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Integrating Green and Low-Carbon Education into the Reform and Practice of the "ERP Sand Table Competition Simulation" Course

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Abstract

With the deepening of the "Dual Carbon" strategy, cultivating high-quality talents with green and low-carbon concepts and sustainable management capabilities has become an urgent task for higher education. The "ERP Sand Table Competition Simulation," as a practical course in economics and management, traditionally focuses on enterprise resource planning and market competition but seldom involves environmental costs and social responsibility. This paper aims to explore the theoretical framework, practical paths, and effectiveness evaluation of systematically integrating green and low-carbon education into this course. Through reforming course rules, introducing a carbon trading mechanism, optimizing green decision-making scenarios, and constructing a diversified evaluation system, the synergistic cultivation of business decision-making ability and low-carbon development awareness is achieved, establishing a teaching model that balances economic and environmental benefits. Research shows that after the reform, students' carbon literacy and sustainable decision-making abilities have significantly improved, providing a valuable practical example for the green transformation of new liberal arts courses.

Keywords

Green and Low-Carbon; ERP Sand Table; Course Reform; Teaching Practice.

1. Research Background

In 2020, China clearly proposed the strategic goals of "peaking carbon emissions before 2030 and achieving carbon neutrality before 2060." The "Dual Carbon" concept has been deeply integrated into all fields of economic and social development, promoting the transformation of enterprises from traditional extensive operations to green and sustainable development. In April 2022, a document issued by the Ministry of Education pointed out that the Party Central Committee's decisions and deployments regarding carbon peaking and carbon neutrality should be incorporated into the work system of higher education institutions, and green and low-carbon development should be integrated into the national education system, fully integrated into all levels and fields of national education. The goal is to cultivate a new generation of youth who practice green and low-carbon concepts, adapt to a green and low-carbon society, and lead green and low-carbon development, leveraging the functions of the education system in talent cultivation, scientific research, social service, and cultural heritage, to make unique contributions from the education sector towards achieving the carbon peaking and carbon neutrality goals. By 2030, the aim is to achieve the systematic development and formation of students' green and low-carbon lifestyles and behavioral habits, form a relatively comprehensive multi-level educational system for green and low-carbon concepts that runs through the entire process of youth growth, and establish a number of internationally

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influential and authoritative first-class disciplines, majors, and research institutions related to carbon peaking and carbon neutrality[1].

2. Research Significance

2.1. Theoretical Significance

Breaking through the theoretical boundaries of traditional ERP sand table teaching, this research designs a complete and replicable "Green ERP" teaching model, transforming abstract sustainable development concepts into specific course rules, decision variables, and evaluation indicators. It constructs a teaching theoretical framework integrating "business decision-making and low-carbon management," enriches interdisciplinary research achievements in green education and liberal arts practical courses, explores effective paths for cultivating compound talents who understand both business management and environmental responsibility, and provides theoretical support for similar course reforms.

2.2. Practical Significance

By reforming course content and operational rules, this research addresses the problem of integrating green and low-carbon concepts with practical teaching, enhancing students' ability to make green decisions in real business scenarios. It enables students to be exposed to and master cutting-edge knowledge and skills such as carbon asset management and environmental cost accounting during their academic studies, giving them unique green competitiveness in the job market and supplying enterprises with application-oriented talents possessing carbon literacy[2].

3. Necessity of Course Reform

3.1. Demands of Social Development

As global attention to environmental protection and sustainable development continues to increase, green and low-carbon practices have become an inevitable trend for enterprise development. Enterprises need to fully consider factors such as resource conservation and environmental protection in their production and operation processes to achieve a win-win situation for both economic and environmental benefits. Therefore, cultivating talents with green and low-carbon awareness and capabilities is an inevitable choice to meet the demands of social development[3].

3.2. Requirements for Talent Cultivation

Modern enterprises require talents who not only possess solid professional knowledge and skills but also have a strong sense of social responsibility and sustainable development awareness. Integrating green and low-carbon education into the "ERP Sand Table Competition Simulation" course can cultivate students' green and low-carbon thinking, enabling them to fully consider environmental factors during the simulated enterprise operation process, thereby improving their comprehensive quality and social adaptability.

3.3. Improvement of the Course Itself

The traditional "ERP Sand Table Competition Simulation" course has certain limitations in teaching content and methods, lacking the embodiment of the green and low-carbon development concept. Integrating green and low-carbon education into this course can enrich the course content, innovate teaching methods, make the course more relevant to reality, and improve the teaching quality and practicality of the course.

