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Study on Educational Reform of Geological Hazard Assessment Based on the OBE Pattern

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Abstract. On the basis of previous studies, the teaching reform in the OBE model has been carried out on the course of Geological Hazard Assess according to the national and social needs of the assessment of geological disasters under the new situation. The main reforms include: 1) Strengthening the course orientation of geological disaster assessment and regional characteristics and increasing class hours; 2) reforming the teaching model and enriching teaching methods; 3) increasing drone and mobile phone teaching with information processing modes like GIS and remote sensing; 4) increasing the analysis of typical cases and the mid-course examination; 5) changing the final evaluation mode so that students can quickly satisfy the market needs.

Keywords: OBE; Talent cultivation; Teaching reform; Geological disaster assessment.

1. Introduction

Geological disasters mainly include landslides, collapses, mudslides and ground collapses. Geological disasters seriously affect economic construction and the life and property security of the people. Many experts and scholars have studied various types of geological disasters in different regions (Wang et al., 2018; Chen et al., 2018; Wen , 2018; Qi, 2018; Luo et al., 2018; Xue et al., 2018; Liu et al., 2018; Han et al., 2018), with a number of achievements. The geological disasters in China cause large loss of life and property each year, for example, the landslide incident in Nayong County of Guizhou in August 2017. China attaches great importance to the prevention and control of geological disasters, and invests a large amount of funds every year for relevant work, so the geological disaster assessment is important and meaningful. With the progress of the society and era, the teaching of geological disaster assessment should also keep pace with the times, and new geological hazard assessment content and methods must be formulated according to the current situation, so as to better guide the evaluation of geological disasters and reduce the destruction of economic construction and life and property. Therefore, this paper uses the OBE model to study the teaching of Geological Hazard Assessmt and discusses the teaching methods of the course under the current situation.

2. Basic Content of Geological Disaster Assessment

At present, the assessment of geological disasters in China mainly includes four parts: 1) geological disaster hazard assessment; 2) susceptibility zoning assessment of regional geological disasters; 3) geological disaster risk assessment; 4) geological disaster risk assessment of construction land (Li et al., 2013). For the students of the two ordinary colleges, it is best to start from the susceptibility zoning assessment of regional geological disasters and the geological disaster risk assessment of construction land. Focusing on the evaluation of these two types of geological disasters is advantageous for the adaptation to the market.

Geological disaster hazard assessment is a macro-assessment that integrates various types of geological data for comprehensive analysis, mainly assessing the mobility and risk level of geological disasters(Li et al., 2013). This type of assessment mainly provides theoretical support for the prevention and control of geological disasters, establishes a model of geological disaster occurrence by systematically analyzing the factors that affect the occurrence of geological disasters, analyzes the area and extent of possible geological hazards, and compiles relevant partition maps.

The susceptibility assessment of geological disaster in counties and cities is aimed at the geological disaster assessment in counties and cities, mainly for the analysis of regional construction and population distribution. At present, China attaches great importance to the evaluation of geological disasters in counties and cities, but the assessment work still has a long way to go for further study in the assessment unit and method. Some enterprises now attempt to establish a dynamic monitoring system and actively carry out pilot projects in counties and cities. If the dynamic monitoring system is perfected and spread out, the accuracy of the earthquake early warning can be greatly improved and the cost of disaster assessment and management can be reduced. From the current situation, counties and cities are the basic units of disaster management. If the dynamic monitoring system can be combined with counties and cities to solve the problem of geological disasters in development at low cost, this model will have great development potential.

The geological disaster risk assessment is the assessment of the occurrence possibility and hazard degree of geological disasters. The difference between geological disaster risk assessment and geological disaster hazard assessment is that geological disaster risk assessment is for specific construction or events, and belongs to the “micro” category, while geological disaster hazard assessment is a systematic review at the regional level. The risk assessment mainly serves several aspects: 1) providing a basis for the prevention and control of geological disasters in highway construction, housing construction, mining construction and the construction of major national projects; 2) providing basis for the monitoring, prevention and emergency response of geological disasters; 3) providing a basis for environmental protection in development and construction(Li et al., 2013).

