Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.15, No.11, 2024

Exploration of Teaching Reform in Environmental Protection Equipment and Engineering Design Course under the Background of New Engineering

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The research is financed by Project of Education and Teaching Reform from Yancheng Teachers University (2023YCTCJGZ07)

Abstract

Environmental protection equipment and engineering design is an important foundational course for environmental majors in higher education institutions, which combines systematic theory with strong practicality. The article is based on research on learning situations and pain points in educational reform. Through a series of educational reform measures, a learning community is established, scientific research is strengthened to support teaching, teaching content is optimized, teaching cases are enriched, and diversified teaching practices are carried out; Expand the second classroom, build a teaching platform, establish a mentorship system for undergraduate students, and organize all students to participate in innovation and entrepreneurship competitions; Integrating ideological and political education into the curriculum, cultivating students' scientific thinking, and solving practical environmental problems. Since the implementation of this innovative model, it has broadened students' horizons and improved the quality of teaching; We have established a comprehensive and full-time education model, enhancing students' practical and innovative abilities; It cultivates students' scientific thinking and exercises their ability to solve practical environmental problems, which has certain promotion and reference significance for comprehensively promoting the reform of the environmental chemistry curriculum system.

Keywords: New engineering, Environmental protection equipment and engineering design, Scientific thinking

DOI: 10.7176/JEP/15-11-03
Publication date: October 30th 2024

1. Introduction

The environmental protection equipment and engineering design course is a fundamental course for majors in environmental science and engineering, suitable for undergraduate teaching. The environmental protection equipment and engineering design course is facing the challenge of finding the right direction for reform and continuously carrying out innovative teaching. The new engineering discipline is a reform direction for engineering education based on new national strategic development needs, new international competition situations, and new requirements for moral education and talent cultivation(Li, X. F. et al.2015; Liu, B. et al. 2015.). Therefore, it is urgent to actively explore the teaching reform of Environmental protection equipment and engineering design courses under the guidance of the new engineering concept.

The environmental protection equipment and engineering design course occupies a core position in the curriculum system for cultivating environmental talents. How to deeply carry out teaching reform and innovation, form teaching methods suitable for cultivating practical and composite talents in the environment, and improve the quality of education in the course teaching is an important issue to meet the new requirements of moral education and talent cultivation in higher education in the new era.

2. Analysis of Pain Points in the Teaching Reform of Environmental Chemistry Course

2.1 Insufficient utilization of the second classroom

In traditional teaching, after the teacher finishes the lesson, the course ends; The second classroom is a

continuation of the teaching classroom, which can strengthen the connection between teachers and students and focus on educating students throughout the entire process(Jiang, W. et al. 2024; Hu, X. Y. et al. 2022). As a fundamental course in the field, environmental protection equipment and engineering design should not only enable students to master the basic knowledge of the profession, but also guide them to learn how to expand and apply it. However, due to insufficient utilization of the second classroom, it is difficult to achieve teaching goals. Therefore, teachers need to explore innovative teaching models for the "second classroom".

2.2 The depth and height of ideological and political education in the curriculum are not sufficient

The environmental protection equipment and engineering design course focuses on cultivating students' scientific thinking, but how to organically integrate ideological and political elements with the course content and enhance the height of ideological and political education in the course is a difficult problem faced by environmental chemistry teaching. The environmental protection equipment and engineering design course aims to cultivate students' micro thinking, understanding the basic concepts, laws, and theories of environmental protection equipment and engineering design, as well as their global environmental macro thinking. From a global perspective, it focuses on environmental pollutants from an international perspective, exploring the concentration levels, pollution mechanisms, behavioral trends, harmful effects, and control technologies of chemical pollutants.

3. Teaching Reform Ideas and Practice of Environmental Protection Equipment and Engineering Design Course

3.1 Optimize teaching content, enrich teaching cases, and carry out diversified teaching practices

Firstly, optimize teaching content and enrich teaching cases. Environmental protection equipment and engineering design is a constantly developing discipline. With the emergence of new environmental problems, environmental protection equipment and engineering design need to constantly supplement new research results and development trends. Secondly, carry out diversified teaching practices and solidly promote the improvement of curriculum teaching level and quality. By establishing a learning community, breaking down the "barriers" between teachers and students. Transforming the environmental protection equipment and engineering design course from a teacher centered classroom teaching model to an equal communication and learning model between teachers and students; From teachers asking and students answering, to students forming teams to find difficult problems for teachers. Guide students to pay attention to environmental historical events and current environmental issues, jointly seek overall understanding and comprehensive solutions, promote student teamwork, active learning, and positive thinking. Thirdly, pay attention to the close integration of online and offline, carry out the informatization construction of environmental protection equipment and engineering design courses, and carry out diversified teaching practices.

3.2 Expand the second classroom, establish a teaching platform and mentorship system

The second classroom refers to teaching activities related to the first classroom that are conducted outside of the first classroom (classroom teaching), focusing on students' quality education and holistic development(Zhu, Y. J. et al. 2020; Song, P. F. et al. 2015.). The course of Environmental Protection Equipment and Engineering Design requires students to understand basic concepts, laws, and theories, and also emphasizes the expansion and application of knowledge. Exploring innovative teaching in the second classroom has formed a comprehensive education model with a chain of "classroom teaching practice platform mentorship innovation and entrepreneurship competition".

3.3 Integrating ideological and political education into the curriculum, cultivating students' scientific thinking, and solving practical environmental problems

Environmental protection equipment and engineering design, as a fundamental discipline, provide basic theoretical support for understanding and solving environmental pollution problems, and scientific basis and technical support for fulfilling international environmental conventions. Internationally, new types of POPs, carbon emissions, and other global environmental issues are constantly emerging. Therefore, teachers should guide students to deeply study the concept of ecological civilization and fight the battle against pollution prevention and control. In order to better integrate ideological and political elements into classroom teaching and solve practical environmental problems, teachers should also use their extracurricular hours to continuously hold environmental protection equipment and engineering design course report meetings, guiding students to comprehensively think and analyze environmental historical events and current hot topics and policies related to

the environment.

4. Conclusion

The course of Environmental Protection Equipment and Engineering Design is a specialized course in the field of environment. The teaching of the course is centered on student development, and aims to cultivate innovative talents who are useful to the country through comprehensive education. This article focuses on the pain points of teaching reform in environmental protection equipment and engineering design courses, optimizes teaching content, enriches teaching cases, carries out diversified teaching practices, and solidly promotes the improvement of course teaching level and quality. By expanding the second classroom, building a teaching platform, establishing a mentorship system for undergraduate students, organizing all students to participate in innovation and entrepreneurship competitions, unleashing students' initiative, and stimulating creativity. Integrating ideological and political education into the curriculum, cultivating students' scientific thinking, enhancing their comprehensive thinking abilities, and solving practical environmental problems. It has certain promotion and reference significance for comprehensively promoting the reform of the environmental protection equipment and engineering design curriculum system.

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