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# Research and Exploration on Ideological and Political Theories Teaching in the Course of Soil Science Experiment: Taking Pingdingshan University as an Example

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**Abstract** Experimental course is an important link of ideological and political education in colleges and universities under the new situation, and plays an important role in the construction of ideological and political theories teaching in the course. Taking Pingdingshan University as an example, by introducing the real soil cases in Pingdingshan area, the ideological and political elements of the course are integrated into the teaching links of laboratory safety training, self-study before class, experimental teaching implementation, evaluation and improvement. By implementing the concept of "All-round Education" in experimental teaching, we are committed to realizing the comprehensive coverage of value shaping, knowledge inheritance and ability training, and explore and practice the reform of ideological and political theories teaching in the course of Soil Science Experiment.

**Key words** Soil Science Experiment, Ideological and political theories teaching in the course, Teaching link

## 1 Introduction

In 2016, General Secretary Xi Jinping clearly stated at the National Conference on Ideological and Political Work in Colleges and Universities: "We should persist in cultivating people by virtue as the central link, carry out ideological and political work throughout the whole process of education and teaching, realize the whole process and all-round education, and strive to create a new situation in the development of higher education in China"<sup>[1]</sup>. The construction of ideological and political theories teaching in the course is an inevitable choice for ideological and political education in colleges and universities under the new situation. Colleges and universities shoulder the important task of training builders and successors of socialism with Chinese characteristics, and should give priority to training students' all-round moral, intellectual, physical and aesthetic grounding with a hard-working spirit. The ideological and political theories teaching in the course can help students establish a correct world outlook, outlook on life and values, and become communicators and practitioners of carrying forward socialist core values.

Soil Science, as a professional basic course offered by environmental and ecological engineering major in Pingdingshan University, is highly practical and closely related to the national economy and people's livelihood and economic development. The course of Soil Science Experiment is an important link in the teaching process of soil science, which realizes the organic combination of theoretical knowledge and practical exploration, and lays

a good foundation for students to engage in soil science research in the future. Experimental courses play a unique role in talent training because of their strong practicality and combination of theory and practice. Integrating ideological and political education into experimental courses can strengthen laboratory safety education, cultivate students' professional ethics, and stimulate students' innovative thinking<sup>[2]</sup>. Integrating the ideological and political education system into the course of Soil Science Experiment will promote the effective integration of ideological and political education and the course of Soil Science Experiment, which will effectively help students develop in an all-round way.

## 2 Overall design ideas of ideological and political theories teaching in the course of Soil Science Experiment

Pingdingshan mining area, an important energy and chemical industry base in northern China, is mainly distributed in the rocky hilly area of western Henan Province. The special geographical location makes the soil environment deeply affected by coal mining and water erosion and wind erosion for a long time<sup>[3]</sup>. The course of Soil Science Experiment focuses on the training objectives of environmental and ecological engineering major, and trains students with knowledge, theory and skills of ecology, environmental science and engineering, innovative and entrepreneurial awareness and engineering practice ability, and applied technical talents who can engage in related work in industrial and mining enterprises and ecological and environmental departments<sup>[4–5]</sup>. On the basis of theoretical teaching content, a series of experimental projects of soil science are introduced into abandoned mining areas and ecological restoration areas in Pingdingshan area as cases, the physical and chemical properties of sampled soil are measured, the soil characteristics and quality are evaluated, and suggestions are provided for soil management and ecological restoration. It guides practice with theory, integrates theory with practice, strengthens

Received: September 19, 2023 Accepted: November 19, 2023

Supported by Science and Technology Research Project of Henan Province (222102110444); Doctoral Startup Fund of Pingdingshan University (PXY-BSQD-202109); 2022 Model Ideological and Political Theories Teaching in the Key Courses in Pingdingshan University (2020-JY05).

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students' ability to use the knowledge and skills they have learned for practical operation and problem solving, evaluates soil properties and provides suggestions for soil management, expands students' ability of innovative thinking and solving practical prob-

lems, fully excavates the ideological and political elements involved in all aspects of experimental teaching (Fig. 1), and realizes the whole process education and all-round education.

