

The Management and Development of Laboratory Technicians in the Construction of High-level Universities

Wu WEN, Peng GU*, Kailun QIU, Xuming GUO

School of Computer Science and Cyber Engineering

Guangzhou University

*Corresponding Author

Abstract—The construction project of high-level universities is the most important initiative to achieve the dream of the strong country in education. It is a systematic project. All aspects including laboratory construction and sustainable development must be considered. The construction of the laboratory technicians is the bottleneck restricting the development of universities. Through the analysis of the current situation and problems existing in the laboratory of high-level universities, the author puts forward the new thoughts on improving the quality of the experimental technicians in the construction and development of high-level university laboratories in the future. The laboratory technicians should strengthen self-management, enhance the awareness of their positions, self-improve continuously and upgrade themselves.

Keywords—high-level universities; laboratory technicians; self-management; upgrade

I. INTRODUCTION

In April 2015, according to the “Suggestions on the Construction of High-level Universities” issued by the Guangdong Provincial Party Committee and the Provincial Government, the construction project of high-level universities in Guangdong Province was officially launched [1]. First-class talents, first-class major and first-class discipline of the universities are essential to the construction of high-level universities. As we all known, the construction of first-class major and first-class discipline must be supported by first-class laboratories, which are the core of a modern university and the cradles of cultivating innovative talents. Therefore, it is believed that the university will not be the top university if it doesn't have first-class laboratories. A first-class laboratory needs not only advanced equipment, but also excellent technicians with high overall quality to guarantee its high-level management and high-quality experimental teaching.

II. THE ROLE AND CURRENT SITUATION OF THE LABORATORY TECHNICIANS

A. The Role of Laboratory Technicians

A university laboratory plays an important role in improving the quality of higher education, which facilitates the development of students' practical ability and cultivation of

students' innovative ability in the university. To achieve the best efficiency of a high level of laboratory, a university should give full play to the role of personnel, finance and material sources of the laboratories. Among the above three factors, personnel are the most active and the most important factor. The role of laboratory technicians is between teaching and administrating. Laboratory technicians work like teachers, but also have administration tasks. They are the “teachers” who provide teaching and management services at the same time. Laboratory technicians are in charge of various of jobs, ranging from preparing for classes, maintaining hygienic environment, taking security precautions, installation and maintenance of the laboratory equipment to the planning, organization and implementation of the laboratory construction. In brief, laboratory technicians play a role that cannot be ignored [2-3]. Therefore, the main part of laboratory management is the laboratory technicians. Laboratory construction and development cannot be separated from the laboratory technicians; the role of the laboratory cannot play well without high-level laboratory technicians.

B. Current Situation of Laboratory Technicians

For a long time, under the influence of traditional education concept, people pay more attention to theory field rather than practice field in terms of higher education. As a result, in a long time, laboratory technicians have not been paid enough attention and have been considered as “assistants”, who are in a subordinate role in the teaching field. Laboratory technicians play supporting role in the fields of teaching and researching. Their performances are important, however, they are never considered as independent achievement. Their achievements are considered as part of achievement in teaching and research [4]. Besides, there is no professional standards or the design of competency assessment for laboratory technicians. The current situation of laboratory technicians can be analyzed from the following four aspects:

1) Unclear responsibilities and duties

Many laboratory technicians experience frustration at work due to unclear responsibilities and duties. They do the repetitive services jobs with many details and have to cope with a very heavy workload, however, they can not get the proper reward and respect, which seriously dampen their work

enthusiasm. They can not feel the sense of value and pride in their jobs.

2) Lack of Effective Training

With the rapid development of science and technology, the hardware and software of the laboratory upgrade rapidly in recent years. Laboratory technicians are required more and more highly due to the extension of the laboratory, constantly upgraded equipment, adjustment of curriculum and high-level scientific researching projects. Unfortunately, many laboratory technicians lack effective training to update their knowledge and improve their professional skills. Day after day, the gap between the knowledge of technicians and the needs of experimental teaching is getting bigger and bigger.

3) Difficult time allocation between the scientific research and daily work

Many laboratory technicians can not allocate their time well between the daily work and scientific research. On the one hand, laboratory technicians have to do lots of daily work of laboratory, for instant, maintaining hygienic environment, taking security precautions, installation and maintenance of the laboratory equipment, experiment site arrangement and teaching environment preparation. On the other hand, they are required to have research achievements such as scientific research project, paper writing and excellent course construction. They are often busy making use of their laboratory source to carry out the experimental technology project and experimental teaching program by innovative methods, for example, self-made experimental teaching aid equipment. It is hard for them to keep balance between them.

