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# The Challenges and Solution Strategies of Ideological and Political Education in the Course "Water Pollution Control Engineering"

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**Abstract:** In recent years, with the steady progress of ecological civilization construction in China, "Water Pollution Control Engineering," as a core course of environmental engineering, has become increasingly important. Ideological and political education in courses emphasizes integrating ideological and political education into the entire teaching process, aligning knowledge transmission and value guidance to move in the same direction, and effectively addressing the problem of "separation between ideological and political education and professional education". However, the ideological and political construction of "Water Pollution Control Engineering" still faces challenges such as rigid and single teaching methods, unsystematic ideological and political elements, and imperfect evaluation systems. As a result, the course cannot give full play to its due educational function, and it is difficult to improve the teaching quality of Water Pollution Control Engineering comprehensively. In response, this paper first analyzes the dilemmas in the ideological and political construction of "Water Pollution Control Engineering," and then puts forward corresponding solution strategies, so as to provide certain references for relevant researchers.

**Keywords:** "Water Pollution Control Engineering"; Ideological and political course construction; Challenges; Solution strategies

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## 1. Challenges in the ideological and political construction of "Water Pollution Control Engineering"

### 1.1. Rigid and single teaching methods

In the teaching of "Water Pollution Control Engineering," influenced by traditional educational concepts, some teachers still adopt the traditional "cramming" teaching method, which lacks innovation. Moreover, in the process of ideological and political construction, ideological and political elements are mostly mechanically implanted [1]. For example, when teaching "sewage treatment processes", teachers only rigidly quote the slogan "clear waters and green mountains are as valuable as gold and silver mountains" to carry out ideological and

political education. Such superficial integration fails to deeply integrate ideological and political education with professional content, making it difficult for students to understand the connotation of ideological and political education, and leading to formalized ideological and political education. Students are thus in a passive learning state, which restricts the improvement of teaching effectiveness.

Meanwhile, ideological and political construction often remains formalistic. For instance, when visiting sewage treatment plants, teachers only focus on explaining treatment processes and ignore integrating ideological and political contents such as responsibility, green development concept and craftsmanship spirit. This results in the separation between ideological and political education and professional teaching [2].

## 1.2. Unsystematic ideological and political elements

At present, the excavation of ideological and political elements is unsystematic, and a complete ideological and political education system has not yet been formed. First, ideological and political elements are fragmented, mostly based on teachers' personal experience and subjective judgment, leading to a lack of logic among them. For example, when teaching "water quality indicators", teachers emphasize the importance of environmental protection; when explaining sewage treatment technologies, they focus on cultivating students' sense of social responsibility. However, these elements are not mutually supportive or progressive, making it hard for students to accurately understand the connotation of ideological and political education [3].

Second, ideological and political elements are not precisely matched with professional knowledge, and some are even far-fetched, without considering the competence and literacy requirements of the water pollution control industry. For example, in the ideological and political education of "sustainable development", teachers fail to systematically integrate ideological elements into energy conservation, resource recycling and sewage treatment process selection. Consequently, ideological and political education cannot effectively guide students' behaviors or internalize into their professional literacy and values.

In addition, ideological and political elements are not dynamically updated. The latest environmental protection policies and industry trends are not timely introduced into the course, so ideological and political education cannot keep pace with the times, making it difficult to improve the educational effect of the course [4].

## 1.3. Imperfect evaluation system

The current evaluation of ideological and political education in "Water Pollution Control Engineering" stays at the traditional knowledge assessment level, lacking a systematic and targeted evaluation of students' ideological and political literacy. Existing evaluation methods usually focus on students' mastery of professional knowledge, such as assessing students' understanding and application of water pollution control theories, processes and technologies through final exams and experimental reports. However, there is a lack of effective indicators and scientific methods to evaluate the achievement of ideological and political goals, including environmental awareness, responsibility, craftsmanship spirit and sustainable development concept formed by students during learning [5].

Meanwhile, evaluation subjects are relatively single, mainly relying on teachers' evaluation, lacking participation of students' self-evaluation, peer evaluation and enterprise practice evaluation, which affects the comprehensiveness and objectivity of evaluation results. Furthermore, the evaluation of ideological and political education effects is a qualitative description, lacking quantitative tools and operable standards, leading to vague results that cannot accurately measure the actual effect of ideological and political construction or the improvement of students' ideological and political literacy [6].

## 2. Solution strategies for the ideological and political construction of "Water Pollution Control Engineering"

### 2.1. Clarify ideological and political teaching objectives

To effectively promote ideological and political construction, teachers should clarify measurable and hierarchical teaching objectives by combining the characteristics of *Water Pollution Control Engineering* with the requirements of ideological and political education.

First, knowledge objectives: students should not only understand and master the principles, technologies and processes of water pollution treatment, but also internalize the concept of ecological environmental protection, such as considering resource recycling when selecting sewage treatment methods and public health when formulating water quality indicators.

Second, ability objectives: cultivate students' ability to flexibly apply knowledge to solve practical problems and their awareness of engineering ethics. For example, when dealing with industrial sewage, students should comprehensively consider economic benefits, ecological and environmental benefits and social responsibilities to formulate scientific and reasonable treatment schemes [7].

