

# Teaching Reform and Practice of Ecological Engineering Course

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**Abstract:** In recent years, environmental problems have attracted much attention. As an important teaching content of environmental discipline, ecological restoration engineering course will provide reference for teaching reform and practice from the aspects of course design, practice innovation and scientific research exploration in order to improve teaching quality, explore teaching methods, optimize teaching content and cultivate students' innovative ability, practical ability and scientific research ability.

## 1. Introduction

Since the 21st century, the global population has increased rapidly, and the social and economic development of human beings has become more and more rapid, which makes the influence of human social behavior on the earth increasingly serious, and the environmental problems faced by nature become more and more prominent. Scientists predict that the global greenhouse gas emissions will increase by 25%-90% from 2000 to 2030, which will lead to the global temperature rising by 0.2°C every 10 years. Over-cultivation, overgrazing and deforestation of human beings make the land barren, vegetation destroyed and soil erosion serious, which aggravates the threat of desertification to human beings. In the past, people paid attention to environmental problems, mainly because environmental pollution would have an impact on human health. At present, the global environmental problems, such as climate warming, air pollution, marine pollution and forest degradation, have far exceeded the scope and extent of the past, and have affected the survival and development of human beings. Therefore, facing the current complex and serious environmental problems, as an important course of environmental science, it is of great significance for ecological restoration project to carry out teaching reform, improve teaching quality and cultivate innovative talents.

## 2. Course Purpose of Ecological Engineering

### 2.1 Clear Teaching Objectives

Teaching research and exploration should be carried out based on the cultivation of high-skilled professionals in ecological civilization construction, hoping to cultivate all-round high-quality students based on the development of ecological civilization construction industry[1]. Experiment is an important practical link for colleges and universities to cultivate high-quality qualified talents. Virtual teaching is to make use of virtual technology to visualize teaching scenes that are difficult to understand, and to improve students' participation, so that boring tables, numbers and programs, installation processes, etc. become vivid and interesting. At the same time, virtual experiments can connect several knowledge points in series, and play a role in summarizing and systematizing[2].

“Ecological restoration” is to stop human interference on the ecosystem, reduce the load pressure, and make use of the self-recovery ability of the ecosystem, supplemented by artificial measures, so that the damaged ecosystem can be gradually restored or the ecosystem can develop in a virtuous circle[3]. Students are required to know not only the environmental investigation and detection of soil pollution, but also the process of water pollution remediation industry, and even the specific details of each remediation process and maintenance[4]. Virtual experiment teaching

plays an irreplaceable role in stimulating students' learning interest, thirst for knowledge and practice, and improving students' learning ability, application ability, innovation ability, research ability and comprehensive quality. At present, it has been highly valued by the National Laboratory Construction Steering Committee and other relevant departments[5]. The teaching of “Ecological Restoration Technology” is devoted to training students to use various technical means to repair, regulate, rebuild and manage the damaged environment from the perspective of ecosystem, so as to make it close to the natural ecosystem; Enhance students' understanding of the application and engineering of ecological environment restoration technology, and have basic skills in the field of ecological restoration technology.

## **2.2 According to the Post Design Teaching Plan**

The ecological restoration project is to better improve the environmental problems. Most of the relevant graduates are engaged in related positions after graduation. Teachers can start with the positions of students majoring in this course, analyze the characteristics of each position, and carry out targeted teaching in class to change the situation of blind class attendance[6]. Enterprises need professional and technical personnel with practical ability, but some ecological projects may take years or even decades to see results from construction. It is almost impossible for young students to have practical experience in this field[7]. Only virtual technology can make students understand the construction process in a short time and meet the technical requirements of enterprises for students[8]. Through the reconstruction and planning of the curriculum, the curriculum reform will take the spirit of the 19th National Congress as the main line, and focus on the ideological and political points such as “ecological civilization” and “green mountains and green waters” to find the point of convergence with the curriculum teaching, refine the ideological and political education elements and functions contained in the curriculum, and vividly integrate them into all teaching links in a seamless and organic way.

