

# The Exploration of the Innovation Application Ability of Graduate Students Based on Multi-disciplinary Integration

Junming Chang, Qiong Ren \*

School of Artificial Intelligence, Jiangnan University, Wuhan Hubei, 430056, China

\* Corresponding author: Qiong Ren (Email: 409466559@qq.com)

**Abstract:** The cultivation of innovative application ability is the key issue when it comes to the raining of graduate students, while the disciplinary integration can break through the boundaries of knowledge system of each discipline and is an effective way to train the talents with innovative application ability. To study the talent quality structure of "character + knowledge + ability", construct the "scientific + technical + engineered" training mode and attainable approach of multi-disciplinary integration talents; emphasizing the combination of innovative practice course and professional education curriculum, depicting the topological structure diagram based on innovation application ability. The research provides references for the cultivation of graduate students in universities.

**Keywords:** Innovation Application Ability; Multi-disciplinary Integration; Raining of Graduate Student.

## 1. Introduction

At present, multi-disciplinary and multi-technology has become the norm, and promote the birth of other new disciplines, technologies and forms of innovations continuously. The integration has been the consensus of the educational circles, universities nowadays choose to lay emphasis on the research of innovative application ability driven by multi-disciplinary integration [1]. Many scholars have deeply discussed how to increase the capacity of master's degree students to solve complex engineering from diverse professional perspectives and gained useful experiences and methods. However, some well-known scholars have concluded that the graduate students are relatively lacking in innovative thinking and awareness through research. Their willingness and ability of multi-disciplinary integration studying are not enough to meet the requirements of talent train, the status quo of integration is not optimistic.

The development of global science and technology has been on a fast track, making electronic information, which covers electronics, communication, computer and artificial intelligence, became the one of the prioritized disciplines around the world in the leading years. As the foundation and core of the development of high-tech at present, and the important focus of undertaking social innovation, a significant feature of electronic information is multi-disciplinary integration [2].

Graduate students are the new and important forces of scientific and technological innovation, the cultivation of innovative application ability is the key focus in graduate education. This paper takes the "talent + quality + structure" as the starting point, studies the talent training model and practice paths with characteristics of interdisciplinary integration to meet social needs, emphasis the combination of innovative practice course and professional education curriculum, construct the topological structure based on innovative application ability. This research provides a new idea and method of innovation application ability based on

multi-disciplinary integration.

## 2. Talent Training Mode based on Multidisciplinary Integration

Knowledge, ability, and quality serve as the fundamental components of excellence and are the ultimate objectives in the cultivation of innovative talents. The nurturing of innovative and practical talents necessitates a focus on the balanced advancement of these three aspects. Traditional talent development programs typically adopt a discipline-oriented approach to establish the respective systems, with the quality of education often being assessed primarily through academic test scores. Directed by social demands and integrative competence, boosting multi-disciplinary integration is an effective strategy to cultivate graduate students with innovative and versatile ability [3]. Throughout the training process, the following perspectives are primarily focused.

- (1) The equilibrium between knowledge acquisition and ability development

The main focus of education training is to teach students to foster independent thinking and problem-solving methodology while imparting knowledge, so as to meets the needs of social advancement. Optimizing knowledge structure, enriching social practice and strengthening ability training are of great significance to improving the level of personnel training.

- (2) The emphasize on character building

In the process of imparting knowledge and cultivating abilities, it is essential to place a strong emphasis on character development, with a particular focus on steering values and behavioral standards. Furthermore, there should be a pronounced effort to foster teamwork and a scientific mindset.

- (3) The coordinated development of knowledge, ability and character

The congruent advancement of knowledge, competency, and character can foster individuals who satisfy societal needs, which constitutes the core of talent nurturing. Consequently, the reconstruction of educational viewpoints, innovation of

training paradigms and the refinery of evaluative methodologies in instructive practices should be closely related to the goal of talents cultivation.

This manuscript is guided by the people-oriented philosophy of collaborative education, and is centered on the educational objectives of the electronic information master's program, aiming to foster character, integrate knowledge, enhance competencies, and promote the acquisition of scientific, structured and technological skills. As shown in Figure.1, this paper constructs the "scientific + technical + engineered" training mode and attainable approach of multi-disciplinary integration based on the talent quality structure of "character + knowledge + ability".

