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Discussion on Undergraduate Emergency Management Education in Domestic Western Colleges and Universities

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Abstract: Emergency management education in colleges holds significant guidance and practical importance. It is not only essential for maintaining social security， but also plays an invaluable role in cultivating specialized emergency management professionals for the future. Given the policy priorities and the capabilities of high-level institutions—particularly in terms of financial support and professional collaboration—many institutions specializing in emergency management have received substantial backing from the state, and their development is currently in full swing. In alignment with the delineation of responsibilities in emergency management, the necessity for local colleges and universities to foster regional talent has become increasingly urgent. This has prompted the emergence of several critical issues, including the establishment of emergency management programs, the development of these programs, the positioning of training objectives, and various related challenges. This article conducts an analysis of the social demand for safety and emergency management personnel, examining current enrollment trends, training orientations, course offerings, and practical teaching components within higher education institutions. Additionally, it draws insights from the professional development of emergency management in the United States and the establishment of the emergency disaster reduction system in South Korea. By comparing these international frameworks with the state of emergency education in our country, the article advocates for the expansion of enrollment capacities, the diversification of educational pathways, the clarification of disciplinary boundaries, the enhancement of faculty development, and the improvement of experimental training facilities. These measures are proposed to facilitate the steady advancement of emergency management education in higher education institutions.

1. Introduction

In the context of economic transformation and rapid development, the contradictions between production safety and the natural environment are becoming increasingly prominent in China. Urban safety issues are emerging, and enhancing urban safety resilience while strengthening social safety governance is severely testing China's capacity to prevent and address risk challenges, as

well as its comprehensive emergency management capabilities [1-3]. In contemporary China, as the nation enters a new era, significant contradictions have emerged between safety and development across economic, social, and ecological dimensions. These contradictions are exemplified by challenges such as the COVID-19 pandemic, the SARS outbreak, various geological disasters, production safety incidents, and public social events, all of which have had a profound negative impact on economic and social order. Notably, the global COVID-19 pandemic, which has persisted for approximately three years, has tested the effectiveness of joint prevention, management, and governance at all levels, from the national to the local. This situation has also highlighted deficiencies in the initial national research, response, and coordination mechanisms in the face of emergencies, thereby imposing greater demands on the standards of national emergency management in the current context, particularly concerning public safety and production security.

Improving the overall effectiveness of national emergency management and developing the associated infrastructure is an urgent and long-term challenge that requires immediate attention. Since the reform of state functions and the establishment of the Ministry of Emergency Management in 2018, China's emergency management sector has gradually progressed towards a model characterized by comprehensive coordination, on-demand deployment, and collaborative efforts. This shift aims to address issues such as fragmented resources, unresponsive deployment, and delays in emergency response. However, in the face of increasingly complex and intricate risks associated with natural disasters, accidents, and public health events, the responsibility for addressing these issues still largely falls on relevant authorities, which are currently far from meeting the internal development needs of emergency management. For instance, the implementation of the first national census of natural disasters, the inspection of accident hazards to enhance supervision, the establishment of a team of disaster informants, the inadequate number of frontline medical and health personnel, and the research into new equipment and technology all highlight the urgent need for advancements in China's emergency management sector, including improvements in science and technology. All evidence indicates that China's emergency management sector urgently requires advancements in science and technology, talent development, and legal and institutional frameworks. Given the multitude of challenges, the key to addressing these issues and minimizing setbacks lies in innovating the education and training of emergency management professionals, enhancing the development of emergency management disciplines, and guiding universities across the nation to actively cultivate a diverse range of emergency management experts [4]. It has always been one of the primary missions of colleges and universities to nurture and produce high-quality talent for various sectors. Simultaneously, as the cornerstone of education, these institutions bear a significant responsibility in the field of emergency management [5]. Therefore, at this stage, it is increasingly crucial to proactively explore pathways for emergency management education in China's universities and to identify strategies for overcoming the existing challenges.