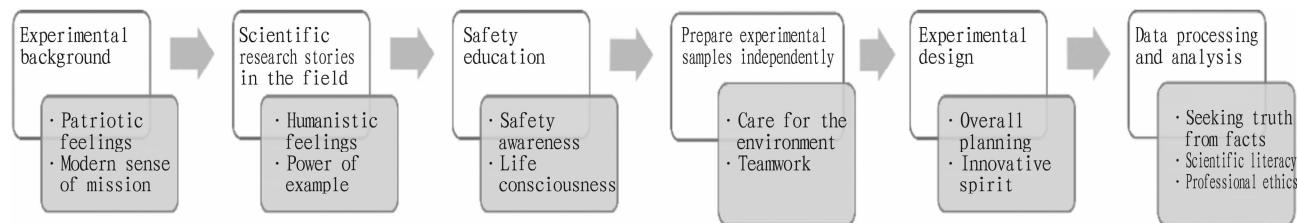


Fig. 1 Mining ideological and political elements in the teaching process of Soil Science Experiment

Thus, it provides solid knowledge and skills for students to take the postgraduate entrance examination, participate in scientific research projects of academic tutors, subject competitions, and publish papers.

### 3 Contents and objectives of the course of Soil Science Experiment

Based on the soil of abandoned mining area and ecological restoration area in Pingdingshan City, this study carried out soil experimental teaching, and provided suggestions for soil quality evaluation and improvement in sampling area. The main objectives are as follows. The goal at knowledge and skill level is to deepen the understanding of theory in experiments and firmly establish a set of basic operation techniques of soil science according to the basic characteristics of soil; the goal of ability training is to train students to fully combine theory with practice, start from real life cases, describe the structure and fertility properties of collected soil according to experimental results, further utilize, control and transform soil, improve ecological environment conditions, improve students' ability to analyze and solve problems, and cultivate innovative consciousness; the goal of ideological and political education is to cultivate students' teamwork ability, scientific rigor, truth-seeking and pragmatic spirit, and enhance students' ideological cognition that "clear waters and green mountains are as good as mountains of gold and silver".

### 4 Teaching implementation of the course of Soil Science Experiment

**4.1 Laboratory safety education and training** According to statistics, there were 126 laboratory accidents in colleges and universities from 2001 to 2021, resulting in 20 deaths and 107 injuries<sup>[6]</sup>. It is urgent to strengthen laboratory safety education and training in colleges and universities. Pingdingshan University attaches great importance to laboratory safety education and training. The school organizes students to participate in laboratory safety culture publicity, laboratory safety lectures, safety and fire drills, laboratory safety knowledge contests and other forms every year. The training contents include laboratory safety risk prevention measures, safety technical specifications and personal protection precautions of major hazardous chemicals in the laboratory, typical case analysis of laboratory safety accidents, classified storage of hazardous chemicals, common sense of first aid, chemical waste disposal, common sense of fire extinguishers and fire extinguishing, and laboratory safety and hygiene responsibility system, etc.

Through safety training, students' safety awareness can be effectively improved, so that students can get a good experience of experimental environment and standardize experimental operation.

**4.2 Self-study before class** It is necessary to establish a network teaching course of soil science on the teaching network platform of Pingdingshan University, upload course resources such as popular science videos related to soil science, scientific research stories in the field of soil science, experimental handouts, experimental operation videos, etc., set up online assignments and establish WeChat group for courses. Teachers can introduce new courses by publishing experimental course questions, such as whether the mine soil in Pingdingshan area after ecological restoration is arable, so as to guide and stimulate students to actively explore problems and seek answers to them. Students can independently learn website courseware, micro-lessons, operation videos, documents and so on before class. According to the experimental project, students prepare the experiment independently and collect soil samples in Pingdingshan mining area in advance. Through self-study before class, students can fully understand the experimental principle and operation, cultivate the patriotism, and establish their awareness of environmental protection.

