

# ***Research on Practical Teaching Reform of Mine Gas Prevention and Control under the Background of Engineering Education***

**Deshan Chen, Wanxin Yang**

*College of Resource Environmental Engineering, Lanzhou Petrochemical Vocational and Technical University, Lanzhou, Gansu, 730207, China*

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**Abstract:** Engineering education is an indispensable way to cultivate engineering and technical talents, while practical teaching is the top priority in engineering education. Taking the practical teaching of mine gas prevention as an example, this article discusses the reform and innovation of practical teaching under the background of engineering education. Based on the analysis and summary of practical teaching of mine gas prevention and control, some ideas and methods for reform and innovation are proposed in order to provide some reference for practical teaching of engineering education.

## **1. Introduction**

Engineering education is the most effective way to cultivate engineering and technical talents. Its goal is to cultivate technical talents with both innovative and practical abilities, while practical teaching is an important teaching mode for rapidly improving the practical ability of students on campus. Mine gas prevention and control is an important link in mine safety work, and practical teaching of mine gas prevention and control is an important way to cultivate the practical ability of mining engineering and technical personnel.

## **2. Practical Teaching Content of Mine Gas Prevention and Control**

The practical teaching of mine gas prevention and control is one of the important practical teaching links for mining engineering majors, and its content mainly includes the following aspects:

### **2.1. Basic knowledge of mine gas prevention and control**

This course will cover the basic knowledge of the generation, characteristics, hazards, and prevention and control measures of mine gas, aiming to provide students with a comprehensive understanding of the importance and necessity of mine gas prevention and control.

## **2.2. Mine Gas Detection Technology**

This course will introduce the types, principles, usage methods, and operating techniques of gas detection instruments in mines, aiming to enable students to understand the basic principles and practical applications of mine gas detection technology.

## **2.3. Use and maintenance of mine gas prevention equipment**

This course will introduce the types, principles, usage methods, and maintenance of gas control equipment in mines, aiming to provide students with an in-depth understanding of the basic principles and practical applications of gas control equipment in mines. Students will also learn how to correctly use and maintain the equipment.

## **2.4. Practical Operation of Mine Gas Prevention and Control**

Through practical operation, students will be able to master the use methods and operating skills of mine gas prevention equipment, and understand possible problems and solutions in actual operation.

## **2.5. Formulation of mine gas prevention and control plan**

Through case analysis and practical operations, students can understand the formulation and practical application of mine gas prevention and control plans, and master the skills and methods of formulating plans.

## **2.6. Emergency Treatment of Mine Gas Accidents**

Through introduce the emergency handling process, emergency plans, and emergency measures for mine gas accidents, students can understand the emergency handling methods and skills for mine gas accidents, and master the basic ability of emergency handling.

## **3. Necessity of Practical Teaching Reform of Mine Gas Prevention and Control**

The reform and innovation of practical teaching of mine gas prevention and control is of great significance and role in improving the quality and level of mining engineering education and cultivating high-quality mining engineering talents.

### **3.1. Strengthen students' practical ability**

The practical teaching of mine gas prevention and control is an important practical teaching link. Through practical operation and practice, students' practical ability can be enhanced, and their practical operation skills and emergency handling ability can be improved.

### **3.2. Promote the reform of engineering education**

The practical teaching reform of mine gas prevention and control is an important component of engineering education reform. Through reform and innovation, the quality and level of mining engineering education can be improved, and technical talents with innovative spirit and practical ability can be comprehensively cultivated.

### **3.3. Promote the integration of production, education, and research**

The practical teaching reform of mine gas prevention and control can promote the integration of production, education, and research, promote the complementarity of practical teaching, scientific research, and production practice, improve teaching quality and effectiveness, and provide strong support for the development and innovation of mining engineering majors.

### **3.4. Adapt to industry development needs**

Based on the rapid development of the domestic coal industry in recent years, the technical and management requirements for mine gas prevention and control are also constantly updated and improved. The practical teaching reform of mine gas prevention and control can adapt to the development needs of the industry, cultivate mining engineering talents that adapt to the development of the industry, and improve their actual operating skills and emergency handling capabilities.