### 3. Attainable Approach for Cultivating Innovative Application Ability

Crossing may seem straightforward, yet integration is notably absent. In the majority of multi-disciplinary courses within the realms of science and technology, there is a preponderance of focus on crossing, with integration being cursorily overlooked due to its inherent complexity. Presently, the curriculum frameworks of the majority of electronic information master's degree programs are structured arrays of general required courses, general elective courses, professional mandatory courses, and professional elective courses. At present, the majority of multi-disciplinary research in which graduate students are engaged predominantly encompasses the completion of cross-disciplinary courses, with the outcomes of remaining at the theoretical level mostly. As a consequent, numerous students acquire the requisite knowledge without mastering the application skills, which significantly detracts from the development of practical abilities and innovative proficiency.

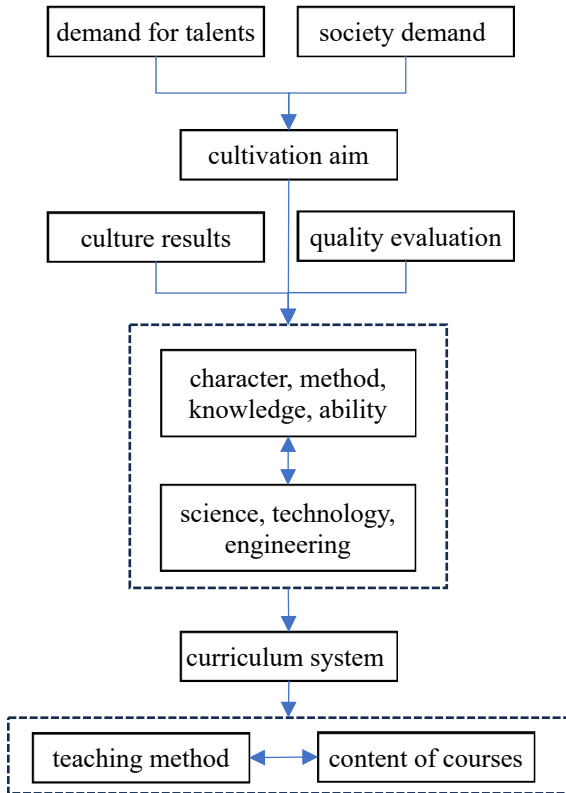


Figure 1. Multidisciplinary Cross-integration Mode and Implementation Path

Engineering practice courses have been set in the outline of professional master's graduate training program by many universities to train the application ability. With the foundation discussion of the structure of knowledge, competency and quality, this paper posits the improvement of curriculum framework and the refining of teaching process to integrate the innovation application ability course and traditional education curriculum, elaborate on an avant-garde talent development trajectory that is compatible with interdisciplinary convergence, and establish a topological framework underscored by innovative application proficiency[4], as shown in Figure 2.

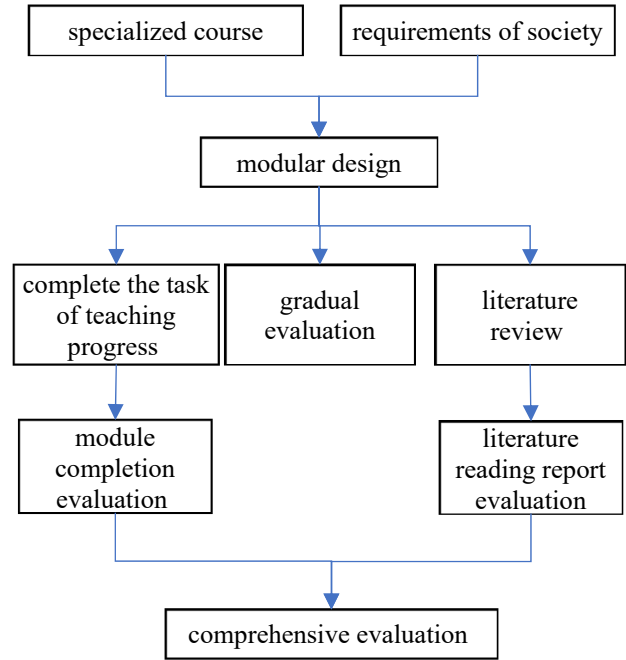


Figure 2. Innovation Ability Training Topology Diagram

### 4. Evaluation Model

The rapid advancement of technology accelerated the trend of multi-disciplinary integration. Mono-disciplinary expertise is no longer adequate to satisfy the demands faced by students, which leads to the necessity the cultivation of individuals with "T-Shape" talent [5], as shown in Figure 3.