4) Lack of communication with the lecturer

Due to various reasons, some laboratory technicians in universities are not allowed to give a lecture in the experimental lessons; they are only allowed to prepare the experiment lessons according to the teaching syllabus. The lectures are responsible for the lecture, while the laboratory technicians are responsible for the operation and implementation of the experiment. If there is a problem in the experiment, the lecturer can not solve the problem because they are unfamiliar with the operation and implementation of the experiment. As a result, although the method of experiment is good, the experiment is not implemented smoothly and the experimental effects are not good enough. There is a lack of communication between laboratory technicians and the lecturers.

III. DEVELOPMENT OF LABORATORY TECHNICIANS

A. Strengthening Self-administration and Enhancing the Awareness of Position

In the new situation of the construction and development of high-level universities, the laboratory technicians should be considered as a "talent", their duty should be considered as "supporting" teaching instead of "assisting" teaching. According to the idea of talent-oriented, it is important to develop the quality of the laboratory technicians, inspire laboratory technicians' work enthusiasm and develop their potential by strengthening self-administration and enhancing the awareness of position.

1) *Although the laboratory technicians are not lecturers or professors, they take the same responsibilities of educating and teaching.* The laboratory technicians' words and deeds, working style and spirit of learning often affect students, because students often work with their laboratory technicians when they do experiments and graduation design project in the laboratory. Therefore, laboratory technicians must discipline themselves, strengthen their self-cultivation and set a good example for the students. A good laboratory technician can guide students to think creatively, acquire knowledge by many of ways and analyze problem independently.

2) *Only when the laboratory technicians possess the spirit of craftsmen can they do their job better.* "Craftsmen" pursue perfection, pay attention to details, and spare no time and energy to strive for the quality of their products. Laboratory technicians spare no time and energy to strive for the quality of their products—students. Thus, they should strengthen practical hands-on operation capabilities, carry out experimental research programs, study experimental principles and methods and develop self-made experimental equipment, which should be considered as a part of "daily work" of laboratory technicians. The laboratory is like a "stage" for laboratory technicians to show their talents, initiative and creative.

3) *Laboratory technicians should be all-around talents with a professional knowledge structure.* Professional theoretical knowledge is the basis for the work of laboratory technicians. Furthermore, with the rapid development of science and technology, new equipment is upgraded continuously and knowledge update faster and faster. The knowledge of the laboratory technicians is likely to lag behind the science and technology development if the laboratory technicians can not get their concept updating and professional training continuously. The training, for example, equipment maintenance and scientific management capabilities should be offered at multiple levels, through multiple channels, and in various forms according to job requirements. And the laboratory technicians can make use of all opportunities to participate in all kinds of training, including domestic and foreign training, seminars, visits and academic exchanges to learn new technologies and knowledge, develop professional experimental technology in this discipline, increase skills, broaden their horizons and update their concept. Thereby the all-around abilities of the laboratory technicians will be improve continuously.

4) *For a long time, laboratory technicians have negative concepts and their work enthusiasm is not high enough.* They need to change their concepts and work attitude. The former Chinese national football team coach Bora Milutinovic said: "Attitude is everything. [5]" Only when laboratory technicians have a positive work attitude, a sense of responsibility, excellent quality awareness, position awareness and service awareness, can they be willing to dedicate themselves to teach their students and do scientific research, to be optimistic at work and to work effectively.

B. Self-improving Continuously and Upgrading Self-abilities

1) *Along with the arrival of the knowledge age, knowledge is being renewed at a higher speed than ever before.* New technologies are changing every day, new science and technology products are emerging. The knowledge acquired by the initial academic education is not enough, especially in the intersection and integration of the disciplines. The experimental content change from verification experiments to comprehensive experiments. All of the above factors require laboratory technicians to have strong self-learning ability, constantly updating knowledge, mastering new experimental methods, all-round quality and modern management ability. In recent years, many laboratory technicians have upgraded themselves from “on-campus” to “off-campus”. For example, they have taken part in technical training for network technology engineers, WLAN technology senior engineers, cloud computing engineers and big data experts at H3C Group. They got H3CNE, H3C-WLAN and H3CCE certified engineer (expert) qualifications and enterprise certified instructor qualifications. At the same time, laboratory technicians participated in actively various laboratory management seminars organized by the “Laboratory Management Branch of the Chinese Higher Education Society”. They learned about the efficient operation management model and advanced experimental teaching concepts of the laboratories from the brother colleges and universities, constantly improve their own management ability and experimental technical level.