2. Analysis of the Demand for Emergency Management Professionals in China

At present, there is a significant imbalance between the supply and demand for professional talent in various fields of emergency security in China. In July 2019, the inaugural general meeting of the Emergency and Security Industry and Education Alliance was held, during which it was emphasized that there is a substantial shortage of emergency security professionals in China. The meeting highlighted the urgent need for a large number of composites, application-oriented, and innovative talents. According to incomplete data, as of 2021, the enrollment of undergraduate, master's, and doctoral students in emergency management is projected to increase to approximately 2,196 [6], and most individuals engaged in emergency management have not received systematic

and specialized education in this field.

August 2014, an interview published in the People's Political Consultative Conference newspaper stated, talent gap in China's emergency management system is approximately 400,000 individuals [7], while the shortfall in the fields of industry, mining, and commerce reaches as high as 2 million people. This figure indicates that the emergency management sector is confronting a significant challenge due to a shortage of qualified personnel. Only about one-third of the practitioners in emergency management departments at the provincial, municipal, and county levels possess a relevant professional background.

C. L. Chen et al. [8] classified emergency management professionals into four categories based on their roles in the primary activities of emergency management: (1) emergency decision-making professionals, primarily found in government agencies at various levels; (2) emergency science and education professionals focused on social teaching; (3) research professionals in universities and research institutions engaged in theoretical research, technology development, and industrial innovation; and (4) technical professionals located in enterprises who provide emergency consultation services and conduct emergency rescue operations. Yang Yue Qiao and other scholars [9] collected news and highlights from official websites and analyzed 20 keywords both individually and comprehensively. Their findings indicated that emergency management training should be integrated with organizational management and engineering technology, emphasizing a balance between "business" and training programs for emergency personnel tend to favor technical skills, with a significant concentration of training occurring at the master's level.

3. The Current Status of the Establishment and Development of Emergency Management Programs in Domestic Universities

At the outset, emergency management programs were primarily developed based on public management curricula, leading to the establishment of specialized emergency management tracks. For instance, Henan University of Technology initiated the enrollment of public safety management students in 2005, marking the introduction of the first undergraduate program in public safety management and emergency management in China. In 2009, Jinan University officially launched the first emergency management college in the country and established an undergraduate major in emergency management. Additionally, institutions such as the China Institute of Labor Relations (2005), the College of Disaster Prevention Science and Technology (2006), and the North China Institute of Science and Technology (2017) have successively introduced programs in public utility management, contributing to the training of professionals in the field of emergency management.

During a similar timeframe, several prominent universities developed educational programs related to emergency management from various disciplinary perspectives. Tsinghua University (2004) initiated postgraduate training and scientific research focused on government emergency management. Nanjing University (2005) concentrated on social risk governance as its primary training and research direction. In 2006, Beijing Normal University established the Institute of Disaster Reduction and Emergency Management, which primarily conducts teaching and research grounded in geographic and disaster sciences. Sichuan University founded the School of Post-Disaster Reconstruction and Management in 2011, emphasizing disaster recovery and reconstruction, and has engaged in relevant postgraduate education and research in collaboration with disaster science. In 2009, Jinan University not only established a major in emergency management but also launched the country's first School of Emergency Management, receiving substantial support from the Guangdong government, which has facilitated its rapid development. Alongside the advancement of undergraduate education in emergency management, several universities have also developed postgraduate programs in this field. Tsinghua University, the

Chinese Academy of Sciences, Beijing Normal University, Dalian University of Technology, and Huazhong University of Science and Technology have all initiated postgraduate education in emergency management.

Since the establishment of the Ministry of Emergency Management in March 2018, the construction of emergency management disciplines, professional planning, talent demand, and talent training have become prominent topics of discussion across various sectors. For instance, Gansu Province and Shandong Province have established local colleges focused on emergency management sciences, leveraging regional advantages. These institutions have created branches and partially introduced majors in emergency management and technology, tailored to address significant regional security issues and capitalize on local educational strengths. According to data from the Ministry of Education regarding the approval of undergraduate majors in general higher education for the years 2019-2024, there are currently 50 ministerial colleges and universities offering programs in emergency technology and management, along with 60 institutions dedicated to emergency management. During this period, a substantial number of provincial institutions, utilizing their unique educational advantages and mainstream professional support disciplines, have also gradually applied for program approval and enrollment.

