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Application and Discussion on the Training of Innovative Graduate Talent Against the Background of "Double First-Class" Construction

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Abstract: Against the background of the "double first-class" construction, the training of innovative graduate talent has become an important issue in higher education. This article discusses the importance of the training of top graduate innovative talent, analyzes the status of the training of top graduate innovative talent at home and abroad, and summarizes the current challenges in the training of graduate innovative talent in China. Lastly, this paper proposes relevant reform suggestions in response to problems in the training of innovative graduate talent, which provides important references for improving the quality of innovative graduate training.

Keywords: "Double first-class" construction; Graduate students; Cultivation of innovative talent

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1. Introduction

In October 2015, the State Council issued the "Overall Plan for Coordinating the Promotion of the Construction of World-Class Universities and First-Class Disciplines," which proposed goals and requirements for the construction of world-class universities and first-class disciplines ("Double First-Class" constructions for short) and prioritized the cultivation of top innovative talent [1]. This important construction task highlights a direction for accelerating the reform of the training model and mechanism for top innovative talent. Given the background of the "double first-class" construction, improving the quality of training for top innovative talent has become a major policy for the development of universities [2] and is a long-term and complex task that requires the joint efforts of schools, teachers, and students. Colleges and universities must accurately grasp the new requirements and challenges put forward by the new era for graduate education, strengthen the construction of graduate education management institutions, standardize the entire process of graduate education and teaching, and improve the quality assurance system for graduate education. Improving the quality of training for top innovative talent is an inevitable requirement for promoting the reform and development of graduate

education in colleges and universities.

As stated in the report of the 20th National Congress of the Communist Party of China (CPC), education, technology, and talent are the basic and strategic support for building a modern socialist country in an all-round way [3]. In recent years, among the newly added academicians and the first completers of the Third National Science and Technology Award in China, self-trained doctors accounted for approximately two-thirds; among the members of the key projects of the National Natural Science Foundation of China, more than 50% were current graduate students, and more than 30% were current students. Doctoral students and graduate students have become the main forces of technological innovation in China [4]. The training of innovative talent is the key to the construction of a "double first class," and the quality of training directly affects the realization of the goal of "double first class." Research shows that there is a strong positive correlation between the level of discipline development and the training level of graduate innovative talent. Therefore, in the construction of first-class disciplines, the training of innovative graduate talent must be an important part of the construction and supporting and leading role of graduate education [5].

With the rapid economic and social development in China and the continuous progress of science and technology, society's demand for top innovative talent is increasing. The cultivation of top innovative talent is a long-term systematic project that requires precise guidance and support at the key nodes of talent training. At present, China has entered a new stage of cultivating top innovative talent, and there is an urgent need to establish a corresponding training system. This requires us to follow the growth pattern of innovative talent, optimize the training paths of top talent, and discover, cultivate, and gather talent in the practice of innovation to provide fertile ground for top talent to stand out. At the top of the national education system, graduate education has the important mission of cultivating high-level talent and promoting innovation and creation [6]. The training of top innovative talent for graduate students in the new era is facing new situations, tasks, and requirements. Improving the training level of innovative graduate talent in the context of "double first-class" construction is an issue worthy of research and consideration.

2. Status quo of graduate innovative talent training

2.1. Exploration of the cultivation of innovative talent in China

Chinese universities have conducted many beneficial explorations of training models for top innovative talent. USTC has established an education system covering five cutting-edge disciplines: quantum science and technology, integrated circuit science and engineering, nanoscience and engineering, scientific exploration technology, and artificial intelligence. This system is committed to cultivating graduate students with high-level research ability through in-depth interdisciplinary integration. Relying on the resource advantage of the Western science and technology innovation port, Xi'an Jiaotong University has joined hands with more than 70 large central enterprises and industry leaders to establish a joint-entity research institute. Through the school-enterprise cooperation model, the school aims to jointly enhance the innovative spirit and practical skills of graduate students. Fudan University has also cooperated with several well-known enterprises to establish graduate practice bases and joint laboratories, providing graduate students with numerous practice opportunities and innovation platforms. West Lake University has overcome traditional admissions restrictions, and both previous undergraduates and new undergraduates who are not eligible for exemption can directly apply for a doctoral degree. At the same time, special emphasis is placed on the interview process, which examines the scientific research experience, language expression, and critical thinking ability of the candidates. BUPT