**4.3 Implementation of experimental teaching** In accordance with pre-class problems and students' self-study problems, students communicate with each other, teachers explain and guide innovative design thinking, and on-site intelligent mobile terminals are used for access to information and in-depth discussion and design. Teachers summarize key points, precautions, estimated results, etc. Students divide their work independently, assist in carrying out experiments, and teachers constantly guide. Teachers emphasize the danger of hazardous chemicals such as strong acid and strong alkaline chemicals to prevent safety accidents caused by misoperation. Teachers demonstrate the standardized use of large instruments. During the experiment, teachers check and record whether the students' operation is standardized and correct it in time; check and record the communication and collaboration ability within the group, whether they can help solve unexpected problems, and synergetically organize the laboratory. Through classroom teaching, students can understand experimental principles, master experimental skills, cultivate their scientific literacy of unity, cooperation, innovation and seeking truth from facts, and establish laboratory safety awareness.

**4.4 Evaluation and reflection** The evaluation of experimental reports should focus on whether the data obtained by students through experiments are reasonable or effective, whether the re-

cords of experimental phenomena are complete, whether the formulas are applied properly, whether the calculations are correct, whether the analysis of data or interpretation of experimental phenomena is accurate, and whether the conclusions or suggestions are reasonable. Comprehensive scores of experimental courses involve pre-test, experimental operation and process, experimental report and ideological and political perception, accounting for 10%, 30%, 40% and 20%, respectively. And ideological and political perception can be comprehensively assessed by asking questions in class, summarizing ideological and political experience, and conducting questionnaire survey. Through the evaluation of students' experimental courses, teachers can reflect on the shortcomings in the teaching process, and make some improvements in the next round of teaching.

## 5 Conclusion

The course of Soil Science Experiment is an extension of the theoretical course of Soil Science. Practice promotes the understanding and absorption of theoretical knowledge, realizes the organic combination of theoretical knowledge and practical exploration, and lays a good foundation for students majoring in environmental and ecological engineering to engage in employment and research related to soil science and environmental science in the future. The ideological and political elements are integrated into laboratory safety training, self-study before class, experimental teaching implementation, evaluation and other teaching links in the course of Soil Science Experiment. Guided by the real cases in Pingdingshan area, students' interest in exploring and studying problems is stimulated, and practical problems are analyzed and

solved with a rigorous and scientific attitude. Students' sense of responsibility for caring for soil and protecting the environment and their sense of protecting the ecology are cultivated, so as to truly implement the concept of "educating students in the whole process and educating students in all directions" in the course of Soil Science Experiment.

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fied assessment and evaluation method should be adopted, which should not only look at the number of papers or awards of students, but also evaluate the effectiveness of tutors' work in terms of students' professionalism and moral values. A good mutual evaluation system between teachers and students should be established to promote the effective implementation and realization of the mentorship system through the evaluation leverage. As one of the main subjects of undergraduate tutoring system, it is necessary for students to evaluate the tutor's guidance work. Tutors can find out the deficiencies in the process of their own guidance through the evaluation of students, and the students' recognition of the tutor's work will greatly stimulate the enthusiasm of the tutor's guidance. Mentors should also be evaluated for the guidance of students, positive evaluation words can greatly stimulate students to participate in the initiative and enthusiasm of the guidance, mentor evaluation of the student's problems pointed out can also become an opportunity for students to actively seek guidance for teachers and students to create opportunities for interaction.

In terms of incentives for mentors, positive incentives can be taken. For example, to give tutors a certain amount of workload, the effectiveness of the tutor's work in guiding students and the evaluation of titles, job promotions linked to the tutor's outstanding effectiveness in guiding the tutor awarded an honorary title, and in the evaluation of recruitment and promotion as a bonus indicator, so as to fully mobilize their participation in the guidance

of the enthusiasm. From the students' point of view, for students who have won awards and achieved certain results by writing papers under the guidance of their tutors, corresponding honors, innovation credits and bonus rewards should be given in order to form a positive influence in the student group and improve the motivation of other students.

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