

# *Exploration and Practice of Ideological and Political Education in University Physics Courses under the Background of New Engineering Education*

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**Abstract:** This paper investigates the integration of ideological and political education within university physics courses, particularly in the context of the evolving landscape of new engineering disciplines. Emphasizing the significance of nurturing innovation consciousness among students, the study explores effective teaching strategies and practical approaches. Drawing on empirical research and educational management principles, the paper discusses the role of case-based learning, social engagement, and interdisciplinary exploration in fostering students' social responsibility and innovative thinking. The findings highlight the importance of aligning physics education with societal needs and fostering a comprehensive understanding of the intersection between scientific knowledge and ethical considerations. The paper also proposes strategies for sustaining the development of ideological and political education within the university physics curriculum, providing insights for educators, administrators, and researchers in the field of science and engineering education.

## 1. Introduction

In the context of the increasing emphasis on comprehensive quality education in higher education, the university physics course, as an important part of cultivating students' scientific literacy and innovative abilities, urgently needs to integrate ideological and political education elements in line with the times. With the rise of the new engineering education concept, traditional knowledge imparting is no longer sufficient to meet the needs of students' comprehensive development. Therefore, the close integration of ideological and political education with university physics courses not only helps cultivate students' sense of social responsibility and innovative spirit but also enhances their comprehensive qualities to adapt to the rapidly changing demands of social development. In this context, the exploration and practice of ideological and political education in university physics courses under the background of the new engineering education have become an urgent need in the current higher education teaching reform.

## **2. Value and Role of Ideological and Political Education in University Physics Courses**

### **2.1. Cultivating Students' Sense of Social Responsibility**

Integrating ideological and political education into university physics courses can guide students to deeply reflect on the social impact of scientific research and technological applications, enhancing their awareness of the relationship between technological development and social responsibility. Through case analysis and practical projects, students are encouraged to focus on the ethics and social value of technological innovation, fostering their awareness of actively participating in social practices and addressing social issues, thus enhancing their sense of social responsibility and mission.<sup>[1]</sup>

### **2.2. Enhancing Students' Innovative Spirit**

In the course of college physics, we should pay attention to cultivating students' innovative thinking, guide students to transcend the boundaries of traditional knowledge and encourage students to engage in experimental design and scientific research on the basis of theoretical study. Through conducting scientific research projects, innovative design competitions, and other practical activities, students' innovative potential is stimulated, enhancing their problem-solving abilities and innovative consciousness, and nurturing engineering and technological talents with independent thinking and innovative abilities.

### **2.3. Shaping Students' Comprehensive Qualities**

The integration of ideological and political education can help students form a comprehensive worldview, outlook on life, and values, promoting their comprehensive development and personal growth. Through diversified extracurricular activities, social practices, and voluntary services, students' teamwork awareness, humanistic literacy, and interdisciplinary comprehensive abilities are cultivated, equipping them with comprehensive qualities to face future career challenges and social changes.

## **3. Specific Practices of Ideological and Political Education in University Physics Courses**

### **3.1. Integration of Ideological and Political Elements into Course Content with Practical Cases**

In the process of teaching practice, the author carried out targeted teaching improvements, integrating ideological and political education into the university physics classroom. Through this teaching, students will understand the practical applications of renewable energy technologies in different countries or regions and evaluate the positive impacts of these technologies on environmental protection, economic development, and improvement of social life quality. Additionally, the teacher will guide students to consider individual and social responsibilities in energy utilization and inspire them to actively participate in practical solutions to global energy and environmental issues.

**Background Introduction:** The teacher can first introduce global energy crises and environmental pollution issues, arousing students' concerns about energy utilization and environmental protection and stimulating their interest in learning about renewable energy technologies.<sup>[2]</sup>

**Explanation of Physical Principles:** The teacher can provide a detailed explanation of the principles and application technologies of renewable energy such as solar energy and wind energy, enabling students to understand deeply the roles and advantages of these technologies in energy conversion

and utilization through examples and charts.

**Case Analysis:** The teacher can guide students to analyze cases of sustainable energy technologies in different countries or regions, comparing their differences and commonalities in policy support, technological application, and socio-economic benefits, enabling students to understand the actual application of these technologies globally.

**Evaluation of Social Impact:** The teacher can organize discussions among students to evaluate the positive impacts of sustainable energy technologies on environmental protection, economic development, and improvement of social life quality, and discuss the challenges and problems that may be encountered in the actual application process.

