

Exploration on Laboratory Management

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Abstract: With the development of science and technology, the construction and management of laboratory becomes more and more important. This paper mainly discusses the issues related to laboratory construction and management, including the formation of laboratory management and its definition, the basic idea of laboratory construction and management, the main contents of laboratory construction and management, the problems of laboratory management and the study of countermeasures. Through the research and discussion on laboratory construction and management, it aims to provide reference for laboratory construction and management.

1. Introduction

A laboratory is a specialized place for scientific research, technology development and experimental teaching, which usually includes hardware conditions such as experimental equipment, experimental materials, experimental apparatus, computer systems and software environments, and software conditions such as research teams, researchers and experimental operators. Laboratories can be used for various scientific research and experimental operations, such as research and experiments in the fields of physics, chemistry, biology, medicine, engineering, etc ^[1]. The laboratory is the practice base in the university. Building a good laboratory is one of the necessary basic conditions for running a good university. Therefore, how to plan, build, manage and use laboratories well is a problem that needs to be studied in depth.

2. The Formation of Laboratory Management and its Definition

Laboratory management has evolved with the development of laboratories. Laboratory management refers to the process of planning, construction, operation, maintenance and management of laboratories, including the organizational structure, management system, equipment management, personnel management, financial management, safety management and other aspects of laboratories.

The definition of laboratory management can be summarized as follows: laboratory management is the process of overall coordination and management of laboratory personnel, equipment, funds, information and safety through management means such as planning, organizing, leading, controlling and coordinating to ensure the smooth operation and development of laboratories, while improving their efficiency and quality. The main goal of laboratory management is to improve the level of scientific research and technological innovation in laboratories, to promote the development of scientific research and technological innovation, and to ensure the safety and sustainable development of laboratories at the same time. Laboratory management requires the development of scientific and

reasonable management systems and operating procedures to ensure the standardization and safety of laboratories. Laboratory management also needs to strengthen talent training and team building to improve the efficiency and teamwork of laboratory members ^[2]. Laboratory management needs to continuously promote innovation and development to meet the changes in scientific and technological development and social needs.

3. Basic Ideas of Laboratory Construction and Management

The construction and management of laboratories need to follow scientific norms and safety standards, and develop scientific management systems and operation rules to ensure the safety and sustainable development of laboratories. Laboratory managers need to have scientific research and management knowledge, be able to reasonably plan and manage the resources of the laboratory, and coordinate the cooperation and division of labor among laboratory members for the smooth operation and development of the laboratory.

(1) Set clear objectives and tasks: Laboratory construction and management need to clarify the objectives and tasks of the laboratory, i.e., the research direction, research content, research methods and research results of the laboratory, so that laboratory members can clearly work in the direction and objectives.

(2) Determine a reasonable organizational structure: Laboratory construction and management need to determine the organizational structure of the laboratory, including the leadership structure of the laboratory, the research team and the research staff, etc., in order to facilitate the division of labor and cooperation and coordinated management of laboratory members ^[3].

(3) Develop a scientific management system: Laboratory construction and management requires the development of a scientific management system, including laboratory management rules and regulations, laboratory financial management system, laboratory equipment management system, laboratory safety management system, etc., in order to facilitate the standardized behavior and management of laboratory members ^[4].

(4) Provide high-quality hardware facilities and software environment: Laboratory construction and management need to provide high-quality hardware facilities and software environment, including laboratory experimental equipment, laboratory computer systems, laboratory experimental materials and laboratory experimental sites, etc., in order to facilitate scientific research and experimental operations of laboratory members.

(5) Strengthening talent cultivation and team building: Laboratory construction and management need to strengthen talent cultivation and team building, including training and education of laboratory members, career planning and growth of laboratory members, team cooperation and communication of laboratory members, etc., in order to facilitate individual development and team collaboration of laboratory members.

(6) Continuously promote innovation and development: Laboratory construction and management need to continuously promote innovation and development, including the scientific research and experimental results of the laboratory, the management system and management system of the laboratory, the hardware facilities and software environment of the laboratory, etc., in order to facilitate the continuous development and progress of the laboratory.

4. The Main Elements of Laboratory Management and Construction

4.1. Save Consumables and Reduce Waste

How to effectively improve the effectiveness of the students' experiments, how to effectively and reasonably manage the consumables, to save less waste is an important task. In the experimental

process, we should pay more attention to saving less waste, mainly to do the following:

(1) Reasonable purchase of equipment to avoid idle waste. (2) Pay attention to the recycling of excess consumables after experiments to reduce expenses. (3) Pay attention to the grouping of students, control the amount of consumables taken, and reduce the amount to a minimum. In short, the use of experimental consumables should be advocated to save less waste, to maximize the effectiveness of the laboratory.