3. Traditional Teaching Methods

The traditional teaching method is mainly direct teaching, generally with 36 class hours. Teachers directly teach the relevant knowledge of geological disasters, including geological disaster types, geological disaster emergency assessment and geological disaster investigation, etc. There is too much content and little class time. The traditional teaching methods are mainly PPT or blackboard teaching, without enough emphasis on the curriculum, diversified teaching methods and key and difficult points that need to be reorganized.

4. Features of OBE Model Courses

4.1 Strengthening the Course Positioning

As an elective course for the geology major, geological hazard assessment has not received sufficient attention for a long time, which resource exploration, geological engineering or other geological majors do not cultivate as a core curriculum. The traditional teaching concept holds that geological disaster assessment is an affiliation of resource exploration engineering and geological engineering majors. Students can select the geological disaster assessment course, but rarely consider it as an independent core course or regard geological disaster investigation, assessment and design as an independent direction of the geology major. It is due to economic conditions and technical constraints that the assessment and treatment of geological disasters before has not yet obtained the attention now. With the economic development and increased national strength, China pays more and more attention to environmental protection and sustainable development, and has also greatly increased the funding so that relevant work such as the assessment and management of geological disasters has bright prospects. Only through good assessment of geological disasters can we minimize the occurrence of geological disasters with correct design, so as to reduce the loss of life and property of the people to the minimum. With the strong support from the country, in order to improve the assessment of geological disasters, the course orientation can be upgraded to a core curriculum, with increased class hours and relevant courses. Also, geological disaster assessment can be set as an independent direction of the geology major, for risk warning and assessment of mines, streets and houses, etc.

With the development of the times, China places much more emphasis on the environment. Under this background, the geological disaster assessment and governance and related directions have greater market prospects. The requirements for land disaster assessment in mine development, engineering construction and construction work are becoming increasingly strict, and follow-up work cannot be carried out without relevant review. Under the premise that mineral exploration continues to shrink and the geological disaster assessment market continues to expand, it is possible to regard geological hazard assessment as an independent direction or as a backbone course of environmental geology orientation. The geological disaster assessment is defined as a professional core curriculum rather than elective, Geological Disaster Assessment can be applied not only to the investigation, assessment and governance of geological disasters, but also to solve related problems in combination with the environment. Geological Disaster Assessment should be positioned as a professional core curriculum, which relevant design and governance should be based on. More class hours are needed accordingly, and, in the current case of 1 credit + 16 credit hours, Geological Disaster Assessment can be adjusted to that with 3 credits + 48 hours or 4 credits + 64 hours.

4.2 Highlighting Regional Characteristics

In the traditional teaching model, the knowledge points and regions involved in the curriculum are wide while the regional targets are weak. For the local ordinary universities, this model is too broad to meet the level of students. In various regions of China, the types and occurrence levels of geological disasters are different. The local ordinary universities should cultivate OBE model applied talents according to local characteristics, highlighting the frequent geological disasters and related work in the region. For example, the graduates of Guizhou Institute of Technology mainly work for the southwestern region, so the course in Guizhou Institute of Technology should focus on the frequent geological disasters in the southwestern region, where the main geological disasters are collapses, landslides and mudslides, and there are mainly collapses and landslides in the Guizhou area, which, in addition, is the karst area and needs targeted assessment. In general, the course should analyze the main geological disasters in different regions, to avoid a wide coverage and a loose combination with the region.

5. Reform of Teaching Methods in OBE Model

5.1 Diversification of Classroom Teaching Methods

The traditional teaching mode is based on PPT teaching, which is relatively monotonous. Nowadays, teaching has entered the era of informationization. New teaching methods such as MOOC, micro-class and flip course can be used in the ecological disaster assessment teaching to fully stimulate students' interest and mobilize the enthusiasm of students. With the help of Rain course and other software, it is possible to strengthen the pre-school preparation monitoring and classroom effect evaluation for students, guide them to study independently after class, change the traditional teaching model that mainly depends on the teacher's classroom teaching, and realize the closed loop of the trinity of the pre-study-classroom teaching, assessment-after-school autonomous study.

