Improvement Upon Management System of Packaging Laboratory for an Increase of Instrument-Used Efficiency

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Abstract: Packaging laboratory is established in accordance with teaching tasks and scientific research directions. Not only should it meet the basic needs of teaching, but also take into account the special requirements of scientific research. The management level of laboratory will affect directly the quality of teaching and scientific research. In this article, the basic situation in management and maintenance of packaging laboratory of College of Packaging & Printing Engineering has been investigated thoroughly. Based on its specific conditions, a series of better principles and schemes such as “multi-subject”, “all-in-one”, “opening management”, etc. used to improve the level of laboratory management and maintenance have been put forward. The proposed management system has been adopted by Tianjin University of Science & Technology and put into practice in packaging laboratory. Through two-year practice, it is proved that the use efficiency of 80% instruments has increased at least by 20%, the trouble frequency of equipments has nearly lowered by 80% and the year income from scientific research has increased 35%. The practical capability of students has also been greatly enhanced. All of these indicate that the modified management system is feasible in practice and can get better effects in college teaching and scientific research.

Keywords: management system, improvement, use efficiency, packaging laboratory

1. Introduction

It is well known that the professional lab of college has played an important role in both teaching and research. However, an acute contradiction we often face in the establishment of lab is that the lack of funds has caused the lab to be in the long-term shortage status, which is unable to meet the needs of teaching and research. At the same time, the utilization efficiency of lab is not high, causing the waste of the resources. Usually, the pertinence of the lab is stronger, scale of the profession is smaller, and the vacancy rate of instruments is higher. The contradiction between the scarcity and waste of resources put the college in a dilemma. The fundamental way to solve the problem is how to establish a “multi-subject”, “all-in-one”, “opening management” professional laboratory.

2. The necessity of improving upon management system of packaging laboratory

For a long time, the laboratory equipment is in the management status of closure and the manager is the ultimate user. The open of laboratory is not enough, so it is more difficult to share equipments between different sectors which restrict obviously the usage efficiency of apparatus. Some major factors for these are concluded as follows:

- Equipments are usually located in several different departments and fail to achieve a comprehensive scale, which induced the technical power to distract and could not give full play to the overall superior. The scope of application of the dispersed equipments to practical teaching is smaller and only a part of students can use them. This kind of management mode has made a lot of equipments unable to play fully their roles in training the practice and innovation abilities of students.
- Many of equipments are in a kind of status of static managements and lack of tracking services. Usually, as long as the account of all equipments and the relevant equipment cards coincide with the physical objects, the related figures of equipments are accurate and procedures of equipment abandonment are complete, the management will be considered to be competent. Moreover, the supervision for the functions, development and availability rate of equipments is lacking, the management, especially for the professional management of equipments, is imperfect seriously and its important position has not been recognized. The quality of the management will affect directly the service efficiency of equipments.
- The phenomenon of “Use uttermost of equipments, neglect of maintenance” is widespread, which has made a lot of equipments be in a state of paralysis or half-paralysis affecting the normal operations of teaching and researching. Due
to limited man powers of some departments, a part of equipments are in a neglected state and their use was arbitrary and free. The faults of equipments can not be excluded in time and the lifespan of equipments will be shortened because of the lack of specialized technical supports, weakness of maintenance and lack of funds.

- The ability of the management team of equipments is poor, the brain drain is serious and the change of administrators of some equipment is faster. The skills of the administrators are hardly improved in a planned way which has prevented the formation of a strong technology team. At the same time, the not enough appreciation for human resources of property managements and lack of motivating measures have resulted in the lower initiative of administrators.

3. The construction of multi-subject, all-in-one and opening management platforms

The system of “integrative experimental researches” can exploit a new study domain and increase the quality and level of scientific and technological innovation, facilitating the developments of several technologies. Usually, the new subject and study field are always in the cross-fields of various subjects. So it is very necessary to transform the “single -subject” laboratory mode into “multi-subject” one, combining the “profession” with “integration”. In our college, “packaging laboratory” and “printing laboratory” are combined to one, named “packaging and printing demonstration centre for experimental teaching”. This laboratory will be used for experiment teaching of four undergraduate courses including packaging engineering, printing engineering, logistics engineering, wood engineering, etc. and postgraduate of all the above mentioned professions. The comprehensive laboratory is moderate and stronger in the scale and its function aspects separately and has lower running cost.

