Practice and Thoughts on Cultivation of Graduate Students Majoring in Engineering Management

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Abstract: The professional master degree of engineering management in military schools in the new era aims to cultivate high-level and application-oriented graduate talents who understand technology and have the superior comprehensive capacity of management, command, coordination and decision-making ability. The combination of scientific research innovation and military engineering management practice is highlighted. In the meanwhile, it emphasizes the integration of engineering technology and military drill implementation, and it pays much attention to the compound concept. Research and practice are carried out from the aspects of training objectives, training programs, curriculum system, teaching implementation, process control. In order to improve the training quality of engineering management graduate students, the characteristics of experience and considered the existing problems are summarized.

1. Introduction
President Xi points out that military management reform should be promoted with efficiency as the core by establishing modern management concepts, optimizing management systems and processes so as to continuously improve management of the military to be more professional, refined, and scientific. At present, in the protective engineering, coastal defense engineering, position engineering, island reef engineering and other types of battlefield engineering and military facilities construction, our military has ushered in an important period of development opportunities. Moreover, the construction of information system engineering based on the application of engineering management information system and command information system is also urgent. Due to the increasing demand for graduate students in engineering management, according to President Xi’s precision-oriented instruction, the goal of the master's degree in engineering management has always adhered to the sole criterion of combat effectiveness, serving the needs of the military, and focusing on cultivating high-quality and applied talents who are proficient in technology and management with coordination and decision-making skills. This cultivation program known as accurate and distinctive has been affirmed by the employers of the military system engineering construction and equipment management [1].

2. Characteristics and advantages
Our school follows the guiding principle of taking the path of connotative development, which takes service demand as the driving force, focuses on innovation mechanism, and improves quality as the core. Through the exploration and practice of engineering construction including major military engineering, military equipment engineering and command information system, our engineering management degree authorization point, relying on the technical advantages of the disciplines such as
2. Combinig scientific research and innovation with military engineering management practices, focusing on developing professional foundation

President Xi repeatedly emphasizes that it is necessary to open a closed loop from practice to theory and then from theory to practice, so that military theoretical research is rooted in practice and accepts practice tests, therefore achieving a benign interaction between theory and practice. Our school firmly remains committed to the strategy of military reforms and technological development to build a new era of military construction. Based on the needs of military engineering construction, it stays close to actual combat and continues to play the professional characteristics and advantages of disciplines in carrying out scientific research and innovation work to advance professional construction. We has undertaken major engineering projects such as the construction of equipment management information system of major events, including the Zhuhai Fortress Mountain blast, known as the Asia's No. 1 Cannon, the Macau International Airport reclamation project, the Yangshan Port blasting and filling project, the 70th anniversary of the victory of the Anti-Fascist War in 2015, and the celebration parade of the 90th anniversary of the establishment of the military in 2017. All of these provide a wealth of military application practice cases for the construction of engineering management.

2.2. Emphasizing the deep integration of engineering technology and military exercise, highlighting distinctive military features

In terms of training objectives, the importance of the organization, planning, leadership, control and innovation of military engineering management talents is emphasized from the aspects of professional knowledge, working competence and comprehensive quality. Moreover, the management concept is used for military exercises and training management. In terms of research direction, from the aspects of planning, demonstration, construction, utilization, maintenance, etc., the life-cycle process management of the project is carried out. In terms of training methods, the double-tutor system is implemented, stressing joint instruction with the external tutors with rich experience in military engineering management. In terms of curriculum setting, a strict curriculum access system is set up. Case studies, seminars, and practice courses with practical engineering backgrounds are offered. Through numerous efforts, our degree authorization point has established a good reputation in the military related units. In 2018, the number of graduate students and admissions has increased significantly compared with that in 2017.