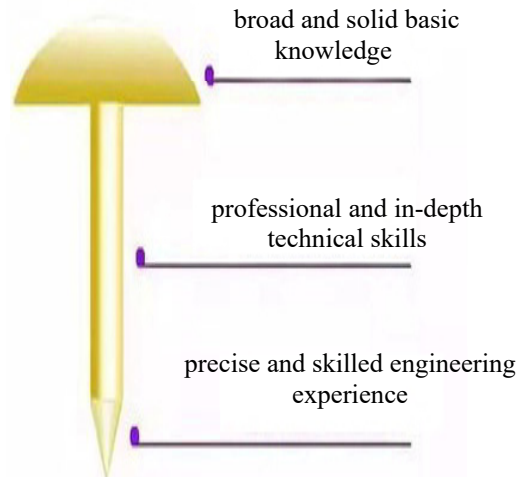


Figure 3. Innovation Ability Training Topology Diagram

The ultimate goal of educational reform is to enhance the quality of personnel development, while assessment of quality is a critical component in guaranteeing the efficacy of such personnel training. This article delineates two perspectives on evaluation.

Construct an evaluation system directed by the integration of character, knowledge, academic proficiency and employment caliber with relative weight determined by analytic hierarchy process, and an evaluation matrix that ensures the quality assessment is comprehensive and systematic.

Construct a comprehensive quantitative evaluation matrix that aligns with the professional attributes to address the issue of rational assessment of innovative application capabilities. This matrix should consider factors such as the quantity and caliber of discipline-related competition achievements, the extent and quality of academic exchanges, the number and significance of published academic papers and monographs, as well as the acquisition of intellectual property rights.

## 5. Conclusion

Multi-disciplinary integration is not only the trend of the development of disciplines, but also an important path to innovative projects. The domain of electronic information is a pivotal node in the matrix of interaction with societal innovation. Transformation of conventional pedagogical frameworks along with the investigation of strategies for interdisciplinary amalgamation, constitutes effective approaches to augment the caliber of practical training, is an effective way to enhance the innovative aptitude and proficiency in practical application among current graduate students majoring in electronic information.

## Acknowledgments

This paper is sponsored by research project of postgraduate education and teaching reform in Jiangnan University in 2021 (Research on the path and quality evaluation of multidisciplinary cross integration with innovative application as the core-taking Professional degree of electronic information as an example.)

## References

- [1] Zhang Liyan, Zhu Jiabo, Chen Guangyu, Wang Xinyu, Li Zhuo, Yu Bofeng, Nie Ying, Sun Xin, "A Study on Cultivating Practice Innovation Through Interdisciplinary Integration in Education," *Journal of Jilin Medical University*, vol. 45, no. 4, pp. 306-309, Aug. 2024.
- [2] CAI Xiaolong, XU Guangbin, JI Bingkui, YAO Xueping, JIN Xin, FAN Jun, LI Mingda. CAI Xiaolong, XU Guangbin, JI Bingkui, YAO Xueping, JIN Xin, FAN Jun, LI Mingda, "Design of Modular Teaching for the Intersection and Integration of New Engineering and Multiple Disciplines," *Application of IC*, vol. 40, no. 5, pp. 56-58, May. 2023.
- [3] Liang Jingwei, Zhang Haocheng, Zhang Xin, "Research on the Path of Improving Postgraduate Research and Innovation Ability under the Background of Entrepreneurship and Entrepreneurship," *Journal of Entrepreneurship in Science & Technology*, vol. 36, no. 8, pp. 177-180, Aug. 2023.
- [4] Sun Zhanguo, Jia Kebin, Feng Jinchao, Liu Pengyu, Li Zhe, "Master's degree in electronic information Discussion on the method of improving innovation ability," *Industry and Information Technology Education*, vol. 4, pp. 19-23, Sept. 2021.
- [5] T-type talent. Sogou Encyclopedia. <https://baike.sogou.com/v-50964782.htm?ch=frombaikevr&fromTitle=T%E5%9E%8B%E4%BA%BA%E6%89%8D>.