4.2. Safety is the Top Priority of Good Laboratory Management

Laboratories manage a variety of instruments and equipment, as well as hazardous materials. If improperly operated, they are prone to cause injuries, property damage and certain hazards to the environment. Safety is related to the safety of the lives of all students and teachers and the safety of school property, as well as the stability and development of the school. Therefore, the laboratory should strictly implement safety management work, which is often negligent and careless in the work, easily causing accidents. Strengthen the safety management of the laboratory to prevent problems before they occur and ensure the safety of the lives of teachers and students and school property.

4.3. Improve the Quality of Experimental Personnel

To do a good job in the laboratory, you must have a good mentality and actively engage in work. We should strive to improve experimental techniques, improve technical conditions and working environment, continuously improve the quality of experimental teaching, absorb new achievements in science and teaching, update experimental content and reform teaching methods. We should often and the brother institutions and experimental equipment units to study and exchange, visit the experimental equipment and results of the exhibition. This will not only enable us to broaden our horizons and understand the new experimental instruments, but also learn the advanced management experience of sister institutions, which will help us to learn and improve in the future ^[5].

4.4. Management of Laboratory Instruments and Equipment

Laboratory instrumentation management is an important aspect of laboratory management, which includes the management of the purchase, installation, commissioning, maintenance, repair and updating of laboratory instruments and equipment.

The following points are required when purchasing laboratory instruments and equipment: (1) understand the needs of the laboratory: before choosing laboratory instruments, you need to know exactly what types of instruments the laboratory needs and their functional requirements, frequency of use and other aspects. (2) Understand the reputation of the supplier: When purchasing instruments, the credibility of the instrument supplier should be considered. You can refer to the experience of institutions or peers, or evaluate the supplier based on factors such as product quality, quality of service, and quality of after-sales service. (3) After-sales service: When choosing laboratory instruments, the quality of after-sales service of the supplier should be considered to ensure that when there are problems with the instruments used in the laboratory, the corresponding technical support can be obtained in a timely manner. (4) Purchase method: Laboratory instruments can be purchased through formal channels or through the secondary market, but it should be noted that, regardless of the method, the quality and performance of the instruments should be ensured to meet the needs of the laboratory, simple operation, accurate indicators, reliable and have a long-term stable operation.

The installation of laboratory instruments and equipment needs to be carried out in accordance with the installation instructions and operation manuals of the instruments and equipment, and in accordance with the standard installation procedures and standards to ensure the safety and normal operation of the instruments and equipment.

The maintenance of laboratory instruments and equipment needs to be carried out regularly to

ensure the normal operation and effectiveness of the equipment. For the parts that need to be replaced, replace them in a timely manner to ensure the integrity of the equipment. For the equipment that needs to be cleaned, cleaning and disinfection should be carried out regularly to ensure the health and safety of the equipment. For equipment that needs lubrication, lubrication maintenance should be performed regularly to ensure the normal operation of the equipment. For equipment that needs calibration, calibration should be performed regularly to ensure the accuracy and reliability of the equipment.

The maintenance of laboratory instruments and equipment requires regular maintenance and servicing according to the maintenance manual and maintenance plan of the instruments and equipment in order to prolong the service life of the instruments and equipment.

The updating of laboratory instruments and equipment needs to be based on the scientific research and experimental operation needs of the laboratory, as well as the updating and upgrading of the instruments and equipment, in order to improve the scientific research and experimental operation of the laboratory in a timely manner.

The management of laboratory instruments and equipment requires the formulation of scientific and reasonable management systems and operating procedures, the establishment of instrument and equipment files and maintenance records, the strengthening of safety management and protection of instruments and equipment, and the improvement of the efficiency and quality of the use of instruments and equipment to ensure the normal operation and service life of laboratory instruments and equipment.

5. Problems of Laboratory Management and Countermeasures Research

5.1. Analysis of the Problems in the Management of laboratory Equipment

For the management of equipment in the testing laboratory, the following main problems exist.

(1) Emphasis on the use of equipment, light on the management of equipment. For a long time, the degree of importance attached to the use of laboratory equipment is higher than the degree of maintenance of the equipment. For example, the management system of various experimental equipment is not strict, the implementation is not enough, the management means are relatively backward, and the management of equipment has not formed a correct awareness and positioning. In recent years, the government has been strengthening the monitoring of various quality, the construction of testing laboratories is gradually strengthened, but the construction of the relevant system is not perfect. The management process of many experimental equipment is relatively backward. The current laboratory management process, as long as the laboratory equipment to ensure the use of little attention to its management, once the problem, will immediately find the equipment maintenance service for repair, in the actual use of the process is rarely managed. So the management of equipment is in a relatively passive situation.

(2) Insufficient attention is paid to the fault prevention of laboratory equipment. The current fault prevention of many laboratory testing equipment is also an important part of the laboratory management. In the management process of many laboratories, cannot regularly on the experimental equipment for periodic management and fault prevention, and the use of equipment does not practice the corresponding prevention concept, so that many equipment failure prevention work is not in place, in the work of laboratory equipment is easy to lead to failure and problems. For example, in the process of using analytical mass spectrometry, once there is a sudden power failure, it is likely to lead to damage to the molecular turbine pump, thus affecting the normal detection work.

