



Reform Exploration on Improving Students' Application Ability through Project-Based Teaching Integrating Ideology and Politics

Take the Case of "Planning and Design of Nature Reserve" as An Example

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Abstract. The construction of ideological and political education in college courses is a strategic measure aimed at fulfilling the fundamental task of cultivating with integrity. It is imperative for colleges and universities to seamlessly integrate ideological and political education into all aspects of their educational programs, thereby achieving comprehensive education. Project-based teaching design with ideological guidance provides a new teaching reform idea for the integration of professional education and course ideological and political education. This study takes the protection measures for biodiversity in "natural reserve construction" as one of the entry points in the course of "Conservation Biology" to design a project-based teaching unit of ideological and political integration for "Planning and Design of Natural Reserve". Through the course implementation, students have mastered the theory and significance of natural reserve construction and have the ability to design and renovate natural reserves. The ideological and political integration of project-based teaching reform exploration in this study is successful and deserves further promotion.

Keywords: ideological and political integration; project-based teaching; biodiversity conservation

1 Introduction

The National Conference on Higher Education Ideological and Political Work, held in December 2016, emphasized the fundamental issue of higher education ideological and political work: the question of what kind of people colleges and universities should cultivate, how they should be cultivated, and for whom they should be cultivated. It further stressed that higher education institutions should adhere to the principle of cultivating individuals with integrity and morality as the central focus, integrating

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ideological and political work into all aspects of education and teaching to achieve comprehensive education. In December 2017, the Ministry of Education issued the Implementation Plan for Enhancing the Quality of Ideological and Political Work in Colleges and Universities. This plan called for a vigorous push for curriculum-based teaching reforms with the goal of promoting ideological and political education, refining teaching designs, strengthening teaching management, identifying ideological and political education elements within specialized courses, integrating them into all aspects of classroom teaching, thus achieving an organic unity between ideological and political education with knowledge system education. On September 18, 2019, the major national strategy of ecological protection and high-quality development of the Yellow River was proposed. In June 2020, the Ministry of Education issued the Guidelines for Course Ideological and Political Education in Colleges and Universities, requiring a comprehensive review of course content, integration of different courses' characteristics, modes of thinking, and value concepts into ideological and political education elements to achieve an organic integration with course teaching for subtle educational effects. The 19th CPC Central Committee's Sixth Plenary Session summarized the great achievements of the new era, including the construction of ecological civilization. In February 2022, "The ecological protection and high-quality development of the Yellow River basin in Shandong" was officially released. In April 2023, Shandong deployed key tasks for ecological protection and governance of the Yellow River.

In this context, there is an urgent need to cultivate talents with high moral standards and strong professional skills for the construction of ecological civilization in the new era. This is also a pressing requirement for the planning of ecological protection and high-quality development in the Yellow River region of Shandong Province.

And the "Conservation Biology" course possesses its own knowledge system for ideological and political education, offering unique advantages in addressing the current needs for biodiversity conservation and ecological civilization construction [1].

Conservation Biology is a discipline that focuses on the protection of biodiversity. The course content covers topics such as biodiversity, threats to biodiversity, species and population-level protection, ecosystem and landscape-level protection and restoration, and the challenges of sustainable development. In response to these teaching contents, an increasing number of universities and educators are placing emphasis on course construction and reforming teaching methods. For instance, Shandong Agricultural University utilizes case teaching methods to enhance students' learning in the "Conservation Biology" course by improving their ability to analyze and solve problems through typical cases and social hotspot cases [2]. Northeast Normal University, Sun Yat-sen University, and other institutions have carried out explorations in the construction of ideological and political education in courses related to "Conservation Biology" [1,3]. Anhui University has provided the teaching effect of "Conservation Biology" course by constructing a hybrid teaching model of "online + offline" [4]. Similarly, Ningxia University edits and compiles videos aligned with ecological civilization content in order to stimulate students' interest in the course [5].

However, "Conservation Biology" is currently primarily a theoretical course in most universities that offer it. This presents a challenge as students are unable to improve their practical application abilities through fieldwork and hands-on experience, similar

to the achievements of ecological civilization construction which relies on the display of beautiful mountains and rivers. Therefore, enhancing the integration of theory and practice and conducting effective practical operations to promote students' understanding and application of knowledge is crucial for assisting biodiversity conservation, ecological civilization construction, and sustainable development. Project-based teaching emphasizes the development of students' abilities. The project-based design of course content can not only enhance students' autonomous learning ability, knowledge application ability, and teamwork skills but also fully integrate industry, teaching, and research. This integration enhances students' practical operational ability to link theory with practice [6-9].

