

## Laboratory Construction and Management

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**Keywords:** Laboratory construction and Management; Importance; Status quo; Countermeasures

**Abstract.** With the improvement of social demand for talents' practical ability, college practice and experimental teaching have become an important basis for training applied talents in engineering colleges. The construction and management of the laboratory play an important role in technical guidance and support, directly affecting the training of personnel. This paper analyzes the problems existing in the construction and management of laboratories, and puts forward some ways and Countermeasures to improve the management of laboratories so as to cultivate high-quality and competent applied and innovative talents.

### Importance of Strengthening Laboratory Construction

With the continuous improvement of the social demand for talent's actual ability, the goal of talent cultivation in Colleges and universities has entered the era of practical ability cultivation. The training of technical, applied and innovative talents is to strengthen students' practical operation and innovative ability through training. It can be seen that practice and experimental teaching have become an important foundation for talents training in engineering colleges. The construction of laboratory is an important link in the construction of experimental teaching system. It plays an important role in technical guidance and support in scientific and technological innovation activities. It is directly related to the teaching effect and further affects the cultivation of talents. However, the common problem is that the construction of experimental technical team lags behind the construction of facilities, and there are still many bottlenecks in the development, to some extent, restricting the development of schools.

### Current Status of Laboratory Construction

**Experimental Equipment Needs Upgrading.** With the continuous development of modern technology and modern education methods, after the reform of traditional teaching methods based on theory, in the strategic context of building innovation, in accordance with the practical needs of cultivating applied, compound and innovative talents, the core concept of applying learning to practice and the concept of educating people in practice are highlighted. Colleges and universities require that old laboratories with insufficient experimental teaching, large energy consumption and poor comprehensiveness be renewed and replaced, and that new types of technology, saving technology, comprehensive, characteristic specialties, scientific research and key practical subjects be constructed, managed and rationally utilized. . So that we can cultivate comprehensive talents with strong application and scientific research.

**The Selection of Instruments and Equipment Is Unreasonable and the Utilization Rate Is Low.** Instruments and equipment in Colleges and universities are the weights for the development of laboratories in Colleges and universities. They are the material basis and necessary conditions for running a school. To a certain extent, they reflect the teaching quality, scientific research level and management level of the school, and are also one of the signs of the strength of the school. With the increase of investment in laboratory construction in recent years, a large number of instruments and equipment have been purchased. However, the selection is not very reasonable. Some instruments have powerful functions and high prices. However, a prominent problem is that some instruments and equipment are not used in experiments, the utilization rate of instruments and equipment is not high, and large-scale precision instruments are not used. Long time idle equipment causes waste of

resources. How to improve the utilization rate of laboratory instruments and equipment is of great significance to the development of efficient laboratory construction.

**Serious Shortage of Experimental Team.** The lab team is badly short. Laboratory is an important part of colleges and universities, with the expansion of the scale of private colleges and universities, the number of laboratories is also increasing, the proportion of teaching tasks undertaken by the laboratory, so the number of personnel is more demanding. Specific data are shown in Table 1. At present, there is a serious imbalance between the number of laboratories and the proportion of students in private colleges. Our school is only 1:1000, while the proportion of students and experimental teachers is about 320:1 in conventional experimental teaching, and the teaching workload per capita is about 300 hours per month, which is seriously overloaded. There are 5 experimental teachers, 20 laboratory staff, and the ratio of laboratory and full-time teachers is only 1:30, which is far from the prescribed proportion of the education department.

Table 1 Scale of experimental teachers in Private Colleges

Year	StudentsNumber	TeachersNumber	Laboratory administrators Number	Experimental teachers Number
2015	30253	611	35	30
2016	29875	600	30	15
2017	31257	805	20	15