(3) The maintenance of a variety of laboratory equipment and maintenance efforts are not enough. In the laboratory testing process, the maintenance of equipment and maintenance work for the performance of experimental equipment has a great impact. The maintenance and management of laboratory equipment should be treated as a daily task, but in the actual laboratory management process, the maintenance and management of equipment is often not done properly, often pay

attention to the use of equipment, ignoring the maintenance and management of equipment. Therefore, in the actual use of the process of a variety of testing structures will have a great impact. For some small problems are not dealt with in a timely manner, will accumulate into a large problem of equipment. Eventually lead to a variety of experimental equipment performance reduction ^[6].

(4) Insufficient attention to management responsibilities. For the management of testing laboratories, there must be a clear system of management responsibility, in the management of many laboratories, although there are a variety of corresponding norms and documents, but the implementation of specific responsibilities or not in place, cannot make the management of people and equipment to correspond, especially for some people operating a laboratory equipment, it is not conducive to the implementation of equipment management responsibilities. And some laboratory management, although the management of a variety of equipment designated people, but the actual management of responsibility is not strong, resulting in the management of experimental equipment there are great problems ^[7].

5.2. How to Strengthen the Management of Experimental Equipment

Problems in the management of laboratory equipment have a great impact on the quality of laboratory testing, in the actual laboratory management, especially to strengthen the management of laboratory equipment and improve the efficiency of the use of laboratory equipment. You can start from the following aspects.

(1) Establish a new management model. First, to strengthen the concept of laboratory equipment management changes. Laboratory equipment is an important means to carry out various experimental management work, and is an important basis for ensuring accurate and reliable test results. In order to ensure the accuracy as well as fairness of the test, it is necessary to strengthen the laboratory personnel's awareness of laboratory equipment management. Second, the laboratory equipment should be standardized management. The construction of the laboratory should be standardized and a modern management system should be established, and the procurement of various equipment, whether it is configuration, procurement or maintenance management, should be reasonable. In the management to strengthen the comprehensive management capacity. Improve the comprehensive utilization rate of various equipment and technologies in the testing laboratory. The relevant person in charge of the testing laboratory, to take the lead in the standardized management of the laboratory and a variety of equipment, the development of appropriate management measures, the corresponding refinement of a variety of work to ensure that in the actual work can be done in accordance with the rules ^[8].

(2) Strengthen the prevention of various laboratory equipment failures. In the laboratory equipment management, to strengthen the prevention of various failures, to "prevention-oriented" equipment management policy and principles for the management of laboratory equipment. In the process of fault prevention, to implement regular maintenance, according to the corresponding plan for maintenance work, to prevent various accidents, the use of equipment to effectively improve the efficiency. To ensure the smooth conduct of testing work. Laboratory equipment failure prevention, one is to carry out preventive maintenance, one is to carry out improved maintenance, both ways need to regularly assess the performance of laboratory equipment to check the status of use, to ensure that a variety of equipment can be used effectively ^[9].

(3) Develop corresponding management plans to strengthen the management of laboratory equipment. In the process of management of laboratory equipment, a detailed management plan should be formulated and the corresponding almost should be implemented in accordance with the regulations. Such as inspection plans for various testing instruments, plans for maintenance and repair, calibration plans, etc. Each plan is an important and indispensable regulatory document in the process of laboratory equipment management, testing centers to be developed in accordance with the corresponding provisions, and in the actual work, but also to strengthen the role of supervision to promote the implementation of each plan ^[10]. And in the actual work to evaluate the effectiveness of

the various plans to ensure that the performance of laboratory equipment can be in good operating condition.

(4) Clear responsibility for the management of experimental equipment. In the management of experimental equipment, the management responsibility is not clear enough, is a serious experimental reality. Due to the implementation of responsibility is not in place, so that the management of experimental equipment often also cannot achieve the corresponding effect. Therefore, in the actual management process, should be to develop the corresponding responsibility management specification system, in the daily use of instruments and equipment in the process of strengthening the management of equipment.

6. Conclusions

In a word, the laboratory is a platform for carrying out experimental teaching and scientific research projects, an important symbol reflecting the teaching, scientific research level and school strength of the school, and an important place for students to carry out comprehensive and integrated quality education and cultivate innovative ability and experimental skills. Under the current situation, the laboratory management construction of colleges and universities is in the transitional period of development, and there are many imperfections, each university should optimize the original laboratory management system according to its own actual situation, and find the most suitable management mode for its own characteristics, in order to better manage the laboratory, provide a good experimental environment for laboratory teachers, students and researchers, and cultivate more high-quality talents for the society. We will continue to optimize the original laboratory management system to find a management style suitable for our own characteristics in order to better manage the laboratory, provide a good laboratory environment for laboratory teachers, students and researchers, and cultivate more high-quality talents for society.

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