Enterprises need talents with simulation technology to provide customers with visual construction results. The application of simulation technology has practical significance for launching new products in time, shortening development cycle, saving cost and improving project quality[9]. Through the research and practice of the teaching reform of the course, students' sense of responsibility for ecological environmental protection and their basic quality and ability to engage in scientific research are cultivated, so that they can realize the significance of pollution control and ecological restoration to China's environmental protection, agricultural production, ecological civilization construction and sustainable development. Relying on majors, they can inspire students' consciousness and sense of responsibility to work hard to realize the Chinese nation's great rejuvenation of the Chinese dream, and guard their initial heart of unremitting struggle to safeguard the country's “green mountains”[10]. Simulation teaching makes it possible to complete the experimental contents that are difficult to complete in reality. If the virtual project construction of ecological restoration and ecological engineering is introduced into the simulation courseware, students' interest will be greatly increased, and they can learn the process and method of actual engineering construction, so as to realize the integration of teaching content with the needs of enterprises.

## **3. Ecological Engineering Course**

### **3.1 The Background of the Course**

With the development of ecological civilization construction and the demand for talents, especially with the rapid changes in ecological conditions and the urgent needs of the society for the cultivation of innovative talents, increasing the curriculum teaching and teaching quality in the field of environmental ecology is the current curriculum management in major universities. It is also the need to improve the comprehensive scientific literacy of life science students[11]. Cultivating students' ability to solve practical problems of environmental remediation is the key goal of our school's environmental engineering syllabus[12]. Combined with the whereabouts of environmental

engineering graduates and the nature of the division of labor, the environmental engineering talent training program is constructed according to “application-oriented” and “innovative-oriented” to meet the different requirements for talents in southern China. Environmental pollution poses a serious threat to the survival and development of human beings, and has attracted strong attention from all over the world. Therefore, it is particularly important to control, restore and restore the polluted ecological environment. There is no complete teaching material for the “Ecological Restoration Engineering Course” course. The existing teaching materials are selected and compiled by the teachers of the course, which lacks systematicness and is not conducive to students' overall mastery of the professional knowledge of the course. Based on the course system of water pollution control for environmental engineering majors, avoid duplication of teaching with other courses. Therefore, aiming at the cultivation of students' innovative ability, according to the positioning and training objectives of professional courses, and social service-oriented, the course content is reconstructed. Facing the continuous evolution of ecological and environmental problems, “ecological restoration technology” is constantly improving and updating, and the country is also promoting the concept of “ecological outlook” in due course. In recent years, we have tried the course setting, teaching content and teaching methods of soil management and ecological restoration course. This course is a highly practical subject, and it is difficult to achieve the teaching objectives through a single teaching method. Therefore, a variety of course contents and forms are a better choice to break through the limitations of experiments. The ecological restoration of the Yellow River Basin is shown in Figure 1.



Fig.1 Ecological Restoration of the Yellow River Basin

At present, some of the teaching video materials overuse the sensory stimulation of “sound, light and electricity”, while others have too much text content, which easily causes students' visual fatigue. There are few optional textbooks of ecological restoration technology at home and abroad. Our school tries its best to meet the requirements of the syllabus, and the content of the selected textbooks is slightly thin, with less integration of ideological and political points. At the same time, it lacks the latest case analysis and summary at home and abroad. The research of soil remediation technology in China started late, because of the diversity of soil types under natural conditions, the imbalance of regional development for a long time, the high complexity of the characteristics and types of contaminated sites, and the diversity of technical requirements. Due to the large amount of information in the course content, and the teaching mode of teachers' lectures and students' listening at the same time, it is easy to cause students' thoughts to slip away and fail to keep up with teachers' lectures. The goal and main task of this course is to let students know and be familiar with the treatment methods and application of soil pollution, and to improve their awareness of ecological harmony and environmental protection. To lay a good professional foundation for future work in pollution control and ecological protection. Keep up with the pace of the times, constantly update the theoretical and practical points in the course explanation process, constantly update the restoration technology, and always keep the advanced content of the explanation.