Driven by the need to integrate ideological education and enhance practical skills, this study combines current content on ecological civilization construction, the ecological protection and high-quality development of the Yellow River, and the course material of "Conservation Biology" focusing on biodiversity conservation measures. One such measure is the establishment of nature reserves. The study employs a project-based teaching approach with ideological elements as its guiding principle and "Planning and Design of Nature Reserve " as its core knowledge chain. This initiative aims to offer a new reform concept for integrating ideology into project-based teaching.

2 Design and Analysis of Project-Based Teaching Cases

This exploratory case study aims to integrate theoretical content from the "Establishment and Management of Nature Reserves" chapter in the textbook of "Conservation Biology" with practical applications.

Global climate change is one of the most pressing challenges facing human society today, and it is causing unprecedented and rapid changes to the natural environment and ecosystems of the Earth. Biodiversity, which forms the foundation of life on Earth and represents nature's most precious wealth, not only sustains human society but also directly impacts the ecological balance and future of our planet. Therefore, in the context of global climate change, protecting biodiversity is particularly crucial.

There are several key methods for safeguarding biodiversity, including in situ conservation, ex situ conservation, utilization of scientific and technological approaches, establishment of political and economic legal frameworks, public education and awareness campaigns, as well as prevention of invasive species [10]. These diverse forms of biodiversity protection give rise to a multitude of national, regional, and industry-specific needs.

For instance, activities include the establishment and administration of national parks, nature reserves, zoos, and botanical gardens; land and resource surveys; biodiversity surveys; prevention of invasive species; construction of scientific resources; development of salt-alkali land treatment; various forms of ecological restoration; carbon trading; blue carbon industry development; medicinal and edible agricultural product development; biological herbicides. Additionally, there are derivative national, regional, and industry needs such as the production of biological fertilizers, biological pesticides, and biological control agents.

The primary theoretical focus chosen by this research institute, "the establishment and management of nature reserves," pertains to the method of in-situ conservation [10]. In-situ conservation, with its most typical form being the establishment of nature reserves (a type of national park), is a highly effective approach for safeguarding biodiversity. The design concept for this project is illustrated in Fig.1. Conservation biology is currently a purely theoretical course with no practical application component. A project-based design can improve students' ability to apply theory to practice. At the same time, although the course itself contains ecological conservation ideas, its direct support for the construction of a beautiful China needs to be guided by cases and explanations. Therefore, this ideological integration project-based design has carried out a suitable teaching reform exploration for the current course's pain points.

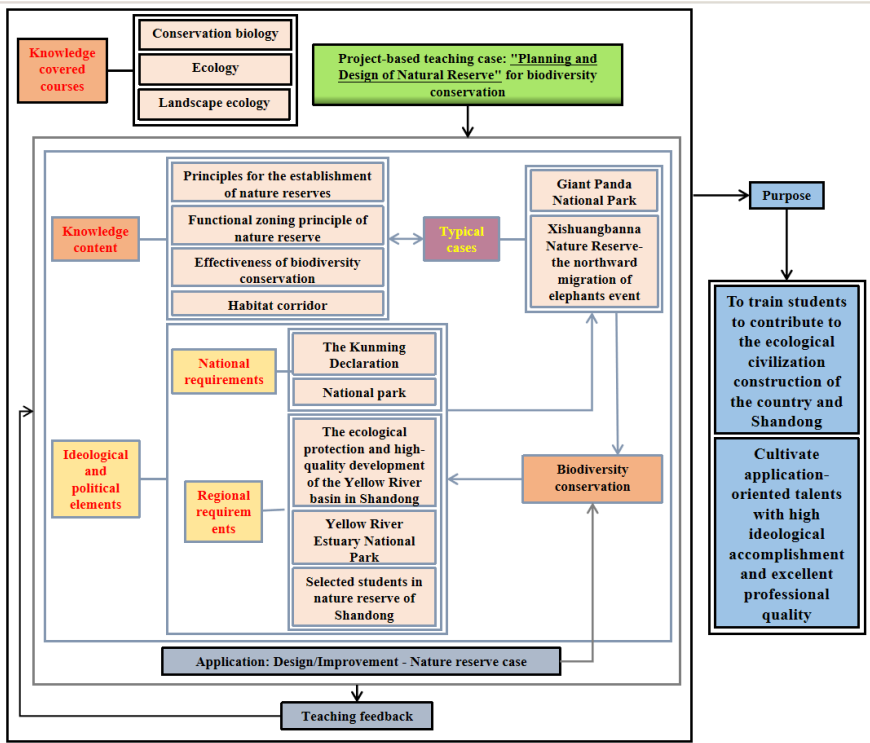


Fig. 1. A Project-based Teaching Case Design for Integrating Ideological and Political Education

