Research on Laboratory Construction and Management in the Context of Applied Universities

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Abstract
Applied universities refer to the exploration of a new educational model that combines undergraduate education with vocational education. In the exploration of educational reform, emphasis is placed on strengthening practical aspects and practical teaching. Practical teaching is an important link in cultivating students' practical and innovative abilities, as well as an important way to improve students' social-professional literacy and employment competitiveness. The laboratory is an important battlefield for practical teaching, technological innovation, and achievement transformation in universities. Therefore, laboratory construction and management are important links in the exploration of undergraduate teaching models in applied universities and are essential support for the reform and development of schools. To some extent, they reflect the teaching, scientific research, and management level of a school. In exploring the importance of laboratory construction and management in universities, this article identifies common problems that currently exist in laboratory construction and management, and proposes effective solutions to these problems.

Keywords
Applied universities, Laboratory construction, Laboratory management, Practice teaching

With the increasing demand for skilled talents in society, the country is paying more and more attention to the cultivation of applied talents. Applied universities refer to the exploration of a new education model that combines undergraduate education with vocational education. After entering the 21st century, domestic higher education has gradually formed a focus on practical teaching and strengthened the cultivation of applied technical talents. In the exploration of educational reform, emphasis has been placed on strengthening the practical environment, increasing the requirements for experimental assessment operations and safety management. Practical teaching is an important link in cultivating students' practical and innovative abilities, as well as an important way to improve students' social-professional literacy and employment competitiveness. Therefore, the construction and management of laboratories are of great significance for local universities. There are still many problems in the construction and management of university laboratories. This article investigates and summarizes many common problems in the construction and management of university laboratories, and proposes corresponding solutions for reference.
1. The importance of laboratory construction and management in universities

As an important component of universities, laboratories bear the responsibility of professional practical teaching, professional knowledge development, and expansion, and undertake important tasks such as talent cultivation, technological innovation, and achievement transformation (Wang Dong et al., 2023). They are an important battlefield for universities to cultivate innovative talents. Laboratory construction and management are essential and important supports in the exploration of applied undergraduate teaching models, which to some extent reflect the teaching, scientific research, and management level of a school.

1.1 The laboratory is the foundation for exploring applied undergraduate teaching models

The exploration of applied university teaching mode is an exploration of educational reform that emphasizes practical teaching and strengthens the cultivation of applied technology talents. The laboratory is a research base established in key disciplines. Through scientific and effective management and coordination, it creates a platform for gathering and exchanging scientific researchers, builds a bridge for the intersection and integration of different disciplines, and promotes the integration of scientific research achievements and industries (Zou Wentong et al., 2022).

1.2 The laboratory is a training base for innovative talents

The main goal of applied universities is to cultivate innovative and practical talents who can serve local economic development, and practical teaching is an important component of university teaching. This requires applied universities to change their thinking when constructing laboratories, with the main goal of serving the cultivation of applied talents, focusing on scientific and technological issues, conducting innovative research, and cultivating innovative talents.

1.3 The relationship between the construction and management of university laboratories

The construction and management of university laboratories include two levels of content, namely laboratory construction and laboratory management. Laboratory construction includes the establishment of laboratories, the addition of corresponding equipment and equipment, the updating of corresponding technologies and equipment, the increase of relevant researchers, and the improvement of existing researchers' abilities. As the main battlefield of education and scientific research, universities shoulder the responsibility of cultivating and transporting applied talents for social scientific research construction. A good laboratory environment and management system can improve the efficiency of experimental teaching and innovation for students and teachers (Shi Xianhong et al., 2022). On the basis of the laboratory management system in universities, the experimental results of the laboratory can be guaranteed, and the quality of experimental and practical teaching can be consolidated.

2. Problems in the construction and management of university laboratories

With the continuous increase in the number of university laboratories, the overall management pressure of universities is also not increasing, which has caused a contradiction between the construction and management of university laboratories. This article comprehensively summarizes several common problems in the construction and management of university laboratories through research and explores solutions (Yang Qin et al., 2022).

