

Practice of Ecological and Environmental Protection Ideological and Political Cases in the Solar Cell Classroom

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Abstract: Curriculum ideological and political education is an important carrier for achieving comprehensive education. In the teaching of solar cells and other related courses, a teaching system of ecological environment protection for ideological and political education in has been constructed around the task of cultivating people. Through various cases such as negative cases of ecological environment protection, positive cases of ecological environment protection, cases of the impact of solar cells on environmental protection, and cases of environmental benefit analysis of solar power generation, the ideological and political classroom has been explored and practiced, and good teaching results have been achieved. The case study of ideological and political classroom can stimulate students' interest in learning, change the dull and monotonous theoretical teaching, and subtly promote the integration of ideological and political classroom into the mind, heart, and practice, ensuring that ideological and political classroom is truly implemented and promoting the effectiveness of moral education.

Keywords: Ideological and Political Education, Environmental Protection, Moral Education, Solar Cells, Teaching Reform

1. Introduction

College is a critical period of forming students' outlook on values, and is also an important force in social construction. College students generally have higher levels of knowledge, but they often overlook the improvement of ideological and moral character. Especially at present, exams are mainly based on knowledge assessment, often neglecting ideological and moral aspects [1].

Curriculum ideological and political classroom is important for higher education teaching reform in recent years. Unlike traditional ideological and political classroom, the curriculum of ideological and political classroom no longer simply conveys ideological and political teaching content to students, but integrates ideological and political elements into basic or professional classrooms, integrating ideological and political elements into the entire education process, achieving all-round education, and further enhancing the ideological character and value orientation of college students [2,3].

The principle and application of solar cells is important for materials science and engineering, helps to strengthen students' understanding and understanding of the application of professional knowledge in practical life, and stimulate their interest in learning professional courses [4]. While imparting basic knowledge, effectively integrating ideological and political materials into the curriculum can deepen students' understanding and understanding of professional courses, and also help strengthen students' moral character, achieving the goal of cultivating morality [5].

With the development of the economy, humans not only consume a large amount of fossil energy, but also cause environmental pollution, leading to global climate change. Glaciers melt, sea level rises, Desertification expands day by day, and natural disasters occur frequently. People are gradually realizing the importance of ecological environment protection, and governments around the world have also adopted many methods to protect the ecological environment [6].

This article mainly explores the organic integration of ecological and environmental protection

ideological and political cases during the courses of solar cell principles and applications. Through vivid and interesting examples, it stimulates students' interest in learning, while achieving the effective integration of professional knowledge and morality cultivation, achieving the goal of imparting knowledge, cultivating morality, and leading value orientation, and achieving the overall development of students' knowledge and ideological character.

2. Negative Case of Ecological Environment Protection

Firstly, let's talk about the recent negative cases of ecological environment protection, so that students can deeply understand the importance of environmental protection. Damage to the environment can endanger human survival, and even lead to serious safety accidents.

On January 31, 2021, a barber shop and bathhouse in Weifang, Shandong Province, which had been operating for more than 20 years, had an accident, resulting in 4 deaths and 35 poisoning. Several residents near the incident site reported smelling a very pungent odor on the morning of January 31st.

The accident investigation showed that acetic acid, Sodium hydrosulfide and other industrial waste liquids were secretly discharged into the sewage pipe network, and the two waste liquids reacted to produce toxic gases such as hydrogen sulfide, which diffused through the pipe network to the residents' homes.

The appraisal report shows that the dumping of hazardous wastes by Wang Hui, Chen Tao and others has resulted in 8370.13 square meters of soil damage in Fengchang Machinery Plant in Shunwang Street, Zhucheng City and the surrounding area, 37666 cubic meters of soil damage earthwork, 15669 cubic meters of earthwork to be repaired, and groundwater environmental damage also exists in the affected land. The volume of the damaged aquifer is 46665.5 cubic meters, and the total value of soil and groundwater ecological environmental damage is more than 24.06 million yuan. After identification, on January 31, 2021, the above-mentioned area suffered air environmental damage due to the illegal dumping of chemical waste liquid and the generation of hydrogen sulfide gas, resulting in an atmospheric environmental damage amount of over 44000 yuan.

