



# Exploration on the Construction of Experimental Technical Team in Local Universities Under the Background of High Quality Development

Qing Zhang<sup>(✉)</sup>

School of Computer and Information Science, Hubei Engineering University, Xiaogan, China  
zhangqing\_lax@163.com

**Abstract.** “Building a high-quality education system” is a major strategic goal deployed by the Party Central Committee, and it is also the construction goal of local universities in the new stage of educational development. The experimental technical team is an important force to promote the high-quality development of scientific research and teaching, practice and innovation in universities. In view of the problems existing in the construction of experimental technical teams in local undergraduate universities, this paper puts forward some improvement measures, such as updating ideas, improving the allocation of experimental technical teams, formulating targeted cultivation mechanism, improving classified evaluation and setting special incentives, so as to promote the high-quality development of experimental technical teams, help local universities to build a high-quality education system.

**Keywords:** experimental technical team · local undergraduate universities · high quality

## 1 Introduction

The year 2021 is the first year of the 14th Five-Year Plan and a crucial year for high-quality development. The Fifth Plenary Session of the 19th CPC Central Committee clarified the policy guidance and key requirements of “establishing a high-quality education system”, “Comprehensively deepening the reform of the construction of teachers in the new period” is the important content. The experimental technical team is an important part of the teacher team, they play an irreplaceable role as theoretical teachers in experimental teaching, scientific research, technical services, personnel training, and innovation of scientific and technological achievements [1, 2]. In recent years, although some achievements have been made in the construction of experimental technical teams in colleges and universities, the level of experimental technical teams in different universities and different majors is uneven, and the overall quality is generally low [3–5]. Under the guidance of the strategic decision of “double first-class”, some national key universities have explored some effective reform measures. For example, combining with the

reform and construction rules of the experimental teaching team, Tsinghua University has obtained better practical experience in improving the comprehensive quality of the experimental teaching team [6]; Sichuan University has made great achievements in the construction of an experimental technical team with reasonable structure and first-class quality, which is suitable for world-class universities [7]; Jilin University has carried out practical exploration in the aspects of evaluation, promotion, post setting, project approval, training and so on [8]. However, there is still a big gap between local universities and key universities, and the development of experimental technical teams lags behind the requirements of high-quality education system and first-class universities. Therefore, it is urgent to build a high quality experimental technical team to help the high quality development of local universities.

## 2 Present Situation and Existing Problems

### 2.1 Present Situation

Our university is a local engineering undergraduate university. At present, there are 1228 faculty and staff members, including 65 experimental technicians, accounting for 5% of the total number, the number of laboratory personnel with establishment of institutions is 54, which is lower than the approved number of experimental technicians of our university (67), and also lower than the proportion of full-time experimental technicians not less than 9% [9] of the total number of university personnel suggested in the guiding opinions on Post Establishment and Management of Institutions of Higher Learning issued by the Ministry of Education (No. [2007] 59). Among the experimental technicians, there are 10 doctors, 39 masters and 5 undergraduates, accounting for 15%, 60% and 8% respectively; At present, there are no senior professional titles among the experimental technicians. There are 19 with deputy senior professional title accounting for 14%, 35 with intermediate professional titles, accounting for 54%, and 11 with other professional titles; 52 experimental technicians under 45 years old, accounting for 80%.

According to the above data analysis, the experimental technicians in our university are insufficient. The number of senior and deputy senior professional titles is relatively low, and the level of professional titles is mainly concentrated in intermediate professional titles. With the active implementation of the strategy of “Strengthening the University with Talents”, the threshold of talent introduction for experimental technical positions has been raised. In recent years, most of the new experimental technicians are with master’s degree and under 35 years old, and the talent structure of the experimental technical team has been greatly improved.

### 2.2 Existing Problems

It took 80 years for our university to develop from the original Hubei Provincial Third Normal School to the present Hubei Engineering University. After many times of school combination and renaming, the experimental technical team has been greatly developed through the efforts of several generations. At the same time, some problems have also been formed in the long course of development.

The composition of the experimental technical team is complex and unstable, and the professional quality is uneven. In the early years, in order to stabilize the teaching staff, the university would arrange some family members of some key teachers, scientific research and management staff to work in the experimental technical post. In recent years, it is more to arrange the doctor's family members to work in the laboratory for the introduced excellent doctors. These two kinds of people are relatively lack of professional knowledge. There are also outstanding undergraduate graduates selected by the university to engage in laboratory work; a small number of teachers or other relevant technical personnel who want to engage in laboratory work are transferred to experimental technical posts. In recent years, the introduction of experimental technicians mainly refers to the professionals with master's degrees who are recruited from the public. These types of personnel have relatively high professional quality, which plays a great role in improving the quality and management level of the experimental technical team, but there are also hidden dangers of personnel instability. For example, some staff transferred from the teaching post felt uncomfortable after a period of experimental technical work and returned to the teaching post; the newly introduced postgraduate students passed the doctoral examination after working for a period of time in the experimental technical post and left, they only regarded the experimental technical work as a transitional stage. Problems such as unstable personnel and uneven professional levels have hindered the construction of high-quality experimental technical teams.

