

Exploration and Research on Teaching Reform of Engineering Geology in Vocational Colleges

Yihang Zhang*

Chongqing Industry Polytechnic College, Chongqing 401120, China

Abstract

The engineering geology course is a professional basic course for the civil engineering specialty. Through the reform of the teaching method of the engineering geology course, this paper improves the students' enthusiasm and quality of learning the course, so that students can have a clearer understanding of the knowledge context of the engineering geology course, and truly understand and master the course in combination with engineering cases, recognize the constraints between disciplines, so as to better connect and integrate into the civil engineering specialty, Finally, it will improve students' professional knowledge, professional quality and employment competitiveness in the future.

Keywords

Civil Engineering; Engineering Geology; Course Teaching; Reform.

1. Introduction

Engineering geology is to use the theory and method of geology to find out the geological conditions of various engineering sites through engineering geological survey and comprehensive theoretical research, comprehensively evaluate the site and its related geological problems, analyze and predict the possible changes and effects of geological conditions under the action of engineering buildings, select the optimal site, and propose engineering measures to solve adverse geological problems, so as to ensure the rational design Provide reliable scientific basis for smooth construction and normal use [1-2].

As a basic course of civil engineering in higher vocational colleges, the newly revised syllabus should first clarify the teaching purpose and the applicable group. For the student group of higher vocational colleges, the teaching goal should not only strengthen the students' learning of the theoretical knowledge of engineering geology, but also let students combine the professional knowledge they have learned with engineering practice cases on the basis of theoretical learning to cultivate their practical ability, Let students understand the similarities and differences between practical engineering geological problems and theoretical knowledge, and strengthen the learning and mastery of knowledge points of the course. This is of great significance for improving the professional quality and employment competitiveness of civil engineering students.

2. Teaching Status of Engineering Geology

In the major of civil engineering, engineering geology is a highly practical interdisciplinary subject between geology and engineering. It studies the geological problems in civil engineering, that is, how to effectively use the natural geological conditions in the implementation of engineering architecture design, construction and operation, and how to solve and transform adverse geological conditions and other geological problems. In view of the basic characteristics of geological engineering, reflecting on the current teaching situation of this course, there are mainly the following problems:

2.1. Cross Disciplinary Issues

As the discipline is more inclined to geology, the students of civil engineering have subconsciously raised the difficulty of the course to a higher level. Some academic terms and professional concepts need to be extended to the direction of geology to strengthen the students' understanding of the engineering geology course [3]. At the same time, subject crossing will also increase the difficulty and workload of teachers' lesson preparation. Teachers need to understand and digest the main knowledge points of geology and civil engineering at the same time to ensure the teaching quality.

2.2. Solidification and Single Teaching Mode

At present, the teaching process in vocational colleges mainly adopts the teacher centered, one to many classroom teaching mode. In the teaching process, PPT demonstration is used as the main teaching form, supplemented by blackboard writing for course explanation. However, it is usually difficult to interact with students in this mode, and it is difficult for student groups to form a strong interest in learning, resulting in a dull classroom atmosphere, which makes students fall into a vicious circle of gradually losing their enthusiasm for learning, and ultimately affects the teaching effect.

2.3. Lack of Practical Teaching

The combination of theory and practice teaching can effectively guide the cultivation of students' hands-on ability. Through field practice, students can initially understand the engineering geological conditions closely related to civil engineering and various adverse engineering geological phenomena, and master the conventional engineering exploration methods and basic requirements. However, due to the limitation of class hours, the practice class hours are less, and the hardware equipment configuration such as indoor model is less, so it is difficult to ensure the integrity of the practice link [4].

2.4. Textbook based Teaching Materials

There are many conceptual knowledge points in the engineering geology course. The scope of examination questions is mainly noun interpretation or conceptual statement. Students can pass the examination only by endorsement, and can't really understand its theoretical basis and principle of action. At present, the commonly used textbooks lack the analysis of practical engineering cases, and through the study of many scattered knowledge points, students cannot form a knowledge framework for self-learning, and it is difficult to clarify the subject knowledge context of the discipline.

3. Teaching Reform of Engineering Geology

For the problems existing in the engineering geology course, this paper attempts to discuss the teaching reform and propose specific improvement measures from the aspects of discipline intersection, teaching mode, practical teaching, textbook content, etc., in order to improve the teaching quality of the engineering geology course and strengthen the students' ability to absorb and understand.

3.1. Promote Interdisciplinary and Diversified Development

The development of a single discipline often faces many insurmountable knowledge gaps, while the cross integration of multiple disciplines can sometimes accurately explain them. The same problem can be easily solved from another angle, which is exactly what cross discipline plays. It forms a new branch of discipline through mutual integration, making the knowledge system develop in a diversified direction. Similarly, the engineering geology course is the intersection of geology and civil engineering. Therefore, in teaching, it is necessary to explain the advantages

of interdisciplinary to students, overcome psychological fears, and understand the relevant geological knowledge while learning this course to expand the knowledge points of this specialty. Proper guidance can effectively improve students' knowledge reserves, but also can improve students' interest in unfamiliar subjects. In addition, in today's harsh employment situation, it can also expand its scope of employment and increase employment opportunities.