On the afternoon of August 12, 2022, five individuals involved in the case were sentenced in the first instance. Among them, Wang Hui and Chen Tao, the principal offenders, were sentenced to death by the Weifang Intermediate Court for committing crimes such as throwing Dangerous goods and polluting the environment. Three workers, Jin Shuguang, Cui Qi and Ma Gang, were also sentenced to life imprisonment, 18 years' imprisonment and 15 years' imprisonment respectively by Weifang Intermediate People's Court for the crime of throwing Dangerous goods and the crime of polluting the environment. 5 people also need to bear corresponding incidental civil compensation.

The introduction of this negative typical case can enable students to feel the responsibility and obligation of ecological environment protection as if they were in person, and stimulate students to establish awareness and behavior of ecological environment protection.

3. Positive Cases of Ecological Environment Protection

Liu Chongxi, Chairman of Ningxia MCC Meili Paper Industry Group, proposed the development of ecological economy, characterized by low mining, high utilization, and low emissions, to minimize the influence of economic activities on the environment.

In 1985, Liu Chongxi, who had recently graduated from university, left the Paper mill run by the government. The Paper mill, which had turned losses into profits, was exposed due to serious pollution and ordered rectification. During the rectification process, he even put forward the bold words of "no longer discharging a drop of sewage into the Yellow River", which shocked thousands of employees: the sewage treatment system that has invested tens of millions of yuan in construction costs 180000 yuan just to inject drugs into the sewage treatment tank every day. Isn't he going to kill the enterprise?

Liu Chongxi has taken another path of ecological pollution control after long-term investigation and research. He dispatched 500 bulldozers to level over 20000 sand dunes and used the method of using square wheat straw to control sand and plant trees. He stipulated that each employee must plant 500 trees per year and take the lead, leading thousands of employees to sleep on sandy slopes and eat in sandstorms, planting trees one by one. It took 7 years, invested 480 million yuan, planted 500000 acres of trees, built over 200 kilometers of roads, laid pipelines and canals for 20 kilometers, diverted water

from the Yellow River into the forest area, and built 5 artificial lakes. This large desert, with an annual rainfall of 180 millimeters but an evaporation capacity of over 1900 millimeters, has created a forest area with continuous green trees and lakes with flocks of waterfowl! Now an industrial park has been built, with trees making paper and sewage treatment being discharged into the lake, which can be directly consumed. The lake water is used to irrigate the forest, forming a virtuous cycle system. 500000 acres of forest can recover costs within 5 years.

What is more valuable is that he has “persuaded” the Tengri Desert to retreat for 10 kilometers to benefit the people of one side. It can be said that the economic and ecological benefits have been win-win. The enterprise he led has become the largest papermaking enterprise in western China.

The introduction of this positive typical case can make students realize that economic development should always pay attention to ecological environment protection. Only economic development based on ecological environment protection is sustainable, and can long-term healthy development and growth be achieved. It can stimulate students to establish awareness and behavior of never forgetting ecological environment protection in work and life.

4. Cases of the impact of solar cells on environmental protection

In recent years, the government has actively supported the development of solar energy, using green power generation to replace traditional thermal power generation.

Nowadays, solar energy signage is widely used in the field of traffic signs, consisting of sign surfaces, sign panels, solar panels, controllers, and light-emitting units (LEDs). It uses text and patterns to convey instruction information of warning and prohibition to drivers and pedestrians, in order to manage safe road traffic. In the day, solar panels absorb sunlight and convert it into electricity stored in energy storage devices. In night, the electricity is automatically converted into light energy, and LED is emitted to outline patterns and convey traffic information.

In the current social environment with increasing awareness of energy conservation and environmental protection, solar energy labeling is gradually extending to a broader field.

The outdoor signage of Tsinghua University Park uses solar lighting technology, truly achieving the construction of an energy-saving and environmentally friendly “green campus”. The overall layout of the campus has four solar panels at the top. The solar energy absorbed during the day is converted into bright lights at night, allowing all teachers, students, and visitors to clearly see every point on the map.

The solar energy labeling project has contributed to energy conservation and environmental protection. Let the labeling industry also contribute to China’s environmental protection construction.

The introduction of this typical case can make students realize the importance of solar cells for ecological environment protection. Only by actively developing solar cell technology can they better replace traditional thermal power generation, achieve sustainable economic development, and improve the ecological environment.

