

# **Design of Teaching Contents of Air Pollution Control Engineering Experiment Course under the Background of Big Environment**

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**[Abstract]** In the face of the current generation of atmospheric environmental problems, the air pollution control engineering experiment class should be combined with the teacher's scientific research project to design comprehensive and design experiments, so that students can understand the cutting-edge technology and apply what they have learned; and the atmospheric environmental problems that are urgently needed to be solved. Combine design innovation experiments to cultivate students' sense of innovation and make them have certain innovation ability.

**[Keywords]** Environment; Air pollution control engineering; Experimental course; Teaching content

## **1. Introduction**

In recent years, the northern cities represented by China's Beijing-Tianjin-Hebei region have experienced a wide range of haze weather, which has caused people to pay more and more attention to the quality of the atmospheric environment. As a national ecological civilization pilot area, Guizhou rarely has the same smog weather as the northern city. However, people living in Guizhou are still sensitive to changes in atmospheric environmental quality, especially those who study environmental engineering in our school. For example, when the ambient air quality is mildly polluted or moderately polluted, the author's students will tell him their feelings for the first time. They like to pay attention to everything related to the environment, especially curious about the atmospheric environment, and always want to find out what causes the environmental environment, air quality, and so on.

## **2. Research on Experimental Course of Air Pollution Control Engineering Conducted by Universities and Colleges**

The air pollution control project is a compulsory course for environmental engineering majors. The air pollution control engineering experiment course is the best way to deepen students' understanding of theoretical knowledge. In recent years, major universities have also begun to pay attention to the study of atmospheric

pollution and prevention, and some universities have used the research results of atmospheric environment in experimental teaching.

For example, Tsinghua University has updated the experimental project for the air pollution control engineering experiment course,<sup>[1,2]</sup> and carried out related research and design on the experimental project. Especially in the dust removal technology, the composite electric bag dust collector suitable for air pollution control experiment teaching has been developed and designed, which will not only keep up with the latest developments in dust removal technology at home and abroad, but also inspire innovative thinking and make students interested in air pollution control.

The project-based teaching mode of the air pollution control engineering experiment conducted by Hunan University was earlier. It analyzed the status quo of the main experimental projects and the characteristics of the teaching content. On the basis of the fusion of the problem teaching method and the inquiry teaching method, the project-based air pollution experiment teaching mode is constructed, and the design of the knowledge points and the fusion methods of some knowledge points in the model are respectively illustrated and explained.

Beijing Institute of Petrochemical Technology integrated and optimized the verification experiment project of the Air Pollution Control Engineering Experiment Course, making it a comprehensive experimental project.<sup>[4]</sup>

### **3. Teaching Content Combined with Our University's Research Projects and Current Hot Issues**

Judging from the current situation, the verification test of air pollution control engineering is more focused on the past pollutant monitoring, and it is out of contact with the current atmospheric environment problems. Experimental teaching should focus on the scientific and timeliness of experimental methods. The design of the experimental content should also be increased according to national policies and current environmental problems, such as the addition of PM<sub>2.5</sub> monitoring projects.

At the same time, it is necessary to update the atmospheric pollutant monitoring methods in a timely manner, which can be accessed through the Science and Technology Standards column in the website of the Ministry of Environmental Protection.<sup>[5]</sup>

The design of the experimental project can be set up in two ways:

First is to combine the experimental course with the scientific research topic to design comprehensive and design experiments. For example, Guizhou, as a typical acid rain area in China, guides students to think about the formation of acid rain caused by the

cause, which leads to the emission of atmospheric pollutants, sulfur dioxide. To reduce the amount of sulfur dioxide released into the atmosphere, it is necessary to reduce pollutant emissions from the source. At this time, it is necessary to design a desulfurization device to understand the desulfurization technology, and there are many kinds of desulfurization technologies. In the laboratory, alkali desulfurization is used. According to this, an absorption method can be used to remove the sulfur dioxide experiment in the exhaust gas, and the original operating conditions are changed. Under the guidance of teachers, students will fully understand the principle of desulfurization in the context of new experimental classes and have a new understanding of technological development.

Second, in combination with the current atmospheric environmental problems that need to be solved, set up innovative experiments, such as where the PM<sub>2.5</sub> in the atmosphere comes from and how it is transmitted to our city. Combining this problem, students can be given a source analysis experiment or a deep dust removal experiment of PM<sub>2.5</sub> in the atmosphere. Because the source analysis experiment of PM<sub>2.5</sub> focuses on the research, it can be set as an experiment. Interested students can complete this part of the experimental research under the guidance of the teacher.

In addition, guide students to pay attention to the real-time status of atmospheric ambient air quality, recording real-time concentration changes of PM<sub>2.5</sub>, PM<sub>10</sub>, TSP, SO<sub>2</sub> and other pollutants in the air, and information such as the Ambient Air Pollution Index (AQI) and primary pollutants on the Environmental Protection Department of our province and the Guiyang Ecological Civilization Construction Committee website, through continuous recording, there are changes in the concentration of various pollutants, such as mean change, monthly average change, and annual change. Teachers not only teach students how to observe records, but also teach students the ability to analyze and process data and find problems.

## 4. Conclusion

In a word, the experimental project of the Air Pollution Control Engineering Experiment Course needs innovation, and the purpose of continuous innovation is to cultivate students' innovative spirit to enable them to have the ability to solve practical problems, the innovative experimental projects are divided into two types: mandatory and selected. Students interested in research can choose to do some innovative experiments to enable students to develop innovative thinking and accumulate certain research experience; Students who are interested in engineering and other applications, through the training of design and comprehensive experimental projects, have strong ability to design and solve practical problems, thereby increasing the employment chances of students.

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