2.1 The management of the laboratory is outdated

The problem of disconnection between laboratory construction and management in most universities is common. On the one hand, the management work of the laboratory needs to be carried out synchronously during the construction process. In the management process of laboratories, there are many trivial contents, but most universities do not carry out systematic planning in the construction and management of laboratories. The inadequate coordination of construction and management resources also leads to the inability to coordinate and form an organic whole in the construction and management process of laboratories, thereby affecting the development of university laboratories. On the other hand, many universities have obvious shortcomings in laboratory safety management, lack a complete system, and inadequate educational content (Wang Huiyin et al., 2022). At the level of laboratory safety assessment in universities, there is also a lack of practical and feasible assessment methods, and students also lack a high awareness of safety experiments. When conducting experiments in daily life, it is easy to generate safety hazards. This has had a negative impact on the construction of university laboratories.
2.2 The experimental equipment was not shared

For university laboratories, various instruments and equipment can to some extent highlight the overall level of laboratory construction. Most universities are placing increasing emphasis on the construction and management of laboratories, resulting in an increasing number of instruments and equipment in the laboratory. However, at the same time, there is also a waste of some resources. On the one hand, the number of instruments and equipment has increased, and many instruments and equipment do not have high utilization rates, leading to resource waste. The emergence of such problems is mainly due to the failure to develop a comprehensive plan when trying to build and manage laboratories, and the lack of emphasis on sharing mechanisms when purchasing and managing laboratory instruments and equipment, resulting in repeated purchases of instruments and equipment, leading to a significant decrease in resource utilization. On the other hand, there is no effective sharing mechanism for some large instruments and equipment. Different colleges and majors often purchase large-scale equipment based on the needs of their disciplines and projects, but these instruments and equipment are limited to internal use within their own colleges, resulting in repeated purchases of large-scale instruments and equipment at the school level. These types of equipment are often expensive and have high maintenance costs, resulting in resource waste.

2.3 The experimental technicians are not professional

The construction and management of a laboratory cannot be separated from laboratory technicians, who play an important role in the safe operation of various laboratory tasks. The development of the laboratory puts forward higher requirements for the technical level and self-positioning of management personnel. On the one hand, some universities attach great importance to laboratory teams and introduce full-time experimental teams, but most of them are relatively young and lack practical experience. Some universities even have part-time experimental management. The job responsibilities of experimental management personnel are unclear, and the laboratory work assessment system is lacking. These will all affect the development of the laboratory. On the other hand, the education department did not provide specialized technical training for laboratory management personnel, which also affected the progress and development of the talent team in laboratory technology.

3. Suggestions for Strengthening the Construction and Management of University Laboratories

In response to the common problems in the construction and management of university laboratories mentioned above, this article proposes the following solutions for selection:

3.1 Constructing Informationization Management of University Laboratories

With the development of the network information era, the amount of data formed in the process of experimental management continues to increase. In the laboratory management process, big data technology is used for management, and its functions such as data information collection, extraction, storage, and interaction are utilized. This not only improves the level of data management but also further realizes the value of data and improves the utilization rate of data. Universities can adopt mature laboratory information management systems, such as Thermo Scientific Core LIMS, which can meet the basic needs of laboratory reagent consumables inventory management, experimental record management, and sample management, ensure the safety and traceability of experimental data, and help laboratories quickly achieve digitization.