actively carries out research and application development of intelligent technologies to support the reform of the training model for top innovative talents centered on serving the overall development of students. Northwestern Industrial University has formulated the Action Plan for Cultivating First-Class Graduate Talents to promote the reform of graduate education and build a training system for first-class graduate talent in the new era. At the same time, a special class for the doctor of engineering was set up to focus on new fields and directions, aiming to cultivate doctoral candidates with engineering practical skills and innovation ability. Fudan University implemented the "Excellent Doctoral Program." Each year, the best undergraduates who are interested in engaging in academic research are selected from the university to directly study for their doctoral degree. This training model, which combines research with a doctoral degree, provides more coherent and systematic academic training for graduate students. In addition, Peking University has implemented the "Liberal Arts Program," Tsinghua University has implemented the "Academic Elite Classes," and Shanghai Jiaotong University has implemented the "Elite Talents Cultivation Program." These explorations have accumulated valuable experience in cultivating top innovative talent.

2.2. Experience in cultivating international innovative talent

Developed countries such as Germany, France, and the United States attach great importance to the strategic significance of top innovative talent for long-term national development and began beneficial attempts as early as the middle and late 20th centuries. Germany has implemented the "Elite University Program," which comprehensively evaluates university teaching, scientific research, and other indicators and provides primary support to a group of outstanding universities with the goal of building them into first-class universities with international competitiveness. France is vigorously implementing the "Initiatives d'Excellence (IDEX)," which, through national strategic investment, has supported approximately 20 universities in entering the ranks of the world's top 100, with the aim of cultivating cutting-edge talent to climb scientific peaks. Top universities such as the Massachusetts Institute of Technology (MIT) and Stanford University, through the implementation of an interdisciplinary comprehensive education strategy and the integration of the industry-university-research education model, have continued to train many talented researchers in the country. The recruitment of talent with high-level innovation capabilities has become a key supporting factor for maintaining its leading position in technological innovation. Moreover, many higher education institutions in the United States have developed detailed talent training programs, such as Stanford University's "Distinguished Leaders Program" and Yale University's "Leadership Development Program." German higher education institutions have also launched programs such as the Elite Graduate Program and the Excellence Initiative. The core goal of these programs is to cultivate high-quality talent with leadership skills and a sense of innovation to provide solid human resources that guarantee the long-term development of the country and society.

Interdisciplinary training is an important feature of world-class universities in cultivating top innovative talent. The United States has significantly increased the number of interdisciplinary studies since 1985, and the number of people awarded interdisciplinary research degrees by 2022 has reached 117,000 people, reflecting a trend of increasing interdisciplinary talent training. Harvard University's College of Arts and Sciences implements general education, MIT has interdisciplinary programs in media arts and sciences, and the School of Engineering of Stanford University has interdisciplinary programs such as biomedical engineering, all of which reflect the new trend of cross-integrated training.

The combination of industry-university-research research is a common choice of world-class universities. In Germany, application-oriented universities and enterprises have engaged in in-depth cooperation to build

R&D centers to provide practice opportunities for graduate students and help them adapt to their jobs as soon as possible. Through the establishment of the Engineering Leadership Center, MIT has built a school-enterprise collaborative innovation platform for graduate students to cultivate leading talents who can lead industrial transformation. Stanford University's Silicon Valley Campus is close to the high-tech enterprise agglomeration area, which is convenient for enabling students to practice and shorten the distance from the laboratory to industrialization. These measures have enhanced graduate students' ability to solve practical problems and realize the rapid transformation from knowledge innovation to real productivity.

2.3. Challenges in cultivating innovative talent in China

Chinese universities have achieved some results in cultivating top innovative talent, but in general, there are still some deficiencies. In terms of the selection mechanism, the current selection focuses more on factors such as test scores and the ranking of undergraduate institutions, and it is difficult to measure the indicators of the innovation potential of students effectively, such as innovative thinking, problem-solving ability, and curiosity; the latter may be due to information asymmetry and other reasons. Some innovative students from non-primary colleges and universities were missed, and the talent selection channels lacked diversity.

In terms of training mode, the boundaries between disciplines are clear, and the construction of interdisciplinary curriculum systems and training programs lags behind. It is difficult for students to acquire interdisciplinary knowledge and skills, which is unfavorable for the cultivation of interdisciplinary top innovative talent; teaching is still mainly based on classroom lectures and graduate students. The participation level is low, and heuristic and inquiry teaching methods are insufficiently used, which is not conducive to stimulating students' innovation consciousness. The theoretical study is out of touch with practical training, and the proportion of practical skill training is low.