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4. Course Reform Content

4.1. Course Overview

The "ERP Sand Table Competition Simulation" course is a comprehensive practical training course widely offered in economics and management majors in domestic and foreign universities. This course uses physical sand table teaching aids and electronic sand tables to simulate the operation of an enterprise, constructing a simulated enterprise environment. Various functional centers cover all key links of enterprise operation, including marketing and planning centers, production centers, logistics centers, and financial centers. Students assume the role of enterprise managers and enter the scenario, simulating the complete operation process of an enterprise over several years. Through a series of activities such as market analysis, strategy formulation, marketing planning, production organization, and financial management, students cultivate team spirit and comprehensively enhance their management capabilities through simulated enterprise operations. Through competitive confrontation, students deeply understand the strategy and tactics of enterprise resource planning, achieve effective allocation and coordination of enterprise resources, and gain practical experience in the management process of enterprise resources.

The traditional ERP sand table course model is mainly built on the logic of the industrial economy era, with its core goal being the maximization of shareholder interests. The traditional "ERP Sand Table Competition Simulation" course focuses on the pursuit of enterprise economic benefits, with decisions concentrated on traditional factors such as market, production, finance, and logistics, while excluding the external environmental costs generated by production and operation activities from the decision-making system. This leads to a disconnect between the decision-making thinking formed by students in the simulation and the green, low-carbon, and circular development concepts currently vigorously promoted in China.

4.2. Course Reform Objectives

(1) Cultivate students' green and low-carbon awareness and abilities

As global attention to environmental protection and sustainable development continues to increase, green and low-carbon practices have become an inevitable trend for enterprise development. Enterprises need to fully consider factors such as resource conservation and environmental protection in their production and operation processes to achieve a win-win situation for both economic and environmental benefits. Therefore, cultivating talents with green and low-carbon awareness and capabilities, establishing green and low-carbon values, integrating green and low-carbon elements into course teaching and textbooks, and strengthening students' sense of responsibility for low-carbon environmental protection are inevitable choices to meet the demands of social development.

(2) Promote the construction of a green and low-carbon curriculum system

The traditional "ERP Sand Table Competition Simulation" course has certain limitations in teaching content and methods, lacking the embodiment of the green and low-carbon development concept. Integrating green and low-carbon education into this course can enrich the course content, innovate teaching methods, make the course more relevant to reality, and improve the teaching quality and practicality of the course. It promotes the deep integration of enterprise information technology and education teaching, implements the combination of "industry-academia-research," strengthens the cultivation of green and low-carbon talents, promotes a new development model integrating disciplinary courses and enterprise technology, improves the education and training system, and deepens the integration of industry and education.

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4.3. Course Reform Content

(1) Adjusting Course Objectives

The core objective of the course is to cultivate students' management ability, teamwork ability, and decision-making ability through simulating enterprise operations. On the basis of the original course objectives, green and low-carbon objectives are added, further expanding the course objectives to include cultivating students' sustainable development concepts and green and low-carbon awareness. Students are required not only to master the basic principles and methods of enterprise resource planning and possess the ability for enterprise operation and management but also to establish a green and low-carbon development concept, understand green and low-carbon policies and regulations, master knowledge and skills in green production, green marketing, etc., and be able to fully consider green and low-carbon factors in enterprise operation decisions.

By simulating how enterprises optimize resource utilization, reduce carbon emissions, and improve energy efficiency in the production process, students can understand the importance of green and low-carbon practices and master related management strategies. Through learning, students can fully understand the significance of carbon peaking and carbon neutrality, profoundly grasp their importance, master relevant theoretical knowledge, lay the foundation for subsequent learning and practice, and cultivate basic knowledge and recognition of the importance of carbon peaking.

(2) Optimizing Teaching Content

① Adding Green and Low-Carbon Knowledge Modules: Divide the course content into five modules: green procurement, green production, green marketing, green logistics, and green recycling. Students simulate operating a Chinese manufacturing enterprise, learning green and low-carbon knowledge and conducting simulated operations throughout the entire process of enterprise management. Introduce theoretical knowledge related to green and low-carbon, such as sustainable development theory, circular economy theory, carbon footprint, etc., into the course, allowing students to understand how to achieve low-carbon and environmental protection in the supply chain and comprehend the connotation and importance of green and low-carbon development.

② Integrating Green and Low-Carbon Cases: Collect and organize successful cases of domestic and foreign enterprises in green and low-carbon transformation, integrating them into the sand table simulation teaching. For example, introduce the experiences of some enterprises achieving green and low-carbon development through adopting energy-saving technologies and implementing green supply chain management, allowing students to learn from them.