Furthermore, in 2019, the Ministry of Education announced the resumption of the undergraduate major in "Emergency Management, which will confer a bachelor's degree in management upon graduation. Wuhan University of Technology has been approved to begin enrolling students in this program in 2020, making it the first university to offer this major following its reinstatement. In April 2020, the Office of the Academic Degrees Committee of the State Council issued a document titled Some Degree-granting Units to Strengthen the Construction of Emergency Management Disciplines. that 20 universities, including Peking University, Renmin University of China, and Tsinghua University, would independently establish the second-level discipline of emergency management under the first-level discipline and implement related programs. This initiative marks the inaugural establishment of a master's degree in emergency management and signifies the beginning of efforts to expand the training of high-level talent for master's and doctoral degrees in the field of emergency management.

In summary, the education of emergency management professionals in China's colleges and universities began relatively late. Initially, during the first decade, training programs for government emergency management personnel were sporadically developed based on the establishment of public management majors. Over time, these programs evolved by leveraging the strengths of various university disciplines, majors, and platforms to offer specialized training in areas such as public management, risk management, and geological disaster research. With the encouragement and support of the Ministry of Education, provincial education departments, and local governments, a broader range of professional training programs in the technology and management fields has been established. It can be said that this development has been relatively slow, and the field is still in its early stages.

4. The Cultivation of Emergency Management Professionals in Domestic Universities that have been Authorized for Specialized Enrollment.

Based on a questionnaire survey and online statistics from universities, we have briefly analyzed the curriculum, practical teaching, and capacity development within the personnel training systems of institutions specializing in emergency response. It is evident that most universities offering majors in emergency technology and management rely on their established disciplinary foundations and practical platforms to cultivate interdisciplinary talents across four key areas: emergency preparedness, response, recovery, and prevention. The core courses create a theoretical framework

centered on disaster awareness, risk assessment, early warning, emergency rescue, and the relevant legal foundations and equipment. Meanwhile, the practical system primarily utilizes existing practice platforms and facilities, while also incorporating virtual practice projects, such as scenario simulations, tabletop exercises of typical accident cases, and virtual software for emergency information processing and decision-making.

The training orientation for emergency management majors primarily focuses on government and grassroots emergency management organizations. It aims to cultivate multifaceted management professionals equipped with skills in organizational decision-making, emergency communication, public opinion analysis, coordination, and post-disaster reconstruction. The corresponding curriculum is grounded in public management, emergency management theory, operations research, emergency information systems, emergency culture, emergency law, and psychological crisis intervention. This comprehensive approach ensures a top-level design orientation and scientific command and decision-making during disaster emergencies. The training of professionals in emergency technology and management is crucial for overseeing the comprehensive deployment of all emergency operations. These individuals are responsible for addressing unconventional and sudden events by conducting objective analyses and research based on the situation at hand. They must make informed decisions, effectively deploy resources, coordinate efforts, and provide scientific command. Additionally, in the realm of national emergency management and social governance, they play a vital role in planning and implementing related policies. Their expertise can contribute to enriching national governance theories and enhancing the development of relevant think tanks.

5. Foreign Experience in Developing Emergency Management Programs

In the United States, the evolution of emergency management education in colleges and universities has been significantly shaped by supportive policies. In the late 1980s, the first undergraduate degree in emergency management was established at the University of North Texas, followed by the launch of the Emergency Management Higher Education Program in 1994. Over the past 30 years, this program has facilitated the widespread availability of emergency management education across the country, fostering strong connections among emergency response organizations at all levels, government, educational institutions, and communities [10]. The Federal Emergency Management Agency (FEMA) should refine and enhance its policies, develop academic disciplines to generate new knowledge and theories, and implement innovative ideas within communities. This approach will strengthen the translation of research outcomes into effective emergency management practices, solidify the development of emergency management as a profession, and promote the gradual professionalization of the field. American universities possess extensive experience and research capabilities in developing emergency management course content, implementing effective teaching methods, and ensuring educational security.

