August 2016.
- [10] K. Cai, "The innovative teaching practice of immunology based on the multi-disciplinary integration," Jour. Shaoguan University, vol. 41, pp. 178-182, December 2016.
- [11] J.Y. Sun, "Research and practice of innovative talent training mode based on competition under the new engineering background," Science & Technology Vision, vol. 24, pp. 148-154, April 2021.
- [12] W. W. Shen, "The training of students practical and innovative ability under the mode of multi disciplinary integration," Edu. Modern., vol.5, pp. 47-49, June 2018.
- [13] X. P. Shen, "On the model of comprehensive practice training of multi-disciplinary integration in vocational colleges," Jour. Jinhua College Voc. Tech., vol.10, pp.1-4, September 2010.
- [14] J. Yang, S. Lv, X. H. Gao, Y. Z. Wang, "Research and practice recognition on the training mode of innovation and entrepreneurship ability of local Universities from the perspective of new engineering," Jour. Higher Edu., vol. 28, pp. 46-49,54, March 2021.
- [15] X. Liu and L. I. Nan, "A Curriculum Reflection on Improving Comprehensive Quality of University Students under the Multi- disciplinary Background," Jour. Edu. Sci. Hunan Normal Univers., vol. 9, pp. 38-41, May 2010.
- [16] Y. H. Li, and P. Yu, "A Preliminary study on college students' innovation and entrepreneurship based on innovative products," Theore. Res. Prac. Inno. Entre., vol. 2, pp. 188-189, June 2020.