### **3.5. Cultivating innovative talents**

The practical teaching reform of mine gas prevention and control can cultivate mining engineering talents with innovative thinking and practical application abilities, encourage students to explore and increase professional knowledge in practice, strengthen their ability to apply the knowledge they have learned to solve learning and future work, and provide strong support for the innovative development of the industry.[1]

In short, the practical teaching reform of mine gas prevention and control has important significance and role in improving the quality and level of education in mining engineering, cultivating high-quality mining engineering talents, promoting the reform of engineering education, promoting the integration of production, education, and research, adapting to the development needs of the industry, and cultivating innovative talents.

## **4. Difficulties Faced by Practical Teaching Reform of Mine Gas Prevention and Control**

### **4.1. Limited practical teaching conditions**

The practical teaching of mine gas prevention and control needs to be conducted at the mine site, but the conditions at the mine site are often limited, such as the depth of the mine, geological conditions, gas content, etc. These conditions have seriously affected the teaching quality and effectiveness of this major.

### **4.2. High security risk**

The practical teaching of mine gas prevention and control is a course related to mine safety issues. Through practical teaching, students are taught how to effectively prevent and control mine gas and ensure the safety of miners. However, due to the extremely high risks in the mine environment, students may face certain safety risks in the practice process. In mines, safety issues such as gas explosions and collapses are very common, and these issues must be effectively controlled and managed to ensure the safety of students.

### **4.3. Insufficient teaching staff**

The practical teaching of mine gas prevention and control is one of the important teaching contents for mining engineering majors. It can help students deeply understand the characteristics, hazards,

and prevention measures of mine gas, and improve their coping ability and safety awareness in practical work.[2] However, to carry out high-quality practical teaching of mine gas prevention and control, it is necessary to have a certain number of teachers. Currently, the faculty of mining engineering is relatively insufficient, mainly due to the particularity of mining engineering, which requires teachers to have rich practical experience and professional knowledge. These special requirements make the teaching staff of mining engineering relatively scarce. At the same time, with the continuous development of the mining industry, mine gas prevention technology is also constantly innovating and developing, requiring teachers to continuously update and learn professional knowledge in order to maintain the high quality of their teaching level.[3]

#### **4.4. Single teaching content**

Currently, the practical teaching content of mine gas prevention and control is relatively simple, mainly focusing on gas detection, emission, extraction, and other aspects, lacking innovation and diversity, which will affect the learning interest and ability cultivation of students. In short, strengthening the innovation and diversification of practical teaching content for mine gas prevention and control can not only improve students' interest in learning, but also cultivate their comprehensive and practical abilities, making contributions to the development of mining industry and the safety and security of miners.[4]

### **5. Strategic Suggestions on Practical Teaching Reform of Mine Gas Prevention and Control under the Background of Engineering Education**

Mine gas prevention and control is a very important content in mining engineering, and is also an indispensable skill for mine safety work. In order to improve students' practical ability of mine gas prevention and control, it is necessary to innovate and reform the teaching of mine gas prevention and control. Here are some strategic suggestions:

#### **5.1. Optimization of practical teaching content**

In the practical teaching of mine gas prevention and control, the knowledge in the teaching materials should be integrated with the practical operation of students on campus, and emphasis should be placed on strengthening the practical application and operation abilities of students on campus. At the same time, attention should be paid to cultivating students' safety awareness and safety operation ability, so that students can truly experience the importance of mine gas prevention and the difficulty of actual operation in practice.

#### **5.2. Innovation in practical teaching methods**

In practical teaching, virtual simulation technology, laboratory simulation technology, and other means can be used to enable students to conduct practical operations under safe conditions, improving the efficiency and safety of practical operations. In addition, professionals from mining enterprises can be invited to provide practical operation guidance to students to better understand the actual operation of mine gas prevention and control.