For instance, in terms of teaching resources, the curriculum covers broad categories of emergency management, types of disasters, disaster response, homeland security, and legal policy. It includes the fundamentals of fire and emergency services management, principles and practices of emergency planning and response, political and policy fundamentals, leadership and organizational behavior, toxicology and biohazards, national emergency security, the social dimensions of disasters, emergency planning, and disaster relief and recovery. All courses offered emphasize standardization, specialization, and targeted development. The courses are delivered through traditional methods, including classroom lectures, group discussions, case studies, and study tours, as well as through various innovative approaches, such as service learning (to enhance the integration of theory and practice) and scenario-based exercises (which involve discussion-based and operational simulations of disaster scenarios, emergency response strategies, emergency

response plans, and other practical exercises). Within the education guarantee system, the focus is on developing emergency management data, training educators, providing necessary hardware resources, and ensuring legal protection. Ongoing efforts for exploration and improvement have been implemented.

The evolution of Korea's emergency management system has undergone several distinct phases. Initially, there was a period of singular response characterized by the enactment of the Civil Defense Basic Law and the establishment of a specialized civil defense agency. This was followed by a phase of limited integration, marked by the introduction of the Emergency Management Act and the Natural Disaster Countermeasures Act, which gradually integrated responses to natural disasters, man-made incidents, technological hazards, and civil defense emergencies. Subsequently, the system entered a phase of full integration, highlighted by the enactment of the Emergency and Security Management Basic Law and a redefinition of the various types of disasters. The most recent phase, termed comprehensive construction, involved the revision and adjustment of several laws, the establishment of the National Security Agency under the direct authority of the Prime Minister's Office, and the reorganization of the State Council. This phase also included the separation of the former administrative core from the State Council, allowing for direct oversight by the Prime Minister's Office and clarifying various command functions. Due to the intricate nature of emergency response activities, the system of emergency and disaster prevention knowledge dissemination has developed a "spider web pattern [11]. emergency and disaster prevention knowledge has been gradually established, extending from the state level down to local residents. In this system, administrative bodies serve as the leading entities, while the media, educational institutions, businesses, and social organizations contribute their unique strengths, fostering collaboration and mutual motivation. The development of this system has involved the active participation of various stakeholders, including government agencies, the media, schools, businesses, and social organizations, each playing a vital role in promoting and enhancing one another's efforts. For instance, we have created manuals and educational materials on emergency and disaster prevention for the public and students, organized emergency drills for various types of incidents, and utilized media channels alongside scientific foundations and industrial fairs to promote education in this critical area.

6. Dilemma and construction of emergency management education in domestic colleges and universities

So far, although professional degree education has been carried out in some universities and regions in China one after another, and professional construction has been carried out to a certain extent and scope, most universities are still at the level of professional declaration and demonstration; for those universities that have already filed and started enrolling students, their emergency management education ideas as a whole appear to be fragmented and unsystematic, or they are still at the stage of groping and trying. For example: whether it is appropriate to position talents according to the existing teaching resources, teachers, overall schooling conditions, and whether it is necessary to break the traditional discipline teaching and training model; in addition, on the premise of limited university resources and funding, how to open up, expand and build outreach practice bases, integrate with the region's emergency industry, integrate science and education, and dock graduates for export.

6.1 Smaller talent training scale and single cultivation pathways

According to incomplete statistics, the total number of students enrolled each year is controlled at about 2,000. The gap between the number of enrollment and the number of people in need is

large.

The training of talents in colleges and universities is a long process, for the professional academic system, the training time spans at least three or four years. This cultivation model must be in the first three years of the "transition period" cannot successfully send professionals to society, resulting in a shortage of professionals, and the slower pace of technological research and development and innovation and stagnant industrial development. Therefore, on the one hand, universities should actively declare the relevant professions if their own schooling conditions are allowed or basically available, or increase enrolments for approved and filed universities; on the other hand, universities should be encouraged to broaden the channels of education and further training, so that personnel who have been working in emergency management and technical industries for several years can continue to receive re-education, further training and training in a systematic manner. This will enable them to enhance their professional skills and capabilities, and enrich the professional workforce during the transition period.

6.2 Lack of Clarity on Cisciplinary Affiliation and Boundaries in Ttalent Training

Most of the emergency management colleges in China that have been declared or established relied on key disciplines such as management science, safety science and engineering, or were driven by the development of regional firefighting, public safety, mining and other public utilities and leading enterprises to develop systematic training of management and professional talents at all levels. Combined with the scope of business to which they belong, and the development of emergency management disciplines no longer relied on a single, certain discipline to support its development, both taking into account theoretical knowledge in social and natural sciences, and requiring good command and decision-making, public opinion control, new technology support, and even disaster psychological intervention and training, etc. Therefore, emergency management disciplines are comprehensive, not simply subordinated to one of the disciplines of management and safety science and engineering, but should be a cluster and integrated of related disciplines between the two disciplines or more, which is urgent to strengthen the re-construction of the discipline's theoretical and methodological system.