With the guide of the market, we should promote the integration of teaching, scientific research and production. First, the requirements of all the experiment teachings should be ensured, which is also the first function of labs. And all the elements of labs such as time, space, facility and regulation should be configured reasonably to accomplish the instructional functions. Second, the major laboratory should assume the research and development functions of some technology projects, especially high-technology products and technical service projects. Again, the lab should have the functions of manufacturing and managing. The products of labs may be scientific and technological achievements exploited by ourselves or other high-technology products and technical services. Our experimental centre has possessed some advanced equipments such as Automatic Gas Permeability Tester, Auto Water Vapor Permeability Tester, PC, Auto Tensile Tester, Friction/Peel Tester, Thickness Tester etc. In addition, this centre often provides technological services for some schools, packaging and printing enterprises. For example, it had provided the basic research supports for China Packaging Federation, Sichuan Changjiang Papermaking Instrument Factory, etc.

In order to make full use of the current resources, the centre has carried out an open laboratory management. Teachers and graduates are allowed to enter the laboratory for experiments or science researches after performing a normal application procedure. Undergraduates can also do experiments under the guidance of teachers to satisfy the requirements of research-oriented learning if they have performed routine procedures. Moreover, the centre has provided outward or social services for example the training services for the society, especially for some schools with poor teaching conditions.

The open mode of labs include three factors which are time, space and content. The first of them means that students can arrange their times of doing experiments based on their own needs and not limited by their curriculums. The second means that the instruments of labs face all the students. When the student has learned the applying method of an instrument, he can operate it. The content opening intends that students can do experiments according to one’s own interest despite of the original experiment guide book. The opening of labs has broke the limitations of time, space and content, which make the students of different major and grade be able to carry out the same or different experiments at the same time and at the same one laboratory room.

4. Further standardizing management system and enhancing use efficiency of instruments

4.1. Improving the ability of the laboratory technician

The laboratory technician plays an important role in experiment teachings. In order to improve the running efficiency of equipments and decrease the maintenance cost, the technical team of the labs should be reinforced. To improve the quality of the experiment-technique team, it is necessary to introduce appropriately some highly educated talents. At the same time, the centre should encourage the in-service teachers to further study for enhancing their research, teaching and experiment skills, which will made the personnel structure, education and the age structure of the team be more reasonable. The technical staff will be employed through competition for jobs. They will be strictly selected, appointed and appraised. Everyone should have clear knowledge to his equipment who responsible for and have strong practical skills to
ensure prompt services.

4.2. Rules and instrument maintenances

It is a prerequisite for us to pay attention to the management of instruments for a better use efficiency. At the end of each experiment, laboratory technicians and teachers should fill in the log books and operation records together, which will make us be easier to discover and solve the problems in the running process and ensures the life of equipments. A detailed equipment maintenance records with respect to equipment malfunction, time, part and solutions should be established, which will be considered as the basis of later equipment maintenance plan.

5. Operating conditions of laboratory equipments in recent years

Through the construction of packaging and printing experiment demonstration centre with properties of multidisciplinary, integration and opening, the use efficiency of lab equipments has increased apparently, the trouble rate of equipments has reduced greatly and the income of our college from the social services has also increase obviously. The annual average machine equipment use condition for more than 50,000 RBM apparatus is shown in figure1. According to the statistical data of equipments for the last three years, it is very obvious that the equipment idle rate before the new management system is applied is higher, but the situation has been improved greatly in recent two years. Figure 2 shows the diagrams of annual maintenance and income. From this figure, we know that the funds of instrument maintenance has reduced by 80% after the system is reformed, however the income from scientific research has increased nearly by 35% than that of two year ago.

Fig.1 The average using time annual for the apparatus(>5RB M)

Fig.2 The maintenance and income for the average

References