3.2 Improve the safety management of university laboratories

Laboratory safety management is very important. On the one hand, in order to ensure the good operation of laboratory safety management, various management rules and regulations during the laboratory safety management period should be scientifically adjusted. Each functional department should have a scientific division of labor, cooperate effectively with each other, and vigorously implement the responsibility system to ensure that responsibilities can be implemented effectively. On the other hand, it is necessary to establish a good laboratory safety management training and assessment system. Universities should attach importance to the construction of a safety management culture, normalize safety education work, and effectively improve the experimental safety awareness of teachers and students. Teachers and students can only enter university laboratories for learning and research after passing safety training and corresponding assessments. Through the above methods, the goals of laboratory construction and management in universities can be effectively achieved.
3.3 Promote the sharing of large-scale instruments and equipment

When constructing and managing university laboratories, it is necessary to coordinate instruments and equipment, promote the sharing of large-scale instruments and equipment among various colleges, improve the utilization rate of instruments and equipment, and avoid the occurrence of low equipment utilization rates. On the one hand, it is necessary to establish a mechanism for sharing instruments and equipment in university laboratories, break through the limitations and constraints of ideological concepts, and make the use of instruments and equipment open, thereby enhancing the efficiency of their use. On the other hand, at the beginning of laboratory construction, before purchasing instruments and equipment, it is necessary to conduct implementation planning and argumentation at the school level, in order to optimize the instruments and equipment in university laboratories.

3.4 Strengthen equipment maintenance management

An important aspect of the construction and management of university laboratories is the maintenance and management of experimental equipment. At present, many university laboratories are managed in a closed manner, which results in a low utilization rate of experimental equipment and can also affect the efficiency of equipment use. During the operation of the laboratory, training is provided to laboratory management personnel to enhance their awareness and ability in equipment maintenance and management, enabling them to operate experimental equipment in an effective manner, ensuring the normal use of experimental equipment to the greatest extent possible and avoiding damage. If equipment damage is found, an immediate warranty is required to extend the service life of the experimental equipment, which is beneficial for improving the quality and efficiency of laboratory equipment management in universities.

3.5 Improving the Quality of Laboratory Management Personnel

With the accelerated application of technologies such as artificial intelligence, big data, and cloud computing, in order to achieve informationization in laboratory construction and management, top-notch laboratory management talents are even more needed. Therefore, improving the informatization level and ability quality of laboratory technicians becomes even more important. On the one hand, the method of "inviting in and going out" can be used to establish a learning community, provide information technology training and security awareness training for experimental technicians, and improve their information technology skills and laboratory management level. On the other hand, it is necessary to establish appropriate incentive mechanisms, adjust the training and performance evaluation of experimental technicians, and enhance their work initiative and enthusiasm. Universities can also encourage full-time teachers to join in laboratory construction and management, which can simultaneously improve their professional and practical skills. In addition, universities can collaborate with enterprises to allow experimental technicians to conduct inspections in the enterprise, accumulate work experience, and improve work abilities. After universities have established a communication platform for instruments and equipment, they have also provided a platform for experimental technicians to engage in professional communication, learn together, and progress together, thereby promoting the development of their professional abilities.

3.6 Establishing a public laboratory

Establishing a public laboratory is beneficial for improving the utilization rate of equipment and reagents, making full use of funds, shortening the equipment update and addition cycle of laboratory construction, strengthening management, and providing support for standardized laboratory management. In addition, it is necessary to establish scientific and effective management systems and regulations, and implement quantitative management to achieve standardization and standardization of laboratory management, fully utilize the efficiency of laboratory use, and improve the utilization rate of the laboratory. Public laboratories can arrange experiments in a more centralized manner based on specific tasks, so as to maintain a relatively high level of laboratory utilization (Wang Dong et al., 2023).

4. Summary

In summary, with the increasing demand for applied and practical talents in society, the thirst for innovative talents directly affects the continuous transformation of higher education towards cultivating applied talents. Laboratory construction and management are important links in the exploration of applied undergraduate teaching models. The quality of laboratory construction and management directly affects the ultimate effect of cultivating practical and innovative talents in schools. It is also a long-term and arduous task that must be combined with the actual situation of universities. Universities should take a long-term perspective, scientifically examine the problems in laboratory construction and
management, and choose more efficient and convenient management models. Only by continuously summarizing, reflecting, and improving through practical experience can we truly enhance the overall level of laboratory construction and management, promote the transformation of applied universities in universities, and improve the effectiveness of education.

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**References**