6.3 Weaker faculty

At present, in the field of emergency management education in China, the number of teachers is insufficient, the quality gap is large, and teachers with both theoretical and practical experience are even scarce. Most emergency teachers on post are not specialized enough in their professional backgrounds, and are basically composed of full-time teachers from similar fields such as safety, firefighting and coal mining, or are gradually trained and developed, and the current situation of teachers in most universities is that the same teachers belong to different majors. What is more, there is a shortage of teachers specialized in disaster response operations, disaster reduction theory and practice, early warning and crisis management and other public emergency management knowledge.

In accordance with the idea of the “Emergency Safety Wisdom Learning Workshop” the canter should increase the training of professional leaders in emergency management disciplines, and collaborate to build a resource pool of emergency personnel formed by government, national and regional emergency administration college training teachers, experts from relevant industries, associations and societies, and emergency industry talents, so as to cultivate a team of "dual-teacher" teachers with a clear research direction, a reasonable age structure, and specialization in their field. The centre and relevant departments have positively planned for policies and programs to promote the development of a team of highly qualified teachers. For example, setting up a target

allocation and reward system, establishing a national or regional training fund committee(the platform is responsible for organizing and selecting young teachers with greater potential for development, advanced representatives of the industry to participate in the training and study of domestic emergency management personnel, or to send famous universities and research institutions at home and abroad for study visits and attachment to relevant enterprises for training). with the help of other platforms, it is beneficial to carry out research on scientific topics, product development and technical exchange and cooperation.

6.4 Imperfect Construction of Experimental Training Labs

The construction of laboratory is an important part of talent cultivation and scientific research in colleges, especially on practical teaching. Combined with the curriculum set on the talent training program, a certain proportion of the courses were matched with practical training (basically the proportion is above 30%). Regarding on the statistics of experimental training and expansion platform at present, most of them were still based on the existing practical teaching platform of colleges and their own advantageous majors and the teaching and training resources possessed by the relevant regional industrial cooperation. The shortage of practical teaching resources and the requirements of standard training talents were basically not satisfied. The cross-disciplinary, cross-regional, co-construction and co-raising practice teaching bases are still under planning.

According to the inherent development concept of emergency management, emergency work is carried out in a series of activities under certain routine and sudden scenarios, presenting characteristics such as diverse scenarios and complex development situations. It is inevitably to require emergency talents to have better physiological and psychological qualities, a calmer and rational decision-making brain in different circumstances.

The training of the above-mentioned skills is obviously limited by the reproduction of scenarios, and it must only be completed through simulated experiments and training to meet the needs. For example, situational simulation of emergency response, practical training in network public opinion security, digital sandbox rehearsal, emergency drill simulation, disaster psychological intervention and reconstruction, virtual simulation of risk prevention and rational decision-making skills development, etc.

Based on the comprehensive management technology of plan-case, we can find relevant typical cases as reference, build the basic scenarios, evolution scenarios and condition scenarios of emergency drills, or digital sand table projections, build certain scenarios, experience the relevant disposal procedures, and practically improve the comprehensive quality of emergency decision-making and managers through repeated adjustments and improvement exercises. At the same time, with the help of the emergency drill simulation training platform, it is easy to carry out practical training courses, promote the participants to clarify their own roles and corresponding responsibilities, experience the handling process, deepen the understanding of the “one case, three systems”, enrich the experience of emergency response, and improve the emergency response capabilities of communication with the media, various departments, collaboration, mobilization, and aftermath restoration. The program will also improve the ability to communicate with the media and various departments, collaborate, mobilize and recover after the emergency.

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Author Contributions

Rili Yang conducted the questionnaire design; Fengfeng Yang distributed and collected questionnaires, Jufeng Zhang and Lan Yu analyzed the data, gave some suggestion, all author together wrote the paper; all authors had approved the final version.

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