2.3. Focusing on the concept of compounding, building a first-class professional master's degree cultivation system

Due to the special needs of military schools for talents, our school constantly underlines that the cultivation of professional degree graduates is not only in line with national higher education, but also reflects the special requirements of military and national defense construction. The first is to strengthen the common needs. When it comes to training objectives and curriculum system settings, the requirements of the guiding norms for professional engineering management degrees in national colleges and universities should be implemented. The second is to reflect the characteristics of the characteristics. According to the special requirements of military engineering, the course teaching and thesis selection should be based on the university's disciplinary advantages and the requirements for sticking to the troops and actual combat in the talent cultivation and curriculum. The third is to show the advanced nature. In order to comprehensively improve the quality of graduate students in engineering management, we fully absorb the latest achievements in social intelligence and information development, and use advanced management concepts and technologies such as mobile Internet, cloud computing, intelligence, and Internet of Things.
3. Measures and experience

3.1. Scientifically setting cultivation objectives, optimizing cultivation programs and curriculum systems

The target of this degree authorization point is to cultivate high-level and applied military engineering management talents. They have solid political and ideological quality and professional ethics, and master systematic management theory and modern management methods, as well as specializing in military engineering. At the same time, they can handle management work independently with strong organizational, planning, coordination and decision-making ability.

In order to adapt to the new situation and task requirements, we scientifically build a high-level talent training system that is more in line with the needs of the new army's transformation, further improving the quality of high-level talent training. In strict accordance with the spirit and specific requirements of the document from the National Engineering Management Professional Degree Graduate Education Steering Committee, the main goal is to cultivate high-level compound talents that meet the needs of engineering, equipment, and business management. In this way, a more complete talent training program is set up, consisting of objectives, research direction, lengths of study, training methods, curriculum, dissertation research and degree awards, which fully reflects the professional, systematic and practical aspects of fields of expertise.\(^2\)

Considering the basic engineering and professional quality of graduate students majoring in engineering management, they not only should have the necessary basic knowledge, but also have broad general engineering management knowledge and solid professional technical knowledge. Therefore, the curriculum system is based on the engineering management discipline and combined with relevant engineering disciplines, which fully reflects the knowledge and quality requirements of specialized talents in the field of engineering management. The curriculum is divided into general foundations, professional core courses, elective courses and practical courses by nature.\(^3\)

Practical courses involve professional practice, research practice, academic exchange and literature study. Professional practice requires graduate students to participate in short-term internships with relevant units in the engineering field, design, implementation and management of engineering projects, collaborative research or project development, or internship practice in conjunction with the tutor's engineering projects. Research practice requires training units or tutors to combine the thesis topic selection and arrange a 15-day military (enterprise) research practice after they complete the course study. Academic exchanges require students to attend at least one academic conference and eight academic lectures. The literature study requires students to study more than 20 relevant Chinese documents and more than 20 foreign documents in the field, and write corresponding reading reports under the guidance of the instructors. In addition, students of professional degrees are encouraged to pursue courses in related disciplines and elective online courses, such as the Military Vocational Education Platform of the Military Commission, the Tsinghua University School Online, and the Chinese University MOOC Platform.

3.2. Promoting the reform of teaching mode and highlighting practical training

Course teaching is an important part of talent training, and it is the main way for students to master solid basic theory and system expertise. The curriculum content of this major is theoretical, cutting-edge, broad, cohesive and feasible, reflecting the needs of high-level talents. By reforming the teaching model centered on the innovative teaching organization form, teaching now comprehensively adopts diverse and open organization forms such as theoretical introductory, research discussion, case analysis, special lectures, and visiting study tours, changing the status quo of one-way infusion, less exploration and discussion, more textbook knowledge, less frontier content, more basic theories, less application practice.

The course teaching adopts advanced network platforms such as MOOC and SPOC to carry out personalized teaching. The core course of the major, Operational Research, is identified by the Ministry of Education as the first batch of national online open courses. In addition, the curriculum
teaching emphasizes the integration with engineering case teaching, writes engineering construction and scientific research results into the case, and introduces them into the classes, enhancing the practical, cutting-edge and pertinence of classroom teaching. Besides, it focuses on cultivating logical thinking ability and comprehensive quality, and forming a problem-based teaching method that organically integrates various teaching methods. What's more, the implementation of the “3+1+X” course assessment mode reform and the concept of capacity-centered assessment are to transfer the focus of the graduate course examination to the quality assessment, therefore cultivating their innovative consciousness and ability.