3.2. Adjust the Teaching Mode and Improve the Classroom Atmosphere

For a long time, classroom teaching has gradually changed from traditional blackboard writing to PPT demonstration mode. This one to many divergent teaching form has deprived students of time for independent thinking, and it is difficult to stimulate students' interest and enthusiasm in learning by observing the teaching content. In order to enhance students' enthusiasm for learning and improve teaching quality, in addition to combining blackboard writing with PPT demonstration, certain FLASH animations can be appropriately selected for playing, such as the animation of the formation process of sedimentary rock, metamorphic rock and volcanic rock, so that students can have a clearer understanding of the definition and correlation of these basic terms, and strengthen understanding and memory [5]. It can also be interspersed with certain video data, such as news reports on geological disasters such as landslides and debris flows, and enumerate some latest cases to guide students to divergent thinking. In addition, you can also refer to the current network live broadcast mode, combine some popular teaching software, set a guided question and answer link in each page of the PPT demonstration content, intersperse a certain reward and punishment system into the usual score, and set separate questions for each student to conduct an online scoring system, so as to fully mobilize the enthusiasm of students.

3.3. Strengthen Practical Teaching and Improve Practical Cognition

In addition to many definitions and conceptual knowledge points, the engineering geology course also includes the working principles and use methods of some instruments and equipment, among which there are many equipment that are difficult to explain by words or pictures. For example, when using a compass to determine the attitude of rock strata, it is necessary to understand the structure of the compass, and it should also be demonstrated in combination with actual rock samples or models. At the same time, the practical teaching should also select a project site nearby, invite project managers to give field lectures, show some project examples, and set up some divergent engineering research topics to cultivate students' independent thinking and practical adaptability. In addition, combined with practical engineering cases, we can also set up relevant innovation and entrepreneurship competitions for students, and encourage students to solve practical problems through a certain incentive mechanism. This practical teaching mode can effectively stimulate students' exploration spirit after class without occupying theoretical class hours.

3.4. Sorting out the Teaching Material Framework and Connecting the Knowledge System

At present, the teaching materials of engineering geology mainly focus on the interpretation of nouns and concepts, and the knowledge points are scattered, which is difficult to sort out in series. Because of this, it is necessary to timely list some specific engineering cases that can effectively connect various scattered knowledge points in the textbooks or PPT presentations, so as to expand and extend, and then cover each knowledge point. The mode from the main line to the branch line can enable students to have a clear understanding of the knowledge framework system of the course [6]. At the same time, for the explanation of the content framework of the textbook, due to the limited class hours of the course, it is necessary to adhere to the principle of first talking about the main content, then talking about the secondary content, first talking about the core content, then talking about the supplementary content, and

reasonably allocate the class hours. Finally, the main line knowledge framework can be listed, allowing students to participate in it, complement and improve the knowledge context, and appropriately set questions for guidance. 3-4 people will have group discussions, so that students can take the initiative to participate in the learning process of the knowledge system as the main body, so as to strengthen students' understanding and mastery of professional knowledge under mutual cooperation.

4. Conclusion

Through the reform of the teaching method of engineering geology course, this paper aims to enable students to use this new teaching method to understand the advantages of discipline intersection for personal knowledge expansion and future employment, clarify the main knowledge context of engineering geology course, and selectively extend it. At the same time, in the course practice, insist on participating in and completing a specific project case. Finally, on the basis of effectively mastering the exploration methods and basic requirements of various engineering geological conditions, we can understand the importance of engineering geology courses to civil engineering construction, and lay a solid foundation for learning other professional courses of civil engineering in the next step.

Acknowledgments

The authors would like to acknowledge the Doctoral Fund Project of Chongqing Institute of Industry and Technology (Grant No. 2022G2YBS2K2-12).

References

- [1] B. He, X.H. Bai, P.J. Han, et al. Exploration on the reform of practical teaching method of engineering geology course for civil engineering specialty, *Education and Teaching Forum*, vol. 52(2018),107-108.
- [2] J.D. Teng, A.T. Dong, S.F. Qiao, et al. Discussion on teaching reform of civil engineering geology practice in transportation characteristic colleges, *Education and Teaching Forum*, vol. 40(2022), 62-65.
- [3] C.R. Liu, Z.Q. Huang, D.X. Zhang, et al. Exploration of Ideological and Political Teaching Design and Teaching Method of Engineering Geology and Soil Mechanics, *Journal of Yellow River Conservancy Technical Institute*, vol.34(2022),86-90.
- [4] F.P. Zu, J.M. Du, X.Y. Lin, et al. Teaching Practice and Thinking of the Course "Principles of Engineering Geological Analysis", *Geological Journal of China Universities*, vol.28(2022),394-401.
- [5] C.X. Xu. Reform and exploration of field practice teaching of engineering geology, *Scientific and technological wind*, vol.(2021),115-117.
- [6] X.Y. Wang, R.S. Wang, J. Yang. Teaching Design and Evaluation of "Engineering Geology" Based on Flipped Classroom, *Journal of Tangshan University*, vol.34(2021),99-103.