**Personal Responsibility and Social Engagement:** The teacher can guide students to think about individual and social responsibilities in energy utilization, discuss how each individual can fulfill social responsibilities through energy conservation, promotion of sustainable energy technologies, and participation in environmental protection activities, inspiring students to actively participate in practical solutions to global energy and environmental issues.

Through this case, students can not only gain in-depth knowledge of physics principles but also realize the significance of sustainable energy technologies for socio-economic development, energy security, and environmental protection. Additionally, the teacher can guide students to consider comprehensive issues in the development of sustainable energy technologies, such as technical challenges, policy support, and socio-economic factors, cultivating students' analytical and comprehensive qualities. Furthermore, the teacher can encourage students to discuss personal and social responsibilities in energy utilization, encouraging them to consider how to make greater contributions to society with their professional knowledge. Through such case-based teaching, students can not only learn professional knowledge but also enhance their sense of social responsibility and mission.

### **3.2. Teaching Strategies to Cultivate Students' Sense of Social Responsibility**

In university physics courses, instructors can employ various teaching strategies to cultivate students' sense of social responsibility. This includes guiding students through case-based teaching to deepen their understanding of the role of physics knowledge in solving social issues, involving students in field surveys or community service activities through the design of social practice courses, and designing research projects or courses related to social issues to make students aware of the importance of professional knowledge for social development. Additionally, through classroom discussions and debates and the integration of social ethics education, students can think from different perspectives and enhance their awareness of social responsibility. Through the organic integration and implementation of these teaching strategies, instructors can effectively cultivate students' sense of social responsibility, enabling them to become outstanding engineering and technical professionals with a sense of social commitment and responsibility.<sup>[3]</sup>

### **3.3. Innovative Teaching Models to Enhance Students' Innovation Awareness and Practical Abilities**

This chapter aims to explore teaching models for enhancing students' innovation awareness and practical abilities in university physics courses. Through diversified teaching methods such as project-driven learning, research-based learning, course project practices, innovative design competitions, and problem-driven learning, instructors stimulate students' enthusiasm for learning and their potential for innovation. By participating in challenging project tasks, independently exploring the principles behind physics knowledge, engaging in practical projects and competitions, and solving real-world problems, students not only deepen their understanding of physics knowledge but also

cultivate problem-solving abilities and innovative thinking.<sup>[4]</sup> These teaching models not only enhance students' academic levels but also shape their competitive professional qualities and innovative abilities in the field of engineering and technology. Through the discussions and practical guidance in this chapter, instructors can more effectively guide students in developing their innovative potential and lay a solid foundation for their future career development.

## **4. Evaluation and Prospects of Ideological and Political Education in University Physics Courses**

### **4.1. Assessment of Comprehensive Improvement in Students' Qualities**

A comprehensive evaluation of the university physics courses integrating ideological and political education should be conducted, assessing students' academic performance, sense of social responsibility, innovation ability, and other aspects. By analyzing students' post-graduation directions and employment situations, the actual effects of ideological and political education on the enhancement of students' comprehensive qualities should be evaluated, assessing the impact of curriculum reforms on students' future career development.

### **4.2. Discussion on Sustainable Development Strategies**

Based on the evaluation, discussions should focus on how to construct a sustainable ideological and political education system, including improving the mechanism of teacher training, optimizing the allocation of teaching resources, updating and expanding course contents, and other aspects. At the same time, explore how to better integrate ideological and political education into university physics curriculum to ensure the long-term stability and sustainability of education reform.<sup>[5]</sup>

### **4.3. Prospects for Future Development Directions and Challenges**

Looking ahead, it is necessary to continuously improve the content and forms of ideological and political education in university physics courses in response to the new requirements of social development in the context of the new engineering disciplines. Efforts should be made to strengthen the cultivation of students' practical abilities, enhance the cultivation of an international perspective, and improve students' global competitiveness.<sup>[6]</sup> Additionally, there is a need to address new challenges such as insufficient teaching resources and inadequate faculty development by proposing targeted strategies to ensure the sustainable and effective development of ideological and political education in university physics courses.

## **5. Conclusions**

This paper discusses the integration of ideological and political education into university physics courses, highlighting its significance in cultivating students' social responsibility and innovative spirit. It emphasizes the importance of combining these aspects to enhance students' comprehensive competitiveness and adaptability. The study provides insights and recommendations for future development, emphasizing the need for faculty development and the expansion of teaching methodologies. It suggests fostering collaboration between academia and industry to enhance students' practical skills and innovative awareness.

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