2) *Laboratory technicians have to work not only independently but also in a group, therefore, they should have teamwork spirit.* First of all, laboratory technicians must make full use of human resources, material resources and financial resources of the laboratory to give full play to the role of the university laboratory. With the above resources, they can carry out experimental teaching, renew the teaching model and update the teaching content and do the scientific researches efficiently. Thus, they have to communicate and cooperate with all kinds of people of different roles, including enterprises personnel of a university-enterprise collaborative project. Secondly, in the scientific research project, they can be the leading researchers of the researching project groups. They will assign the tasks to every member of the group: collect the material relevant to the project, carry out the experiment, collect the data by survey, by questionnaire or by interview, write paper etc. Besides the scientific researching project, they may also build up experimental teaching center and practice teaching base, for example, launch a university-enterprise collaborative project. All in all, it is important for laboratory technicians to have the ability of team work.

3) *Experimental teaching is as important as theoretical teaching in the university.* Laboratory technicians and lecturers have their respective advantages: laboratory technicians are good at practical hands-on operation, and lecturers do well in theoretical teaching. If the senior laboratory technicians are allowed to give the lecture in the experimental courses, they can complement lecturers in terms

of practical teaching. The workload of the laboratory technicians will be regarded as a part of their performance. In this way, on one hand, the students will benefit from the advantages of both of them; on the other hand, laboratory technicians will be fully motivated to work in their fields and urged to improve their own qualities continuously.

IV. CONCLUSION

Laboratory technicians are not only the assistants of experimental teaching and the trainers of students’ practical ability and innovation, but also the administrators of laboratories and instruments. They are the bridges and cornerstones of practical teaching and scientific research; they are the supporters of the lectures and researchers; they are the scientific researchers as well. They are “generalists” who have all-round abilities and integrating skills, who have strong career conversion ability and adaptability [6]. To possess those qualities, laboratory technicians must make efforts to become a professional person with knowledge and ability to keep up with the development of the times. Therefore, in order to meet the needs of the high-level university construction and sustainable development in the new era, laboratory technicians should, first of all, strengthen self-administration and enhance the awareness of position: discipline themselves, strengthen their self-cultivation and set a good example for the students; have a craftsmen spirit to pursue perfection; have a positive work attitude, a sense of responsibility, excellent quality awareness and service awareness. Furthermore, laboratory technicians should self-improve continuously and upgrading self-abilities: make their best to become all-around talents with a professional knowledge structure; have self-learning ability, update their knowledge constantly and have teamwork spirit. With the development of laboratory technicians, laboratories will become first-class laboratories, and first-class laboratories can become scientific researching bases and important places for training high-quality innovative talents. All those are essential to the construction of high-level university.

REFERENCES

- [1] Zhu Rong. Construction and Management of University Laboratories in the Context of the Construction of High-level University[J]. Research and Exploration in Laboratory, 2018, 37(3):278-282. (In Chinese).
- [2] Feng Dongru, He Yanming, Qi Kangbiao, Liu Bing, Wang Hongbin, Wang Jinfa. Some thinking on strengthening team construction of laboratory technician in colleges and universities[J]. Experimental Technology and Management, 2014, 31(9): 232-234. (In Chinese).
- [3] Liang Yan-wen. Team Building of Laboratory Technician under the Background of the Development of College Teachers’ Professional Abilities[J]. JOURNAL OF JILIN INSTITUTE OF CHEMICAL TECHNOLOGY, 2015, 32(3): 44-47. (In Chinese)..
- [4] GE Haiyan, CHEN Huoying, LIU Yan, TAO Yiwei, FANG Xinkui. Giving Full Play to Lab Technicians and Improving the Utilization Ratio of Experimental Teaching Equipment[J]. Research and Exploration in Laboratory, 2018, 37(1):234-236, 246. (In Chinese).
- [5] Hui Tuo. Strengthening the construction of experiment technique team, cultivating high quality and innovative talents[J]. Experimental Technology and Management, 2007, 24(1): 148-150. (In Chinese).
- [6] Li Tian, Xu Jinrong, Yang Ling, Wu Zhongyun, Zhu Tao. How experimental technicians playing more positive role in experimental teaching[J]. Experimental Technology and Management, 2015, 32(6): 143-145.(In Chinese).