

The Implementation of Ideological and Political Education in the "Physical Geology" Course

Zisang Huang*, Zhongquan Li, Bo Ran and Wei Long

Chengdu University of Technology, Chengdu 610000, China

* Corresponding author

Abstract: In the context of integrating ideological and political education, this article utilizes Chengdu University of Technology's "Physical Geology" as a case study to explore practical methods for ideological and political education. By integrating ideological and political education with professional teaching, the article introduces and compares examples to achieve the following objectives: Firstly, it aims to enhance students' professional confidence and enthusiasm, providing them with a deeper understanding of their career prospects. Secondly, it seeks to foster scientific thinking among students, encouraging them to question and innovate, thus avoiding the limitations of existing knowledge on their creativity. Lastly, it aims to instill the concept of ecological civilization in students, emphasizing its significance as a prerequisite for the sustainable development of human society.

Keywords: Earth Science; Geology; Undergraduate education.

1. Introduction

Universities are the main battleground for talent cultivation, with the core elements being "What, How and for Whom to Cultivate" [1-2]. The connotations of these questions may vary with the changing times, but the core of socialist education with Chinese characteristics, which is "educating people for the Party, cultivating talent for the country," remains unchanged. Upholding this ideology, Chinese universities have proposed curriculum-ideology reform at the National Conference on Ideological and Political Work in Universities. This reform, while respecting the laws of curriculum, aims to integrate ideological and political elements into the teaching of professional courses, thereby tapping into the guiding function of curriculum values. This is done on the premise of achieving the transmission of professional knowledge and the cultivation of skills [3-6].

The course "Physical Geology" offered by the School of Earth Sciences at Chengdu University of Technology was born out of the need for geological resources. Since its establishment in 1956, it has been continuously offered, undergoing the efforts of several generations of teachers. Over time, it has gradually developed into a comprehensive curriculum system, contributing to the training of numerous outstanding talents in relevant industries. Based on the "30·60" Dual Carbon Goals and the "14th Five-Year Plan" [7-9], and considering the practical needs of ideological and political education, we take "Physical Geology" as an example to explore ideological and political elements compatible with professional courses. The aim is to better align professional content with ideological and political education, thus realizing a comprehensive educational approach.

2. Course Content and Objectives

"Physical Geology" is a foundational course that forms an independent system and serves as the first geological course for students majoring in geology-related disciplines. As the initial professional course for university students, it

encompasses various aspects of geology, providing a broad coverage suitable for students to develop an initial understanding of earth sciences. Specifically, it starts from microscopic elements to macroscopic minerals, from the three major categories of rocks to planetary geology, from the fundamentals of dynamics to global tectonic activities. Each aspect is intricately interconnected, forming a systematically complete and logically structured knowledge system.

Through the study of this course, students should be able to grasp the fundamental concepts, basic knowledge, and theories of geology, understand methods for visually identifying minerals and rocks, and recognize common minerals, rocks, and geological phenomena. They should also develop a historical and developmental perspective on geological processes and phenomena, using geological thinking to elucidate various processes of Earth evolution. Moreover, cultivating students' abilities is also a crucial objective of this course, including: 1) fostering scientific thinking and the ability to apply acquired knowledge to solve simple geological problems; 2) understanding the historical development, current status, trends, and frontiers of the profession; 3) instilling awareness of energy conservation, environmental protection, and safety.

3. Exploration and Design of Ideological and Political Education Elements

3.1. Confidence in the profession

Chengdu University of Technology was founded in 1956 and is one of the three geological institutes established in the early days of the People's Republic of China. Over the years, it has produced a large number of outstanding talents for industries such as geology and petroleum. In recent years, due to the decline in international crude oil prices, related enterprises have reduced recruitment, leading to a lack of confidence among some students in their majors and an increasing trend of students switching majors. However, in the long run, energy, as the economic lifeline supporting national welfare and the material foundation for human

survival, the promotion of energy production, and the construction of a clean, low-carbon, safe, and efficient energy system, remain constant themes in national development. Especially in recent years, with the increasing energy demand, China's oil and gas industry has entered an important period of opportunity, achieving significant results and continuously increasing the demand for related talents. Therefore, the ideological and political education in "Physical Geology" should aim to instill professional confidence in students and help them plan their long-term goals rationally.

Taking students majoring in Resource Exploration Engineering as an example, "Physical Geology" is their first major course after enrollment. For many of these students, this course represents their first introduction to the field of Earth sciences. Therefore, it is essential to help them build confidence in their chosen profession while teaching the course. For instance, when teaching chapters on introduction, rock types, tectonic movements, etc., instructors can integrate textbook content with the international situation of oil and gas exploration. They can analyze the current domestic and international development prospects, salary prospects, working environment, relative advantages and disadvantages of oil and gas companies, etc. This approach guides students to understand the characteristics and employment advantages of the profession, fostering a correct employment outlook that sees oil and gas exploration and development as a promising career path. By linking textbook content on rocks and tectonic activities with oil and gas exploration, instructors can extend discussions to students' future career planning. This approach can greatly stimulate students' interest, cultivate their geological thinking, instill confidence in the industry, and increase their love for and interest in the profession.