### 3.2 Course Teaching Optimization

The most important part of the lecture is to introduce the rise and development of soil pollution control; related definitions of soil pollution, including soil environmental background value,

environmental capacity, types of soil pollutants and pollution sources. Curriculum construction is an important measure to achieve the goal of talent training, which directly affects the teaching level and talent training quality of colleges and universities. Optimize teaching resources and strengthen students' ability to solve practical ecological restoration engineering problems. Take students as the main body, make full use of the “Internet +” contemporary educational means, and stimulate students' enthusiasm for spontaneous learning. Ecological restoration technology is an engineering application course, which needs to improve students' ability to solve practical problems through a large number of case studies. The existing textbooks mainly focus on repairing principles and techniques. Although some cases are included, they are relatively outdated, and most of them are descriptions for one section, which are not conducive to the cultivation of students' systematic thinking. When explaining different restoration technologies, it should be pointed out that ecological restoration technology emphasizes the subjective initiative of human subjects, exerts human scientific intervention methods, and realizes the optimization and restoration of damaged ecosystems as soon as possible, so as to maximize the service of the entire human society. Concept, highlighting such a macro concept and thinking, the ultimate goal is to require people to continue to carry out technological innovation.

The idea of sustainable development with the basic theory of ecology as the core plays an increasingly important role in coordinating the relationship between man and nature and protecting national ecological security. In order to ensure the teaching effect and improve the teaching quality, the teaching team of the “Ecological Restoration Engineering Course” course has carried out all-round exploration and research in terms of teaching content, teaching methods, textbook construction, and course assessment, and strives to allow students within the limited class hours. As much as possible to absorb, digest and master the theoretical knowledge of soil health and restoration, improve students' innovation ability and scientific research ability, and cultivate students' interest in learning and self-learning ability. Learning the course of ecological restoration engineering is to strive to protect the ecological environment on which people live and the beautiful “home” where people live, so as to realize the sustainable and healthy development of the country. Through a series of studies, students can think about the sustainable development of the environment and human society. To develop the relationship, guide students to establish a sense of responsibility and mission to protect the environment, and have the feeling of “loving home and patriotism”. Expand the practice methods and cultivate students' engineering practice ability and innovation ability. In all aspects of student training, engineering schools have the advantages of environmental engineering disciplines and enterprises have industrial technology advantages. The two sides combine to give full play to the financial advantages of the enterprise, unite multiple teams, and use the technology research and development and practice talent training platform. The teaching system is an extremely important factor to achieve the goal of talent training. A good teaching system not only contains basic professional knowledge and skills, but also creates more favorable conditions for students' innovative consciousness and innovative thinking ability, ability to analyze and solve problems, ability to work independently and tenacious will and perseverance. In view of the fact that there are few examples of teaching materials, rapid changes in social needs, the emergence of new theories and methods in the industry, and the integration and development of disciplines, the latest scientific research achievements in the scientific community are introduced into teaching, so that “research” is “used” for teaching. Ecological restoration engineering education is also the ideological guarantee for the smooth progress of China's ecological civilization construction. To eliminate the ecological environment crisis and restore the damaged ecological environment, it is necessary to continuously correct people's ideas and behaviors through ecological environment ideological and political education and restoration technology, and cultivate national awareness of ecological and environmental protection, and build an ecological civilization.

#### **4. Conclusions**

Facing the 21st century, global environmental problems are becoming increasingly prominent, and soil pollution and protection, treatment and agricultural product safety are bound to be put on

the agenda. Soil remediation and ecological restoration is a theoretical course with strong practicality. Schools can improve students' ability to analyze problems in soil remediation and ecological restoration, propose solutions and innovate by timely updating the teaching contents of the technical part of the teaching content, strengthening the construction of teaching teams and using local resources to improve the teaching effect. With the further development of economic globalization, ecological and environmental problems are constantly developing. The emergence and appearance of new problems will all involve national life, national interests and even national security, but we can certainly overcome them. Schools should constantly update scientific and reasonable teaching objectives, optimize teaching contents and establish an effective curriculum system. Through teaching exploration, the school has strengthened students' mastery of theoretical knowledge, improved their practical ability, and continuously improved the teaching effect of this course.

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