According to Fig.1, the initial step in the process of educational reform involves analyzing the ideological and political education elements inherent in the course content. This analysis begins by considering national (such as China's official announcement of the establishment of the first five national parks in 2021, and the adoption of the Kunming Declaration at the 15th Conference of the Parties to the United Nations Convention on Biological Diversity) and Shandong (including initiatives such as "The ecological

protection and high-quality development of the Yellow River basin in Shandong", Yellow River Estuary National Park, Selected students in nature reserve of Shandong) needs. The focus is on designing/remodeling a specific nature reserve with practical operational skills as a project-based teaching goal. The project-based teaching design integrates ideological and political elements, course knowledge (including the principles of establishing nature reserves, the functional zoning of nature reserves, the main objectives of biodiversity conservation, the ecological characteristics of species, and the theoretical basis of biodiversity conservation), expanded knowledge (such as the maintenance of genetic diversity), and national exemplary cases (such as Giant Panda National Park and Xishuangbanna Nature Reserve - the northward migration of elephants event) to provide a more comprehensive understanding of China's biodiversity conservation achievements. The guiding principle throughout the entire teaching process is for ideological and political content to serve as a thread running through it all, ultimately achieving the national, regional, and school's training objectives.

In the operational phase of the project - "Planning and Design of Natural Reserve" (Fig.2), students can analyze the hierarchical relationship (a national park is a type of natural reserve) to understand specific requirements for nature reserve design based on principles (theory of island bio-geography), purpose, and significance of nature reserve construction. This will guide students in planning and functional zoning of nature reserves using available information. After the completion of the preliminary design, the course will conduct an analysis and summary of the advantages and disadvantages of three types of protected area designs as examples. These include shapes and functions that meet the requirements, shapes that do not meet the requirements but have good function implementation, and shapes and functions that are both lacking. Additionally, students will be provided with specified information about previously designed areas, including location, main protected objects, reserve area, official internal planning/visitor map, etc.

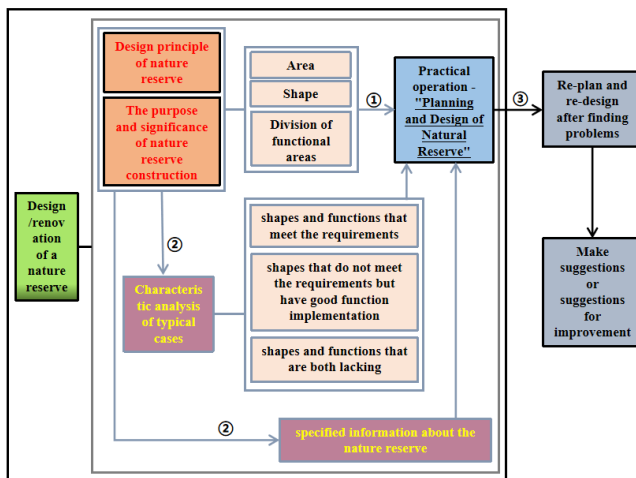


Fig. 2. Design Diagram for the Practical Operation Section

After analyzing and explaining the above materials, guide the students to further enhance and adjust the planning and functional division maps of the nature reserve in accordance with the purpose and significance of nature reserve construction. Subsequently, based on the actual situation, provide practical suggestions or opinions for improving the current nature reserve construction and management.

3 Student Evaluation of the Operation of Project-Based Teaching Projects

During the implementation of this teaching reform project, students were required to possess a strong foundation in theoretical knowledge, encompassing multiple courses. Furthermore, they were expected to demonstrate an understanding and practical application of this knowledge. As a result, the project-based teaching design not only enhanced students' ability to connect theory with practice but also fostered their teamwork and creative thinking skills in exploring solutions. Additionally, the project integrated ideological and political education related to national and regional needs into the exploration of theories, enabling students to comprehend the significance of ecological civilization while honing their application skills. Through case studies, students also acquired practical ways and methods for implementing ecological civilization.