5. Cases of Environmental Benefit Analysis for Solar Power Generation

Solar energy is a renewable and clean energy source. Solar power generation is safe, reliable, pollution-free, noise free, environmentally friendly and aesthetically pleasing, with low failure rates and long lifespan. Its energy-saving and emission reduction benefits, environmental benefits, and social benefits are all very significant. The environmental benefits of solar cells do mainly not emit any harmful gases, such as smoke, sulfur dioxide, nitrogen oxides, and other harmful substances, because of the reduction of conventional energy consumption. . The following is an example of a photovoltaic power generation project to illustrate its specific effectiveness in reducing pollution and emissions.

The total installed capacity of a photovoltaic power generation project is around 5 MW. The average annual online power generation is 6.712 million kWh. This project generates 167.8 million kWh of electricity during its lifespan. Based on the national average coal consumption of approximately 3149/kWh in 2023, approximately 2107 tons of standard coal can be saved annually. The energy and pollutant emission reductions are calculated as follows.

(1) **Standard coal emission reduction per kilowatt hour of electricity consumption:** Calculated based on the national average power supply coal consumption of about 0.314kg/kWh in 2023, the

photovoltaic power generation system of this project has saved a total of 167.8 million kWh of standard coal during its 25 year service life $\times 0.314\text{kg standard coal/kWh}=52700$ tons.

(2) **CO₂ reduction per kilowatt hour of electricity:** referring to the reduction of CO₂ emissions per kilowatt hour of electricity, with a baseline of 0.8841kg, the system has been calculated to reduce CO₂ emissions by 167.8 million kWh over the past 25 years $\times 0.8841 \text{ kg CO}_2/\text{kWh}=148400$ tons.

(3) **Sulfur dioxide (SO₂) emission per kWh of electricity:** Referring to the reduction of SO₂ emissions per kWh of electricity generation, which is 0.005501kg, the system has been calculated to reduce SO₂ emissions by 167.8 million kWh over the past 25 years $\times 0.005501 \text{ kg SO}_2/\text{kWh}=923.07$ tons.

(4) **Dust reduction per kilowatt hour of electricity:** Referring to the standard of reducing dust emissions by 0.002160 kg per kilowatt hour of electricity, the system has been calculated to reduce dust emissions by 167.8 million kWh over the past 25 years $\times 0.0021609 \text{ dust/kWh}=362.45$ tons.

(5) **Nitrogen oxide emissions reduction per kilowatt hour of electricity:** calculated based on the reference of 0.001728 kg of nitrogen oxide emissions reduction per kWh of electricity generated. The system's 25 year emission reduction of nitrogen oxides: 167.8 million kWh $\times 0.001620 \text{ kgNO}_x/\text{kWh}=271.88$ tons.

The introduction of this typical case can make students realize that photovoltaic power generation such as solar cells significantly reduces pollutant emissions and effectively improves the ecological environment; Encourage students to study professional knowledge seriously and devote themselves to new energy industries such as solar cells in the future, making contributions to the green development of their homes.

6. Conclusion

Through the ideological and political education system in the curriculum, combined with the characteristics of professional courses such as solar cells, and combining ecological and environmental protection ideological and political cases in the teaching of professional knowledge, the teaching concept of "integrating ideological and political education into courses, ideological and political education into courses" is integrated throughout the entire teaching process of professional courses. Through different typical ideological and political cases, students are encouraged to think deeply during class, stimulate spiritual transformation, enhance awareness and concepts of ecological environment protection, and enhance their ideological and moral character. The case teaching mode of ideological and political education integrates the advantages of rich life materials, highlights the conceptual transformation of student-centered teaching methods, shortens the distance between professional courses and actual life, stimulates students' interest in learning, enhances their awareness of ecological environment protection, and helps to shape students' correct outlook on life, worldview, and values while learning professional knowledge, promoting ideological and political education to take immediate effect.

Acknowledgment

This work is supported by Excellent Teaching Team of Qilu University of Technology (No. 2023JXTD006), the Teaching and Research Project on "Ideological and Political Special Item" of Qilu University of Technology (No. 2020szzx04 and 2019zd01).

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