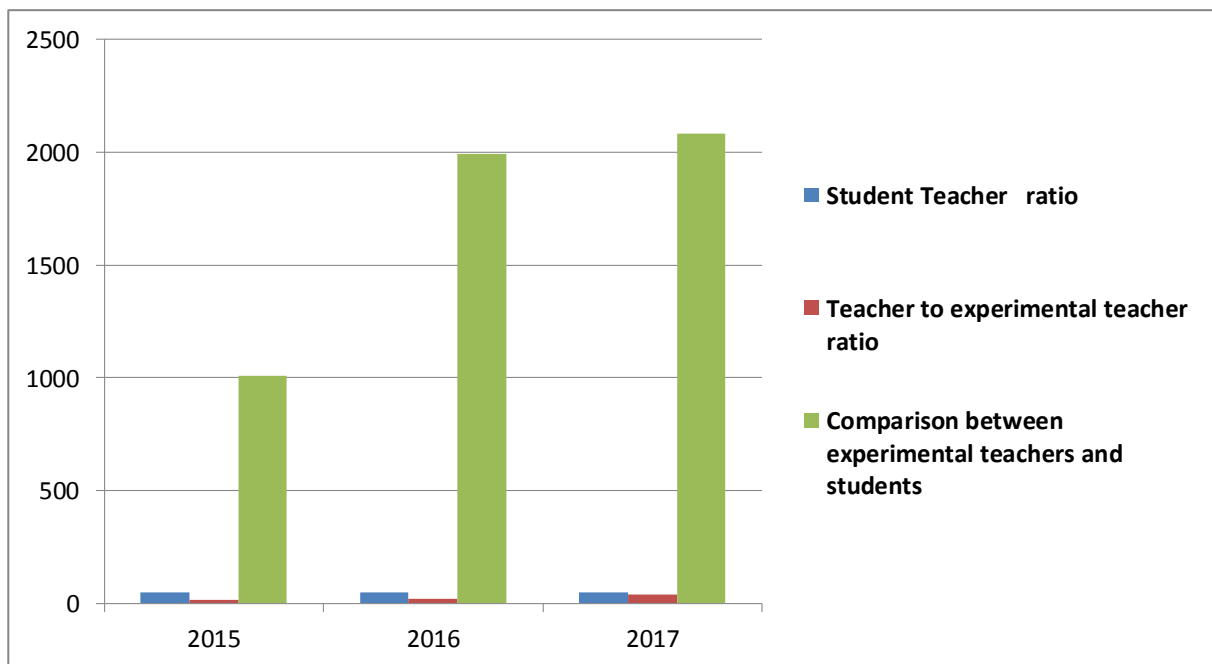


Figure1. Teacher student ratio of laboratories in Private Colleges

**Laboratory Personnel Positioning Is Low, Work Enthusiasm Is Not High.** Laboratory technical team is composed of teachers, engineers and technicians, laboratory technicians, managers and workers working in the laboratory. Each of them is responsible for its own duties and the work contents are different. It is not easy to use teaching assistants or administrators as an introduction. However, at present, the practice of private colleges is to designate the laboratory team as teaching assistants, or even as the custodian of instruments, laboratory personnel are not allowed to lecture on experimental courses, positioning is low. This kind of practice has blocked the enthusiasm and enterprising spirit of the laboratory staff, and is easy to cause instability of the experimental team.

Laboratory technicians have a heavy workload, but they are designated as teaching assistant posts. Their salaries differ greatly from those of full-time teachers. There is a phenomenon of unequal pay for equal work. When they retire, they can not enjoy 100% salary of teachers. There are also many restrictions and requirements in the title evaluation, and the training of laboratory technicians in Colleges and universities is also deficient. Many training are not allowed to participate in laboratory technicians, and promotion opportunities are few. The above reasons lead to the lack of enthusiasm for the work of experimental technicians, uneasy about their own work, not active and enterprising state.

### **Countermeasures for Laboratory Construction and Management**

In order to deepen the reform of laboratory system and break the previous laboratory management mode, system, teaching system and teaching methods. To find a modern management system of laboratory management that can speed up the construction of laboratory management in accordance with the socialist market economic system and the scientific outlook on development, give full play to the role of laboratory as an entity of teaching and scientific research such as experimental teaching, technical research, cooperation and exchange, effectively utilize the efficiency and openness, improve the quality of teaching, and Good for teaching and scientific research.

**Rational Selection and Demonstration of Laboratory Equipment.** Selection and demonstration of laboratory equipment is the key to improve the utilization rate. How to do well in the selection and demonstration of equipment is also very important. This process is the key factor to ensure the utilization rate. The selection of laboratory equipment should be determined according to laboratory construction objectives and experimental teaching tasks or scientific research tasks. When configuring instruments and equipment, it is necessary to follow the principles of selecting advanced technology, functional use, economy and rationality, and to configure instruments and equipment with high cost performance as far as possible. The selection of experimental instruments should have clear standards and detailed demonstration, and the performance requirements of experimental instruments should be fully grasped. In the process of equipment selection, in addition to the overall grasp of technical performance, but also should grasp the market price information, to make an advanced, practical, durable, reliable and economic combination of equipment configuration plan. In particular, it is prudent to purchase the electronic information equipment with a short period of service and a fast updating speed. More study and study in brother school will help to select the equipment.