After the project was implemented, a survey and evaluation were conducted on various aspects including the overall design of the project, knowledge objectives, ability objectives, and quality objectives for students. The results are presented in Fig.3 - Fig.5. Three questionnaires were designed, including those for course design and participation evaluation, frontier and practicality evaluation of courses, and evaluation of teachers' teaching. They were distributed to multiple grades (including Grade 2019-2022) and multiple majors (such as Environmental Ecology and Engineering, Resource Recycling Science and Engineering, Remote Sensing Science and Technology, Agricultural and Forestry Economic Management, Artificial Intelligence, and Food Quality and Safety) to collect effective questionnaires from 43-72.

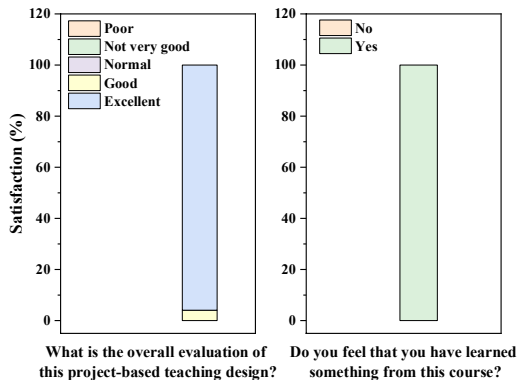


Fig. 3. The results of the overall evaluation of project-based instructional design and course operation

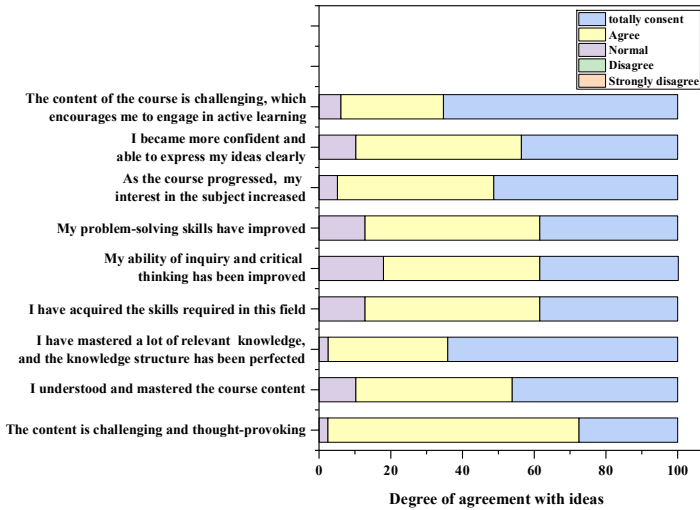


Fig. 4. Evaluation results related to the achievement of knowledge objectives and competence objectives

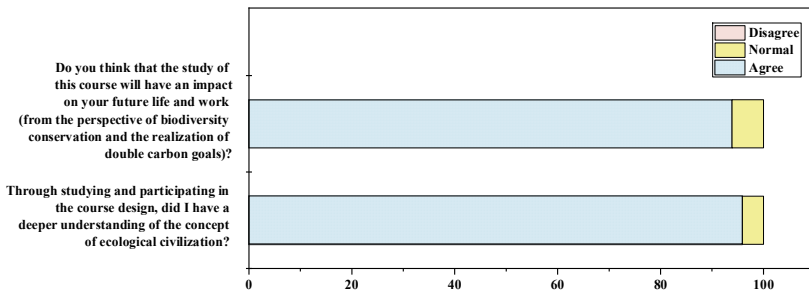


Fig. 5. The evaluation results of the achievement of quality goals

The analysis of the questionnaire (Figure 3-5) indicates that students are generally satisfied with the design of the project-based teaching approach, with over 80% of students expressing satisfaction on various issues. This approach effectively integrates relevant theories and practices, while also equipping students with the ability to contribute to ecological civilization construction in line with current national and regional needs.

4 Conclusion

The successful implementation of this project-based case study seamlessly integrates ideological and political elements from national and regional needs into the curriculum, while effectively combining theory and practice to enhance students' practical abilities and teamwork skills. Throughout their learning and practice process, students achieve

the knowledge, ability, and quality goals set for the course. Therefore, the exploration of ideological and political integration in project-based teaching reform is deemed successful and worthy of further promotion.

Acknowledgments

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