5.2 Modernization and Informationization Means

As science and technology advance, the geological industry can also use a variety of high-tech means to conduct geological disaster assessment more effectively. The frequent and unpredictable occurrence of geological disasters makes it difficult to implement manual on-site monitoring. However, if a dynamic monitoring system with automatic monitoring and precaution and personnel maintenance is established, the cost of improving the prediction accuracy can be greatly reduced. This system has been used and needs further development. In the monitoring process, the level of informatization of operators is strictly required. Therefore, informatization and geological evaluation should be combined, with the connection between GIS, remote sensing technology and geological disaster assessment. In addition to strengthening informationization, the use of drones and other means can effectively improve the evaluation effect, so the application of drones can be added in

geological evaluation in the classroom or in practice to change students' stereotypes about geology. Besides drones, mobile phones, GPS and 3D topographic maps can also be used flexibly in geological disaster assessment. Through the use of modern tools, the efficiency of geological disaster assessment will be improved, and the dynamic and accurate monitoring and forecasting efforts will be finally realized.

6. OBE Model Capability Enhancement

6.1 Strengthen Professional Internship

Mapping internship is an important part for the resource exploration engineering major. The period for mapping internships is generally 6-12 weeks. The previous mapping internships only focus on the training of the geological mapping of mineral exploration rather than the geological disaster assessment. The content of geological environment assessment can be strengthened in this link, so that students receive direct training in the field to effectively enhance their impression and understanding and lay a solid foundation for follow-up work. In addition to mapping internship, a professional geological disaster assessment internship can be set up. The internship can either be a basic introduction or direct simulation training. In short, students' practical application should be strengthened.

6.2 Typical Case Analysis

The "inversion" means should be used to cultivate students' thinking for applied talent cultivation. Traditional teaching neither pays sufficient attention to geological disaster assessment nor comprehensively and carefully analyzes typical cases. Cultivating applied talents requires students' practical operation after a short training period before or after graduation, which calls for targeted training. Typical case analysis is a very effective training mode. Teachers will simulate the actual environment, step by step from the most preparatory work to the final evaluation plan, so that students can integrate into the actual operation and deepen their understanding and mastery of specific work. After the case analysis, another similar case will be given to students for practical exercises, in which their mastery of the knowledge and the effect of the actual application will be known, to summarize the teaching experience, and induct the general and specific problems, explain in detail, repeatedly simulate and solve these problems. Typical case explanation can not only effectively improve students' interest, but also greatly improve students' practical ability.

6.3 Cross-direction Development

Geological disaster assessment is closely related to the environment. Although mineral exploration has been greatly reduced under the current situation, there are many environmental projects related to mines, such as mine greening and comprehensive environmental management, etc., which can be combined in teaching to enable students to master the preparation of a series of related reports, laying the foundation for their future comprehensive development.

6.4 OBE Model Evaluation - Assessment Report Writing

The evaluation method of geological disaster assessment is the examination, which can still be used after the adjustment to the professional core curriculum, with alternated examination content. Instead of basic knowledge points, but actual operation should be the key points for examination. The practical operation ability as the examination target and the preparation of the evaluation report or the specific case analysis as the assessment method can otherwise be combined. This evaluation mode has several advantages: 1. to directly understand the mastery of the students; 2. to increase the pressure and urgency of the students, so that the students can actively learn relevant knowledge and enhance the application ability; 3. students who pass the evaluation can immediately meet the requirements of companies and directly put what they have learned into work after graduation.

7. Conclusion

After systematic analysis, the course of Geological Hazard Assessm is very important, with good market application prospects, so it should be positioned as a professional core course or set up as an independent direction. The training of OBE model applied talents should be reformed from the following aspects: 1) It is more appropriate to adjust the class time to 48 hours or 64 hours; 2) the teaching mode can be enriched by combining the characteristics of regional geological disasters; 3) the analysis and practice of typical cases should be strengthen and internships be increased; 4) the evaluation of various types should be strengthened and a model for preparing an assessment report or an case analysis should be the final one.

Through several aspects of teaching reform, students are made aware of the importance of the course of Geological Disaster Assessment and improve their interest in the course of Geological Disaster Assessment. Through systematic study, students can master tools such as drones, mobile phones and GPS, etc., and systematically grasp the key points and assessment processes of geological disasters in different regions by means of GIS, remote sensing and so on. Therefore, they can directly carry out not only geological disaster assessment after graduation, but also related work such as mine greening and comprehensive environmental management. At the same time, they have a certain understanding of the design and construction work of geological disaster management, which lays a foundation for their future development.

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