

# Exploring the Safety Production Management Mode of Scientific Research Lab

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## Abstract

The university laboratory is an important base to undertake experimental teaching, scientific research and innovation, and improve the practical ability of college students, which has also gathered most of the cutting-edge technical equipment and educational resources. It can be seen that the safety of the scientific research laboratory is an important basis to ensure the order of scientific research and teaching activities. However, college laboratory safety accidents have occurred frequently, causing incalculable losses. Learning and drawing lessons from the advanced concepts and management methods in laboratory safety of colleges and universities of developed countries plays a significant role in establishing and improving the laboratory safety management system of colleges and universities in China, giving impetus to create a safe campus and maintain social harmony.

## Keywords

University laboratory; Safety management; Management system.

## 1. INTRODUCTION

In recent years, with the continuous improvement of scientific and technological innovation ability of colleges and universities, the construction of laboratories in colleges and universities has reached a new level. The safety and stability of university laboratories are closely related to the health, lives and property safety of teachers and students, as well as social harmony and stability. All civilized countries in the world attach great importance to them. This paper is divided into three parts, which aims at analyzing the defects of laboratory safety management in colleges and universities, and briefly introducing the laboratory management mode of foreign colleges and universities. It provides reference for domestic colleges and universities to improve the level of safety management.

## 2. CURRENT SITUATION OF LABORATORY SAFETY MANAGEMENT IN CHINA

### 2.1. The Safety Management System of University Laboratories Needs to Be Improved

Colleges and universities are important bases covering multidisciplinary teaching and scientific research, involving chemistry, biology, medicine, food, machinery, physics and other disciplines. This shows that the management of the school safety responsible department involves various fields. Large management scope and high complexity are the weaknesses of university laboratory management. Some colleges and universities have set up many kinds of laboratories according to needs, but they are managed uniformly with the same management system[1]. For some special and high-risk laboratories, there is inevitably a certain security risk due to the lack of targeted management measures. The laboratory safety management rules and regulations are poorly implemented, lack of supervision, and unclear rewards and punishments

are key issues. At present, the laboratory management rules and regulations formulated by the vast majority of colleges and universities according to the national requirements are virtually non-existent due to the weak implementation of the university leaders and laboratory management departments. The main reason is that there is no corresponding supervision mechanism for the implementation of the safety management rules and regulations, and the rewards and punishments are unclear. Once an accident occurs, the handling of the responsible subject is mostly a mere formality. Most universities have not established a risk management and control mechanism for experimental activities, and there is no risk identification system, risk assessment system, full cycle management system for hazard sources, safety emergency system, access system for laboratory personnel, etc[2]; In addition, supporting systems such as regular inspection system, emergency plan system, emergency drill system, accountability and reward and punishment system have not been well implemented.

## **2.2. The safety Awareness of University Laboratories Needs to Be Strengthened**

It is a common problem that college teachers do not pay enough attention to laboratory safety in most colleges and universities. Many teachers usually convey laboratory safety knowledge and experimental precautions orally in class. Laboratory safety education has little effect. Laboratory managers have insufficient awareness of the hazards of possible accidents and weak risk awareness. Many laboratory managers always have a fluke mentality, believing that the possibility of accidents is very small. However, ordinary teachers and students think that the safety of the laboratory is a matter for the laboratory staff and has little to do with themselves. This negligence is the biggest problem in the safety management of university laboratories[3].

## **2.3. Insufficient Laboratory Funds**

In China, laboratories in various colleges and universities are under funded to varying degrees, and even some colleges and universities have misappropriated insufficient laboratory funds. Due to the lack of funds for university laboratories, the laboratories in many universities are not large in scale and the equipment is relatively old, which cannot cultivate students' experimental ability. In recent years, although the education funds of various colleges and universities are increasing, the proportion of investment in laboratory funds is decreasing. Many university laboratories lack stable financial support, which makes it difficult for the laboratory to play its due role.

Building a laboratory that meets the safety standards is the key to do a good job in laboratory safety management. At present, the aging experimental equipment in many colleges and universities has not been eliminated in time, such as smoke alarm, waste water vapor recovery device, toxic and dangerous laboratory supplies counter, etc., which has brought potential safety hazards to the laboratory[4]. Due to the lack of funds, many laboratories in the school have the problem that the aging equipment can not be updated in time. The continued use of aging experimental equipment will inevitably bring potential safety hazards to the laboratory. In addition, some university laboratories are not fully equipped with emergency facilities. Such necessities as fire prevention, electric shock prevention, burn prevention, poison prevention, eye protection, emergency medical appliances and drugs, which are necessary to ensure laboratory safety by agreement.

