Cultivation of Graduate Students’ Field Practice and Scientific Research Ability—Taking Island Geological Disaster Survey as an Example

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Abstract: In order to improve the independent scientific research and innovation ability of the graduate students majoring in the Marine Environment, the teaching method of graduate students’ field practice was discussed on the basis of the island environment field survey. The effects of four items on the graduate students’ scientific research ability were analyzed, including the choice of practice subject, the determination of research scheme, the process of investigation, and the writing of practice report. The field teaching methods focused on cultivating the students’ field investigation, experiment and analysis ability, which was conducive to improving the experimental operation ability and innovation ability.

Keywords: Island, Environmental Geological Hazard, Field Investigation, Teaching Method, Innovation Ability

I. INTRODUCTION

With the rapid development of the social economy, science and technology have played a leading role and require scientific and technological talents to continually improve their scientific research ability. The cultivation of graduate students in the colleges/universities is directly related to the composition of national talents. The cultivation of scientific research practice and innovation ability is essential for the national innovative talent training strategy [1]. Field surveys and experiments play an irreplaceable role in the process of postgraduate training. The Environmental Science-related majors focus on the relationship between humans and nature, especially the postgraduate education of environmental specialty with marine characteristics. The requirements for field practice teaching are relatively high. However, the current postgraduate practice teaching attaches importance to knowledge and conclusions, and ignores the experimental process and operation ability. This phenomenon results in students’ lack of innovative consciousness and practical ability, unable to maximize the benefits of field practice [2]. The goal of field practice teaching is to understand and strengthen the knowledge in books in practice, and to train students’ ability to work in the field and study independently. Its goal orientation is no longer the continuation of simple theoretical teaching and experimental teaching. It focuses on the study and practice of methods and procedures in the field oceanic investigation, the sample collection and processing, the use of testing instruments, and the analysis and maintenance of field data while learning the theory. In this way, the students can not only consolidate the essential professional knowledge and have an intuitive understanding of marine environmental problems. They can also understand the process of knowledge acquisition, and experience the process of knowledge value generation in practical activities.

Therefore, the field investigation can help students to actively construct their own knowledge structure, and exercise the ability to independently engage in field work in the marine environment and to carry out independent scientific research [3]. It is imperative to study and improve the field practice teaching methods of postgraduates majoring in marine environment. The objective of this paper is to discuss the methods of cultivating the graduate students’ research ability in the process of field practice teaching in Daguan Island, Lingshan Island and Juhua Island of Liaoning, Shandong Province and Tianjin.

II. DESIGN PROCESS OF TECHNICAL ROUTE TO CULTIVATE SCIENTIFIC RESEARCH ABILITY

The determination of technical route requires graduate students to have relevant basic knowledge of environmental science, geology and marine science, which is carried out on the basis of consulting and summarizing relevant literature. It is of great benefit to improve students’ ability to find and analyze problems [4]. The design of the investigation scheme is an effective exercise for the students’ ability to analyze and solve problems, which is discussed by the members of the special group and reviewed by the instructor. The investigation scheme needs to have strong feasibility and rationality [5]. Because the islands have geographical particularity, the geological disasters appearing in the island might have many types. Therefore, in order to prevent wasting human, material and financial resources, and eliminate security risks, it is necessary to collect many disaster point-related data and reasonably arrange the research route, which is the foundation of the follow-up island survey.

Taking the survey in Daguan Island as an example, the distribution of geological disasters is shown in Fig. 1. The preliminary work mainly included the interpretation of remote sensing data, the investigation and location of potential geological disaster points, the selection of the best exploration route, etc. All this work needed to be communicated with the local functional departments and relevant scientific research institutions many times. Therefore, the field practice of the island geological hazard survey had high requirements for the students' rigorous scientific research thinking and effective and perfect data collection [6]. During the period of route design, students' various abilities would be exercised.

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III. EXPERIMENTAL INVESTIGATION TO ENHANCE THE SCIENTIFIC RESEARCH ABILITY

Practice is the only criterion to test the truth, and the field practice provides a rare exercise opportunity for graduate students to solve practical problems. The process of the island disaster survey included on-site debugging and testing. It included a lot of practical knowledge and valuable experience that can’t be encountered in books or classes, for the students who are used to the laboratory work [7]. Additionally, because the graduate students had more opportunities to operate measuring instruments, their practical ability was generally improved. Through the field practice, the postgraduates could also skillfully master the instruments’ use method and operation principles, which played a role in promoting the mastery of theoretical knowledge.

Taking Lingshan Island as an example, it is a typical volcanic island. The breccia that fell from the eruption weathered and eroded to form a jagged ridge [8] in this island, as shown in Fig. 2. A large number of large volcanic eruptive rocks located at the back of Lingshan Island, which mingled with a lot of pebble-size stones with higher roundness. This phenomenon was caused by the mingling of volcanic eggs ejected during the volcanic eruption when the ejected rock had not yet condensed. The southeast of the island was eroded by the sea, forming peculiar sea erosion landforms, such as Tiger mouth, Elephant Trunk Hill, Shi Xiucai and so on, which played a very high role in teaching. Through these special geology and geomorphology, students had a better understanding of the causes and characteristics of geology and geomorphology while practicing in the field, and deepened their understanding of a variety of island geological disasters.

IV. EFFECT OF THE EXPERIMENTAL REPORT ON CULTIVATING THE SCIENTIFIC RESEARCH ABILITY

The thematic practice report is an essential part of practical teaching and one of the vital evaluation indexes of field scientific research effect [9]. By analyzing the data and the report’s writing, the students summarized and analyzed the existing problems or newly discovered problems and put forward reasonable suggestions for the following particular survey. The writing of the particular topic practice report enabled students to effectively master the writing methods and requirements of scientific and technological papers, and laid a solid foundation for the smooth completion of their follow-up graduation thesis work [10].

Taking the investigation of Juhua Island as an example, there were significant differences in the disaster points’ image data provided by different working groups at the same collapse disaster site with geographical coordinates of 120°49°39.06”E and 40°29°34.93”N. Some students only provided the close-range and distant view of the collapse point. In contrast, others provided the pictures from different angles such as close-range, distant view, top view and upward view. Some students also provided the images of students’ actual survey and discussion when climbing to the highest point, as shown in Fig. 3, which reflected different thinking abilities and working attitudes.
CONCLUSION

The field teaching mode and method were studied, combined with the observation of disaster phenomena in the typical island environmental geological disasters survey. The method focused on the cultivation of graduate students' field practice ability. The effects of the technical route formulation, the implementation of scientific research investigation, and the writing of an experimental summary report on cultivating the graduate students' creative ability were also studied. The postgraduates could get comprehensive, systematic and standardized practical training in the learning course. The method helped improve the students' initial data collection ability, the theory with practice ability, the self-management ability, and scientific research innovation ability.

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References