In terms of teaching staff, supervisors often supervise multiple students at the same time and have to balance their own scientific research and teaching tasks, making it difficult to train each graduate student on personalized innovation ability; some supervisors have an outdated knowledge structure, and scientific research projects are not innovative enough. Graduate students should be guided to carry out cutting-edge and innovative research. In China, the training mode of graduate education mainly adopts the "single-mentor responsibility system" where each student is provided with all-round guidance by a supervisor [7]. This model limits the training of interdisciplinary talent to a certain extent and has an adverse effect on the cultivation of compound innovative talent with interdisciplinary knowledge.

In terms of the scientific research environment, key universities and advantageous disciplines have access to abundant scientific research funds and equipment resources, whereas some ordinary universities and emerging disciplines face the problem of a relative shortage of resources, which limits the opportunity for graduate students to conduct high-quality scientific research activities. At the same time, academic exchange activities in some institutions or disciplines are limited, and graduate students have fewer opportunities to know the latest academic thoughts and cutting-edge developments, which is unfavorable for stimulating innovative thinking.

In terms of the evaluation system, too much emphasis has been placed on the number of published papers and the level of journals, and as a result, graduate students may pay more attention to the completion indicators and neglect the innovation and actual value of the research; evaluations based on a fixed period cannot adapt well to different disciplines and studies. The actual progress of the topic may adversely affect some studies that require long-term investment to produce innovative results.

To cultivate top innovative talent with international competitiveness, colleges and universities urgently need to expand the reform of the talent training model. We will conscientiously summarize the successful experience of cultivating top-notch innovative talent and provide strong talent support for national technological progress and economic and social development through measures such as optimizing resource allocation, strengthening cross-integration, deepening the integration of industry and education, and expanding the international vision.

3. Reform of the training of graduate innovative talent

In the Third Plenary Session of the 20th Central Committee of the Communist Party of China (CPC), the strategy of rejuvenating the country through science and education, the strategy of strengthening the country through talent, and the strategy of innovation-driven development must be implemented in a coordinated manner, the reform of the integrated mechanism of education, science and technology talent must be promoted, the new type of nationwide system should be improved, and the overall effectiveness of the national innovation system should be enhanced [8]. We should deepen comprehensive education reform; strengthen the development of basic disciplines, emerging disciplines, and interdisciplinary disciplines; train top talent; and focus on training innovation ability [8]. The training mode of innovative talent should focus on improving talent selection quality; reforming the admission examination system; investigating students' professional accomplishments, research skills, and innovation potential; improving innovation ability; and promoting a balance between "learning" and "application." The organic combination of talent and social needs should be strengthened; the goal of improving practical skills should be a reasonable arrangement of course studies and practical training, and practical skill training should be strengthened while improving teaching quality to achieve a reasonable connection between talent training and social needs and serve national training and produce innovative compound talent [7]. To improve the training quality of top innovative talent, we need to reform and explore the education system and mechanism.

3.1. Establishing better curriculum offerings and teaching reform

A more flexible course elective mechanism needs to be established to allow students to make personalized course choices according to their own interests and professional needs and to break traditional disciplinary boundaries. Moreover, interdisciplinary integration should be strengthened, students with different disciplinary backgrounds should be encouraged to study and discuss together, and the exchange and collision of interdisciplinary knowledge should be promoted. We need to reform teaching methods and content and pay attention to the cultivation of students' innovation ability. In the course teaching process, teachers should actively adopt teaching methods such as heuristics, discussions, and participation to cultivate students' active thinking skills and academic attitudes toward the courage of questions. The content of the courses should keep up with the frontiers of the disciplines, with an increased proportion of research methods and cutting-edge topic courses to guide students in understanding the latest research progress and developments in this field.

3.2. Improving the academic training system and strengthening the construction of innovation practice platforms

The graduate academic training system should be established and improved to provide necessary academic training or professional practice for graduate students and enhance their academic innovation ability and communication skills by allowing them to participate in scientific research projects, academic seminars, graduate forums, and scientific paper writing experience sharing sessions. A positive academic atmosphere is

created through various means, such as by regularly organizing academic conferences, lectures, and forums and by inviting well-known experts and scholars to engage in academic sharing so that students can gain the most cutting-edge academic achievements and expand their academic horizons. Scientific research incentive mechanisms such as graduate student research scholarships and scientific research innovation projects have been established to encourage graduate students to more actively participate in academic research and academic exchanges and to enhance their academic innovation ability. We have built various innovation practice platforms to provide students with a stage to display their talents. Various academic competitions and innovation and entrepreneurship projects should be actively organized, and students should be supported in their supervisors' scientific research projects and encouraged to transform their scientific research achievements into applications. Schools can also cooperate with enterprises, scientific research institutes, and other institutions to build innovation practice bases so that students can exercise their scientific research innovation ability in real engineering practice.