Third, ideological and political objectives: guide students to establish a global vision by showing international advanced experience and common challenges in water pollution treatment, helping them understand that environmental protection is closely related to the survival of all mankind; cultivate craftsmanship spirit by introducing typical cases to emphasize rigorous attitude and pursuit of excellence; inspire patriotism by introducing China's achievements and current situation in water pollution control, encouraging students to devote themselves to environmental protection.

By reconstructing teaching objectives and implementing them throughout the teaching process, the resonance between ideological and political education and professional teaching can be ensured [8].

### 2.2. Adopt flexible and diverse teaching methods

First, the problem-based teaching method. After teaching knowledge about sewage discharge and standards, teachers can raise questions: How to monitor whether the effluent of sewage treatment plants meets the standards? Who is responsible for monitoring? With pictures, teachers guide students to recall internship scenarios and find answers: online monitoring equipment collects effluent data and transmits them to the supervision hall of the ecological and environmental bureau in real time. Then a second question follows: What will happen if the effluent fails to meet standards? Students search for penalty cases online. A third question is put forward: Is it feasible to replace monitoring samples or add chemicals to effluent to avoid fines? After listening to students' answers, teachers show cases of disrupting online monitoring to warn students. This method effectively enhances students' legal awareness and helps them abide by laws in their future careers [9].

Second, a discussion-based teaching method. When teaching "operation modes of activated sludge process", teachers ask students to analyze the disadvantages of the traditional activated sludge process in groups, exchange ideas and put forward solutions. Teachers summarize these solutions and compare them with improved processes, guiding students to think deeply. In this process, teachers integrate ideological and political ideas such as collective wisdom and collaborative innovation, stimulate students' exploration spirit and guide them to establish correct professional values [10].

Third, the case-based teaching method. Teachers collect hot topics and current news in water pollution control engineering, convert them into short videos, animations and illustrated materials, and introduce

appropriate cases according to teaching content. When analyzing cases, teachers use infectious and expressive language to create immersive learning scenarios, stimulate the integration of professional knowledge and ideological and political elements, and further improve teaching quality [11].

## 2.3. Systematically explore ideological and political resources

Teachers should fully understand the knowledge system, theoretical basis, scientific principles, engineering technologies and disciplinary development trends of "Water Pollution Control Engineering," and grasp the ideological and political elements contained in the course as a whole.

For example, when teaching water resource protection, combined with China's severe water shortage and water quality status, teachers guide students to recognize their responsibilities and missions, and establish the ecological concept of "clear waters and green mountains are as valuable as gold and silver mountains". When introducing the development of sewage treatment technologies, teachers can tell stories of engineers overcoming difficulties to cultivate students' spirit of exploration and perseverance. By studying advanced water pollution control cases worldwide and comparing laws, technological investment and public participation in different countries, teachers strengthen students' patriotism and sense of mission, encouraging them to actively participate in China's ecological civilization construction [12].

From the perspective of engineering ethics, when selecting sewage treatment processes and disposing of sludge, teachers emphasize the importance of engineers' social responsibility and professional ethics, cultivating students' correct values and professional ethics. Projects designed by students should not only meet technical standards but also balance environmental, social and economic benefits. By systematically exploring ideological and political elements, fragmented contents are organically integrated with professional knowledge, realizing the unity of explicit professional teaching and implicit ideological and political education, and completing value guidance while imparting knowledge [13].

## 2.4. Establish a multidimensional teaching evaluation system

Evaluation is an indispensable part of the ideological and political construction of "Water Pollution Control Engineering." Teachers should adopt effective evaluation methods to test the implementation effect, find problems in time and make improvements. Therefore, teachers should break through the traditional evaluation mode, shift from focusing on knowledge and skills to evaluating students' learning attitude, values and thinking mode, and form a multidimensional evaluation system integrating knowledge, skills and value guidance to improve the comprehensiveness of evaluation results [14].

In addition, since ideological and political construction is a long-term process and educational effects may not be immediate, teachers should adhere to the principle of "long-term + short-term effects". First, adopt task-driven evaluation. Design project-based schemes for course content to motivate students, stimulate their creative thinking, cultivate their sense of responsibility, and use such indicators to assess performance. Second, combine periodic and long-term assessments, build digital evaluation files to track students' learning process in real time, stimulate their learning enthusiasm and encourage them to achieve teaching goals. Third, expand the evaluation subjects. In addition to teachers' evaluation, introduce students' self-evaluation, peer evaluation, enterprise evaluation and AI evaluation to provide feedback on students' value formation, learning status and professional level in real time, ensuring the objectivity of evaluation results [15].

## 3. Conclusion

In summary, the ideological and political construction of "Water Pollution Control Engineering" is a systematic and sustainable project. It is not only related to students' mastery of professional knowledge, but also shoulders the fundamental mission of fostering morality and talents. Therefore, teachers can start by clarifying teaching objectives, adopting flexible teaching methods, systematically exploring ideological and political resources, and establishing a multidimensional evaluation system. Only in this way can the course truly realize its educational value and cultivate a new generation of environmental engineering talents with solid professional skills, noble moral sentiments and a strong sense of social responsibility, contributing to China's ecological civilization construction and water pollution control.

In the future, with the deepening of educational reform and the rapid development of information technology, the ideological and political construction of *Water Pollution Control Engineering* needs to keep pace with the times, continuously explore and innovate, and constantly improve the quality and effect, laying a solid foundation for cultivating more high-quality environmental engineering talents to meet national development needs.

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