## **3. LABORATORY MANAGEMENT IN FOREIGN UNIVERSITIES**

The model of German university laboratories is similar to that of China, that is, they are all funded by the university, and there is no additional funds for the laboratories themselves. However, the laboratory management in Germany is more standardized and outstanding. They have finely allocated laboratory personnel according to different work functions. For example, the laboratory director is responsible for the transfer of laboratory personnel; The instructor is

responsible for the design and arrangement of teaching experiments; The management personnel are responsible for daily work such as equipment management; The staff shall be responsible for equipment cleaning, etc. In this process, German universities attach great importance to the quality of laboratory personnel themselves, and will conduct regular assessment on them. Not only that, there are very few confirmatory experiments in the laboratory, most of which are to solve real problems encountered in daily life, or research projects required by the market. The knowledge learned by students through laboratory experiments is also highly practical and has good practical ability, which makes it easier for laboratories to obtain financial support from enterprises. On the other hand, in our university laboratories, many experiments are confirmatory experiments, and the comprehensive quality of laboratory personnel is not up to the standard, resulting in a vicious circle of bad laboratory development environment.

Domestic laboratories have neglected the safety of laboratories, and many laboratories have not seriously considered the special requirements of chemical laboratories at the beginning of construction[5]. No basic safety facilities and lack of publicity and universal education on safety knowledge are main problems in Chinese universities laboratory management. The British chemical laboratory has complete safety facilities, and the design of the laboratory building also fully considers the safe passage for escape after an accident. The first training in the laboratory is to inform the laboratory of the safety measures, the location of fire protection equipment, the escape routes in case of accidents and other information.

Although the safety education and management of laboratories have been repeatedly emphasized in China, they are mostly formalistic and difficult to adhere to for a long time. There is a lack of practical and specific measures to ensure that the safety education is deeply rooted in the hearts of the people. The Department of Chemistry of Bristol University attaches great importance to laboratory safety and personal safety. Each laboratory is equipped with sprayers, eye washers and first aid kits. It is stipulated that everyone must wear protective glasses, gloves and work clothes in the laboratory.

The University of Leeds, a world famous university that has never had a major safety accident in more than 60 years after the Second World War, has its own excellence in laboratory safety management. Leeds University uses the "Environment, Health and Safety" (EHS) management system to build a safety management information system with specific and practical safety responsibilities assigned to people at all levels. The university is equipped with a full set of software and hardware systems and relevant personnel to ensure the normal operation of daily safety management. Software: through the establishment of a complete security management system to achieve security in the school network. It mainly includes the list of safety directors at all levels, scope of jurisdiction and contact information, safety manuals and training materials of each laboratory, information filling and management system of dangerous goods and dangerous equipment, registration and authorization system of laboratory equipment and personnel, monitoring of key areas, patrol records and accident notification. The hardware includes three parts: (1) Access control management at all levels; (2) Install sensors and cameras in key areas for monitoring and early warning; (3) Independent safety protection and equipment management shall be carried out for valuable and dangerous equipment and articles, such as fireproof, radiation proof and corrosion proof containers with password locks.

## **4. IMPROVEMENT OF LABORATORY MANAGEMENT STRATEGY IN DOMESTIC UNIVERSITY**

### **4.1. Improving the Laboratory Safety Management System**

We should determine the division of responsibility for laboratory safety management and improve the whole process management mechanism of the laboratory, and specify the specific

responsible person of each link. The laboratory teachers are responsible for the daily management and inspection of the laboratory. The teachers who carry out the experimental teaching are responsible for the safety of the experiment. The leaders in charge of the college and the laboratory director regularly or irregularly carry out the laboratory safety supervision. If problems are found, they should be timely handed over and urged to solve them[6]. If they persist in teaching, the relevant personnel should be held accountable. In addition, the laboratory supervision group inspection, the educational affairs office and the security office inspection should also conduct regular inspection, including laboratory inspection before school starts, seasonal inspection, laboratory safety spot check and other forms. We should formulate and improve the laboratory safety management assessment mechanism, incorporate the laboratory safety management into the year-end assessment indicators for teachers, give preference to teachers with good laboratory safety management in terms of professional title and excellent evaluation, mobilize the enthusiasm of teachers to implement safety management, and improve their safety awareness.

#### **4.2. Strengthening the Safety Awareness of Students**

In addition to strengthening laboratory safety training for teachers, attention should also be paid to improving students' laboratory safety awareness. The Academic Affairs Office of colleges and universities should take the lead in setting up laboratory safety courses, carry out laboratory safety education for students on a regular basis, which will be included in credits in the year-end final examination, so as to improve students' enthusiasm for learning. Especially for students majoring in chemistry and biology, they are regular "household" of the laboratory. As a member of the laboratory, we can select some students with solid business knowledge and outstanding hands-on ability as laboratory assistants to help experimental teachers participate in the laboratory management, which can not only reduce the workload of teachers, but also improve their own safety awareness[7]. The Academic Affairs Office and the Security Office shall cooperate with the experimental center of the secondary college to organize and carry out laboratory safety emergency drills on a regular basis, guide teachers and students how to deal with and resolve possible emergencies in the laboratory, improve teachers and students' safety knowledge reserve and ability to rescue themselves and constantly improve teachers and students' safety awareness in the laboratory.

### **5. CONCLUSION**

Colleges and universities should strengthen the level of laboratory safety management in an all-round way. In addition to improving the safety awareness of teachers and students and the level of safety management system, we can also build a complete and powerful laboratory safety system by using advanced information technology and various network support platforms to strengthen and improve the construction of university laboratory safety management system, improve the level of laboratory safety management, and achieve effective management of university laboratories.

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