3.3. Strengthening cross-cultural exchanges and cultivating an international perspective

A system for schools and supervisors should sponsor graduate students to participate in international academic exchanges, establish extensive cooperative relationships with high-level foreign universities and scientific research institutions, and sign cooperation agreements, including student exchange programs, joint training programs, memorandums of academic cooperation, etc., to provide support for graduate students to participate in international academic exchanges and create opportunities. An international academic exchange fund has been established to subsidize graduate students to participate in international conferences, short-term study visits, academic competitions, and other activities to reduce the financial burden on graduate students. It will hold international academic seminars and special lectures, invite well-known foreign scholars to give lectures and exchanges on campuses, encourage graduate students to actively participate in the interaction, and select outstanding graduate students to serve as assistants in the activities. At the same time, graduate students should take the initiative to strengthen the study of foreign languages, especially academic foreign languages, and be able to skillfully use foreign languages for academic communication, thesis writing, and report presentation.

3.4. Strengthening interdisciplinary integration and scientific research team building

Academic research teams are organized by colleges, disciplines (interdisciplinary), and scientific research projects to guide graduate students through multiple forms of guidance, such as a supervisor team, a supervisor group, and a dual supervisor, and give full play to the respective advantages of supervisors in different disciplines to provide students with comprehensive guidance. All-round guidance is provided so that students can obtain information and resources from multiple sources and receive the guidance of multiple teachers. Multiple-tutor guidance is conducive to broadening students' academic horizons; promoting the cross-integration of knowledge in different disciplines; and strengthening interdisciplinary and interprofessional exchanges and cooperation between graduate students so that they can learn the research thoughts, ideas, and methods of different supervisors and disciplines and promote academic innovation thinking and broaden the academic field. It is also necessary to actively build a scientific research practice team consisting of on-campus supervisors and off-campus researchers and make full use of on-campus academic platforms and high-quality off-campus resources to allow graduate students to increase their innovation ability in practice. Moreover, the supervisor selection and assessment mechanism will be improved, and the performance of guiding students in scientific research and innovation will be included in an important part of the supervisor assessment.

4. Conclusion

In the context of the "double first-class" construction, the training of top graduate innovative talent has become the focus of the reform and development of higher education, which requires the concerted efforts of universities, the government, and enterprises. As the main fronts for talent cultivation, colleges and universities need to reform and innovate the talent training mechanism, optimize the curriculum system, innovate the teaching modes, expand the innovation practice platforms, strengthen international academic exchanges, enhance the guidance of mentors, and deepen education from the pattern of talent growth. The comprehensive reform of graduate education, improvement of the selection mechanism for top innovative talent, and creation of an institutional environment that is conducive to the emergence of innovative talent provide strong talent support for the national innovation-driven development strategy.

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References

[1] Notice of The State Council on Printing and Distributing the Overall Plan for Promoting the Construction of World-Class Universities and First-Class Disciplines, 2015, Bulletin of The State Council of the People's Republic of China, (32): 110–114.

[2] An G, Zhao X, 2022, Research on the Problems of Outstanding Talents Training Under the Background of "Double World-Class" Construction. Journal of Henan University (Social Sciences), 62(01): 117–125 + 155.

[3] Xi J, 2022, Hold High the Great Banner of Socialism with Chinese Characteristics and Work Together for Building a Modern Socialist Country in an All-Round Way, People's Daily, October 26, 2022, (001).

[4] Top 10 Hot Spots of Postgraduate Education in China in 2022, 2023, Chinese Graduate Students, (01): 2–7.

[5] Liu G, 2019, Research on the Improvement of Postgraduate Education Quality from the Perspective of World-Class Discipline Construction. Education Exploration, (03): 62–66.

[6] Wu Y, 2023, Find the Focus to Improve the Quality of Graduate Training. Higher Education in China, (17): 32–35.

[7] Yuan C, 2017, Exploration of the Innovative Talent Training Mode of Interdisciplinary Graduate Students. Only Practice (Modern Management), (02): 45–47.

[8] Central People's Government of People's Republic of China, 2024, Decision of the Communist Party of China Central Committee on Further Comprehensively Deepening Reform and Advancing Chinese-style Modernization, viewed October 25, 2024, https://www.gov.cn/zhengce/202407/content_6963770.htm