**Experimental Instrument and Equipment Resource Sharing.** Laboratory equipment resource sharing is to improve the efficiency of laboratory use, solve the problem of empty and waste of laboratory time and equipment, make up for the shortage of local laboratory resources, and promote the rational use of experimental teaching and research among colleges (departments). It is also a method of laboratory construction and management. Previously, there were generally two problems: first, the colleges (departments) some of the public basic laboratories, each college (departments) are built the same laboratory, there is a waste of resources, there is no adequate rational use of resources. Some colleges are not enough, some colleges are redundant or no one is using them. Second, the use rate of professional courses such as equipment is low, only one class a year, one class and only a few hours of experiment, other time the laboratory does not use, long-term use, or no one to maintain and maintain, the existence of equipment can not be used. Therefore, universities require the rational use and allocation of experimental instruments and equipment, so as to achieve resource sharing. The idea of unified distribution and unified management for laboratory construction network information management system is established in universities.

**Increase Investment in Experimental Funds.** With the continuous development of the market economy, the price range is rising, and the prices of testing equipment and materials are also rising. Many colleges and universities lack funds for laboratories, the results of laboratory construction are not obvious, the basic conditions are difficult to keep up with, do the experimental conditions are poor, can only complete the most basic experiments, to be in-depth experimental conditions can not be met, so it is very important to train high-quality personnel, let alone cultivate innovative talents. Some

colleges and universities also cut off a lot of experiments due to lack of funds, resulting in the phenomenon that students have not learned anything. Therefore, the university laboratory must increase investment in experimental funds, in order to improve the effectiveness of laboratory construction, to ensure the quality of experimental teaching and scientific research level, but also to better train students to create knowledge and skills.

**Strengthening the Construction of Experimental Teaching Staff.** Laboratory teachers are composed of teachers, researchers, engineers and technicians, laboratory technicians, managers and workers who are engaged in laboratory work. Their characteristics are many kinds of work and different responsibilities. At present, the practice of colleges and universities is that the laboratory faculty is designated as ordinary auxiliary personnel, and people can be lab technicians, the problems are obvious. First, the importance of the quality of laboratory teachers has been reduced. Compared with the construction of theoretical teaching staff, experimental technicians have low status, many things and heavy tasks, which is not conducive to the construction, cultivation and improvement of experimental teaching staff, resulting in the decline of experimental teaching quality. Second, ignoring the role of laboratory teachers in teaching and scientific research, the enthusiasm and enthusiasm of high-level laboratory personnel are attacked, which will easily lead to personnel loss and team instability. This can not improve students' practical ability and creativity. Therefore, we should strengthen the construction of experimental teaching staff, and establish a contingent of high-quality experimental personnel with high level of technology, innovative spirit and practical ability by means of training, stabilization and introduction. Schools should adopt the maximum reward mechanism to mobilize the enthusiasm of the experimenters.

**Improving the Management System of Laboratories.** Improving the management system is the guarantee of laboratory construction and management. In daily experiment teaching and management, it is a very important link. Without the restriction of a good management system, the experimental work will be confused, the responsibility is not clear, the responsibility is not obvious phenomenon, can not improve the quality of experimental teaching. Colleges and universities should establish and improve various management systems, such as "laboratory management system", "laboratory staff duties", "laboratory staff assessment method", "laboratory work procedures", "instrument and equipment management method", "student experimental code", "laboratory synthesis". "Joint governance measures" and so on. We have improved the rules and regulations of the laboratory, strengthened the examination of the laboratory staff, and improved the management level of the laboratory.

**Reform of Experimental Teaching System and Method.** The reform of experimental teaching system is centered on the cultivation of students' practical and innovative abilities. It is necessary to establish an experimental teaching management system that combines theoretical teaching with experimental teaching in a clear and modular way. It is also necessary to construct an advanced experimental teaching environment with excellent facilities, well-organized management and all-round opening. Students learn Autonomy, cooperation and research to ensure the comprehensive improvement of the quality of personnel training. In order to improve students' practical ability and innovative ability, we should expand the content and study it deeply according to students' knowledge level and interest. The reform of experimental teaching method requires classifying basic experiment, skill experiment and innovation experiment, and realizing the teaching reform according to the order of basic skill innovation.

## **Conclusion**

In short, in the process of laboratory construction and management in private colleges, we should strengthen the construction of laboratories from the macro-level, but also from the micro-level to strengthen the management of laboratories, so as to better escort the experimental teaching and cultivate more applied, composite and innovative talents.

## Acknowledgements

The project originates from Xi'an PeiHua University "Research on Air Quality Grid Monitoring Platform Based on Internet of Things". (No. PHKT18053)

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