#### **5.3. Improvement of practical teaching environment**

In order to improve students' practical application abilities, it is necessary to improve the teaching environment on campus. A practical teaching base for mine gas prevention and control can be

established to provide students with a more realistic practical operating environment, enabling them to better understand the actual operation of mine gas prevention and control and their ability to respond to emergencies. In addition, in practical teaching, it is also possible to focus on safety education for students in school, enhance their safety awareness and safety operation standards, and enable them to improve their safety awareness and form good safety habits in practice.

#### **5.4. Improvement of practical teaching evaluation**

Practical teaching evaluation is an important part of teaching reform, and multiple evaluation methods can be used, such as practical operation assessment, experimental report scoring, and practical operation video evaluation, to comprehensively evaluate students' practical operation ability and theoretical knowledge mastery. At the same time, it is also possible to timely understand the shortcomings of practical teaching through student feedback, teacher evaluation, and other ways to further improve the content and means of practical teaching.

#### **5.5. Strengthening the construction of the teaching staff**

Teachers are an important component of practical teaching, and it is necessary to strengthen the construction of teachers' team. Through teacher training, experience exchange, and other methods, teachers can improve their practical operation ability and teaching level, allowing them to better guide students in practical operations. At the same time, it can also strengthen the contact between teachers and mining enterprises, understand the latest development and practical operation technology of mining enterprises, and provide richer content and means for practical teaching.

#### **5.6. Improvement of student participation**

In practical teaching, attention should be paid to students' participation, allowing them to actively participate in practical operations, and improving their practical and autonomous learning abilities. Group collaborative learning, case analysis, and other methods can be used to enable students to collaborate and communicate in teams during practical operations, improving their learning effectiveness and results.

#### **5.7. Combining with industry practice**

In order to better cultivate students' practical operation ability, it is possible to combine it with industry practice and invite professionals from mining enterprises to provide practical operation guidance, so that students can better understand the actual operation of mine gas prevention and the ability to respond to emergencies. At the same time, industry practice cases can also be introduced to enable students to understand the actual operation and workflow of mining enterprises, and improve their practical operation and application abilities.

#### **5.8. Continuous improvement and improvement**

Practical teaching reform is a continuous process that requires continuous improvement and improvement. Through student feedback, teacher evaluation, industry practice, and other methods, we can understand the shortcomings of practical teaching, further improve the content and means of practical teaching, and improve students' learning effectiveness and results. At the same time, it can also strengthen the construction of the teaching team, improve the practical operation ability and teaching level of teachers, and provide richer content and means for practical teaching.

### 5.9. Pay attention to the practical application of practical teaching

In practical teaching, emphasis should be placed on practical application to enable students to apply the theoretical knowledge they have learned to practical operations. Practical cases can be introduced to enable students to solve practical problems through practical operations and improve their practical application abilities. At the same time, professionals from mining enterprises can also be invited to share practical operation experience, so that students can better understand the practical application scenarios of practical operation.

### 5.10. Combination of practical teaching and scientific research

Combining practical teaching with scientific research can improve students' scientific research ability and practical operation ability. Scientific research projects can be introduced to enable students to conduct scientific research exploration and experimental design in practical operations, improving their scientific research and practical operation abilities. At the same time, it can also apply the results of practical teaching to scientific research projects, promoting the mutual promotion and development of practical teaching and scientific research.

## 6. Conclusion

With the rapid development of China's industry in recent years, the development of the mining industry has also received increasing attention. As an indispensable part of the mining industry, mine gas prevention and control is extremely important for ensuring the safety of mining personnel and the sustainable development of mining enterprises. Therefore, it is imperative to innovate and reform the practical teaching mode of mine gas prevention and control. In the context of engineering education, the innovative reform of the practical teaching system for mine gas prevention and control needs to focus on the combination of theory and practice, and on strengthening the practical operation ability and safety awareness of students on campus. On this basis, it also needs to innovate practical teaching methods and improve the practice campus environment, strengthen the construction of the professional teaching staff and enhance student participation, and integrate with industry practice. Through the above reform research, it can better improve the practical operation ability and safety awareness of students in school, strengthen their innovation ability and practical application ability, and improve their employment competitiveness and practical operation ability.

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