We make full use of the existing experimental conditions and off-campus practice bases of our school to carry out practical course teaching and training. Our school has established national key laboratories for explosion shock prevention and disaster reduction, national key laboratories of electromagnetic environment effect and photoelectric engineering, military blasting engineering comprehensive laboratory, crossing river bridge equipment teaching test training ground, Zhushan teaching test tunnel, all of which provide practical opportunities for the teaching of related courses.

3.3. Strengthening management control and improving the quality of degree authorization
The quality of dissertations is an important manifestation of the level of discipline construction. Therefore, our school has founded a systematic quality assurance system for graduate degree thesis, formulated the Interim Measures for the Quality Management of Postgraduate Thesis, and established a corresponding mechanism called three centralized and one spot check. The mechanism is based on the teaching and research section as the basic unit for centralized opening, centralized mid-term inspection, and centralized thesis defense and spot checks are organized from time to time. It forms a dynamic quality monitoring mechanism covering the whole process of postgraduate study, including literature reading, paper opening, mid-term inspection, paper review and defense, and degree award.

For starters, strictly supervise literature reading and dissertation opening. It is stipulated by the college that graduate tutors should clarify the reading list according to the requirements of the training program, regularly check the reading notes of graduate students, organize and participate in the book sharing and discussions. Next, strictly conduct mid-term examinations of dissertations. It is generally carried out by the teaching and research section in the form of a defense meeting, aimed at fully evaluating their dissertations. Postgraduate students who have been identified as qualified in the comprehensive examination are listed as the main target of attention, and intensified inspection and guidance in the subsequent training. Additionally, strictly monitor the passing standard of dissertations. The first is to strictly organize the dissertation review. Before the dissertation is recommended for review, each teaching and research section needs to set up a pre-defense committee to carefully review the quality of the dissertation. The second is to strengthen the construction of academic ethics. Graduate dissertations must be tested for repeat rate in the academic misconduct detection system and reach the pass level to apply for a degree. The third is to strictly organize the dissertation defense. The defense is organized in units of the teaching and research section. Before the defense, students should make serious revisions to the opinions of the experts on the review of the papers, and they can participate in the thesis defense after passing the examination by the tutor and the subject. After the defense is over, the students need to further revise and improve the thesis according to the opinions put forward by the defense committee, and report the revised results to the Office of the Academic Degree Evaluation Subcommittee of the College for consideration, which they can only apply for a degree after passing.

4. Problems and thoughts
Since the approval of this degree authorization point, it has achieved certain results in the aspects of training programs, curriculum settings, and enrolment promotion. However, there are still some shortcomings in the joint training mechanism and case base construction, which needs further improvement.
4.1. Main issues
First, the practice teaching base needs to be further advanced, especially the off-campus practice teaching base that is compatible with the military post requirements of the in-service postgraduate cadres and closely integrated with the training goals of the major. Second, the management case library of related engineering disciplines needs to be further enriched. Third, the construction of engineering management discipline based on the perspective of military-civilian integration needs to be further improved [4].

4.2. Improvement measures
In view of the existing problems and deficiencies, there will be continuous improvement in the following aspects. Firstly, taking the Double First-class Project as an opportunity, through in-depth cooperation with military enterprises like the rocket army engineering base, the army engineering maintenance corps, and Yutong Group, we will strengthen the conditions for relevant practice bases. Secondly, by participating in large-scale military operations, major project construction, and key project research and development, we will summarize relevant experience in engineering planning, construction, management and maintenance, and then form an engineering management case library including a variety of digital media resources and paper textbooks. This will help further link the curriculum teaching with engineering management practices much closer so as to improve the teaching effect of the curriculum. Thirdly, through academic exchanges with key universities such as Nanjing University and Southeast University, we will learn from the advanced experience of high-level postgraduate cultivation in engineering management, and further enhance the overall sportsmanship and discipline level of the tutor team.

5. Conclusion
In the process of training graduate students in Engineering Management of our college, the combination of scientific research innovation and military engineering management practice is highlighted. Meanwhile, it emphasizes the integration of engineering technology and military drill implementation, and it pays much attention to the compound concept. Research and practice are carried out from the aspects of training objectives, training programs, curriculum system, teaching implementation, process control. In order to improve the quality of engineering management graduate students, the characteristics of experience and considered the existing problems are summarized.

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