③ Designing Green and Low-Carbon Operation Rules:

1) Set up a dedicated energy management and energy conservation/emission reduction module, allowing students to analyze waste problems in enterprise energy use and propose improvement plans for energy conservation and emission reduction.2) Add green and low-carbon indicators to the sand table simulation rules, such as carbon emissions, energy consumption, waste treatment rate, etc., and incorporate them into the enterprise's operational performance evaluation system. In the process of simulating enterprise operations, students need to comprehensively consider economic and environmental benefits and formulate green and low-carbon development strategies[4].3) Circular Economy Model: Guide students to explore how to optimize the recycling of enterprise resources and reduce resource waste through circular economy models.

(3) Innovating Teaching Methods and Means

① Project-Based Learning: Use green and low-carbon projects as carriers to organize students for group cooperative learning. For example, have students simulate undertaking a green and low-carbon transformation project for a Chinese manufacturing enterprise, participating in the

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entire process from project planning, scheme formulation to implementation evaluation, cultivating their teamwork ability and problem-solving skills in practical situations.

② Scenario Simulation Teaching:1) Design case scenarios related to green and low-carbon, allowing students to play different roles, such as head of the environmental protection department, environmental regulator, etc., and solve practical problems in the simulation.2) Set different green and low-carbon scenarios, such as the government introducing strict environmental policies, increased market demand for green products, etc., allowing students to make decisions in simulated scenarios, enhancing their ability to cope with complex environmental changes.

③ Blended Online and Offline Teaching: Utilize online teaching platforms to provide rich teaching resources, such as teaching videos, online tests, discussion forums, etc. Students can conduct self-directed learning before class, engage in group discussions and practical operations in class, and conduct review and extended learning after class, improving learning outcomes.

(4) Improving the Course Evaluation System

① Establishing Diversified Evaluation Indicators: Add green and low-carbon related assessment indicators to the evaluation system. In addition to traditional enterprise operation performance indicators, include green and low-carbon evaluation indicators, such as green technology innovation achievements, green brand building, fulfillment of green social responsibility, etc. Use a combination of teacher evaluation, student self-assessment, and peer assessment to comprehensively evaluate students' learning outcomes and examine how students reflect green and low-carbon concepts in the simulation process (Table 1).

Table 1. Course Evaluation System

Evaluation Indicator	Evaluation Criteria	Evaluation Weight	Assessment Method
Economic Benefits	Net Profit, Market Share, Asset Turnover	40%	Sand Table System Auto-calculation + Student Self-assessment
Green Benefits	Carbon Emission Reduction Rate, Green Investment Return Rate, Environmental Compliance	30%	System Data + Report Evaluation
Comprehensive Ability	Quality of Green Decisions, Teamwork, Depth of Review Report	30%	Teacher Scoring + Group Peer Assessment

② Emphasizing Process Evaluation: Pay attention to students' performance during the course learning process, such as participation in discussions, teamwork ability, problem-solving ability, etc. Provide timely feedback and guidance to students through classroom observation, assignment evaluation, project reports, etc., to assess students' understanding and application ability of green and low-carbon management.

③ School-Enterprise Cooperation and Social Service

Cooperate with enterprises to integrate green and low-carbon concepts into actual enterprise operations. For example, invite enterprise experts to participate in course design and teaching activities, sharing successful experiences of enterprises in green and low-carbon aspects. Carry out school-enterprise joint projects, allowing students to practice green and low-carbon management strategies in real enterprise environments. Through participation in social welfare activities, environmental actions, etc., cultivate habits and awareness of low-carbon

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living, guide students to pay attention to social issues, cultivate their sense of social responsibility, and actively engage in the cause of carbon peaking and carbon neutrality, contributing to society^[5]^.

5. Conclusion and Outlook

The reform of integrating green and low-carbon education into the "ERP Sand Table Competition Simulation" course, through reconstructing teaching objectives, reforming the content system, optimizing practical processes, and upgrading the evaluation mechanism, effectively solves the problem of the lack of a green dimension in traditional courses. It can cultivate students' green and low-carbon awareness, improve their practical ability and comprehensive quality, and cultivate professional talents for green and low-carbon development. In future research, the application of green and low-carbon education in the "ERP Sand Table Competition Simulation" course can be further deepened, exploring more effective teaching methods and models. At the same time, integration with other courses should be strengthened to build a sound green and low-carbon talent cultivation system, making greater contributions to promoting the development of green and low-carbon education in China.

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