3.2. Scientific thinking

In the section on "Stratigraphic Contact Relationships," it's important to understand that the rock layers beneath our feet serve as a comprehensive record of Earth's history. Therefore, in the absence of any missing layers, the rock layers should exhibit standard continuity. This continuity can be likened to the unchangeable historical order seen in China over five thousand years, where each dynasty follows the previous one in a fixed sequence. However, unlike ancient history, which is recorded by humans over millennia, Earth's history is inscribed by nature over billions of years. This natural timescale introduces significant uncertainties, as factors such as tectonic movements or other geological processes can disrupt the continuity of rock layers. The discontinuity of stratigraphic ages serves as a window for exploring various geological issues.

The entire teaching process begins with allowing students to appreciate the unique geological landscape of the famous Colorado Grand Canyon. In the Grand Canyon, 25% of Earth's history has vanished - the rock layers no longer exist. Geological scientists at the time referred to this geological feature with missing ages as a great unconformity. This sets the stage for the main theme of the lesson: learning the basic classification and formation processes of unconformities, how to identify them, and discussing their significance in research. At the end of the class, the causes of the "unconformity" in the Colorado Grand Canyon are explained, followed by the presentation of two drastically different scientific research results regarding Snowball Earth. Students are encouraged to look up related references and critically choose the most scientifically sound viewpoint. Based on the

starkly different research results concerning the Colorado Grand Canyon, students are urged to cultivate habits of critical thinking, to dare to question and innovate, and not to let existing knowledge constrain their scientific creativity. They are reminded that scientific research is endless, and through thinking, debating, and innovating, they will continually approach the truth, which is the essence of scientific research.

3.3. Ecological civilization concept

In September 2020, China solemnly pledged at the United Nations General Assembly to strive to peak carbon dioxide emissions before 2030 and to achieve carbon neutrality by 2060. It is evident that vigorously promoting the construction of an ecological civilization is an important task for China's development in the new era. The latter part of "Physical Geology" discusses various unique geological phenomena formed under geological processes. These phenomena provide an opportunity for a profound understanding of the concept of ecological civilization. Therefore, teaching the concept of ecological civilization during the teaching process has unique advantages.

In the section on "Life Evolution and Geological Epochs," it's crucial to elucidate to students the coupling between life evolution and major geological events, emphasizing the significant contributions of the environment and climate in driving the process of biological transformation. By discussing the flourishing and extinction of ancient organisms such as dinosaurs, trilobites, and ammonites during different geological periods, we can explore the important impact of environmental changes on the future of humanity, thereby helping students understand the importance of environmental protection. In addition, when discussing natural landscapes such as rivers, karst landscapes, glaciers, oceans, lakes, and loess plateaus, we can use numerous examples of natural scenery to capture students' interest and cultivate their love for nature. Finally, in the section on "Gravity Geological Processes," by discussing common geological disasters such as landslides, collapses, and debris flows, we can use real-life negative examples to illustrate the severe consequences of violating natural laws and damaging the geological environment. This helps students recognize that the construction of an ecological civilization is a prerequisite and foundation for the sustainable development of human society, thereby helping them establish the concept of ecological civilization.

4. Conclusion

In the course of "Physical Geology" there are rich ideological and political elements such as scientific thinking and ecological civilization concepts. By introducing examples and expanding comparisons, integrating ideological and political education into the professional content helps guide students to consciously embrace ideological and political concepts while mastering the knowledge system of the course. This fosters a scientific mindset that is brave in questioning and innovative, and instills in students the concept of ecological civilization. Ultimately, this approach achieves the goal of nurturing qualified geologists for the new era.

References

- [1] J.J. Feng: The Chinese Answer to "What, How and for Whom to Cultivate", *Educational Research and Experiment*, vol. 4 (2021), 1-10.
- [2] C.Y. Luan, J. Bai: The Original Contribution of "What Kind of People to Cultivate, How to Cultivate People, and for Whom to Cultivate People", *Journal of Tianjin University(Social Sciences)*, vol. 24 (2022), 223-229.
- [3] D.Y. Jiang: Crossover, integration and reconstruction: three characteristics of vocational education as a education type—the learning experience of National Vocational Education Reform Implementation Plan, *Chinese Vocational and Technical Education*, vol. 7 (2019), 223-229.
- [4] D. Li, C.L. Zhao, Z.Q. Zhu, et al. Construction of Multi-dimensional Ideological Education in Curriculum System for the Course of Energy Geology, *Chinese Geological Education*, vol. 32 (2023), 75-78.
- [5] L.M. Lin, J.H. Zhao, and L.Q. Zhang: Design and Implementation of Ideological Education in Curriculum of the Course of Unconventional Oil and Gas Geology Under Engineering Education Accreditation, *Chinese Geological Education*, vol. 32 (2023), 79-82.
- [6] X.L. Teng, Y.X. Jiang, D.A. Zhao, et al. Exploration on the training path of top-notch innovative talents in geology under the background of in-depth integration of innovation and entrepreneurship education and speciality education, *Journal of Innovation and Entrepreneurship Education*, vol. 14 (2023), 151-156.
- [7] C. Wang, Y.X. Zhang: Implementation Pathway and Policy System of Carbon Neutrality Vision, *Chinese Journal of Environmental Management*, vol. 12 (2020), 58-64.
- [8] A.G. Hu: China's Goal of Achieving Carbon Peak by 2030 and Its Main Approaches, *Journal of Beijing University of Technology(Social Sciences Edition)*, vol. 21 (2021), 1-15.
- [9] Y. Fang, W.Y. Zhang, J.W. Cao, et al. Analysis on the Current Situation and Development Trend of Energy Resources in China, *Conservation and Utilization of Mineral Resources*, vol. 4 (2018), 34-42.