The number of experimental technicians is insufficient, and the post task is heavy. With the increase of the scale of students and the expansion of the campus, the laboratory has also been expanded. The number of laboratories in our experimental teaching center has increased from 10 to 15, and the number of equipment has increased from 1735 to 3656, while the number of experimental technicians has remained five to six for many years. The laboratory is overloaded, the weekdays are filled with experimental courses from day to night, and on the weekends there are public elective courses and double major courses, as well as some teachers' temporary classes. Experimental technicians are also overloaded with work. In addition to the daily work of laboratory teaching preparation, equipment maintenance, instrument procurement, safety and health, there are also experimental teaching tasks, scientific research tasks, student head teacher work and title assessment. All these lead that the experimental technicians are too tired to cope with the work, can not complete the task of high quality, so that the experimental technical team can not play its due role in the construction of high quality education system.

Training opportunities are few, professional title promotion is difficult. Local universities invest less in training their own experimental technicians, and most of the resource opportunities are inclined to professional teachers. Because of less participation in teaching tasks and lack of student teams, it is difficult for experimental technicians to apply for project resources, and the requirements for professional title promotion are mostly focused on the assessment of projects and papers. Therefore, experimental technicians are seriously lack of enthusiasm for work, and their pursuit of scientific research and teaching research is also lack of motivation, unable to adapt to the requirements for the construction of high-quality experimental technical teams.

Experimental technical teams are not valued in terms of ideas and policies. The construction of professional teachers has always occupied a major position, and the

experimental technical team has been subordinate for a long time. It is in a weak position in resource allocation, training, promotion of professional titles, and evaluation of excellence [10]. The experimental teaching tasks of experimental technicians in some departments of our university need to be apportioned through negotiation with professional teachers. Experimental technicians will be deducted the corresponding hours of duty pay for undertaking experimental teaching tasks. Over time, some experimental technicians have low experimental teaching intention. At the same time, it is difficult for the experimental technicians to apply for scientific research projects, and fewer people can participate in the evaluation of excellence projects, which dampens the enthusiasm of the experimental technical team. The experimental technicians are only responsible for opening and closing doors, equipment storage and maintenance of machines, so much so that they either simply “lie flat” or change jobs, making the experimental technical team unstable and slow development.

### **3 Reform Measures**

#### **3.1 Change Concepts and Improve the Status of Laboratory Personnel**

Concepts such as “emphasis on construction over management” and “emphasis on theory over experiment” hinder the development of laboratories and should be abandoned [11, 12]. Managers should not only pay attention to the construction of laboratory hardware, but should promote the construction of experimental technical team to the same height as the construction of professional teachers. In combination with the development goals of local universities, practical policies and planning should be formulated to match the development of experimental technical team, so that the experimental technical team and the teacher team can go hand in hand and develop harmoniously. At the same time, we should have enough respect and concern for the experimental technicians emotionally, and cultivate their feelings for the department and the sense of responsibility and belonging to the experimental technical post. The practice of “using more, cultivating less, assigning more tasks and caring less for growth for experimental technicians has been fundamentally changed.

#### **3.2 Rationally Set Posts and Optimize the Structure of Experimental Team**

Colleges and universities should allocate experimental technical posts according to the subject nature of the teaching departments, the amount of equipment maintenance, and the differences in the tasks of experimental courses. The experimental technical posts of other public experimental platforms and scientific research departments of the university shall be verified according to the actual work needs. The experimental center of our department undertakes the experimental teaching of computer related courses for multidisciplinary majors in the whole university. With the increase of laboratory hardware equipment, the existing experimental technical personnel configuration can no longer meet the actual needs. We should update the configuration of experimental technical posts according to the comprehensive accounting of the development scale of the laboratory in real time, so that the construction of experimental technical teams is

consistent with the development plan of the laboratory. The introduction of experimental technical personnel should be changed from passive to active, moderately relax the educational requirements for experimental technical personnel, and pay attention to whether the experimental technical personnel have the matching professional background and post ability. In recent years, most of the new experimental technical personnel in our university are masters of relevant majors, or have practical experience in enterprises, which is of great help to improve the structure of our experimental technical team.

### **3.3 Attach Importance to Training and Establish a Training Mechanism**

Local colleges and universities should attach importance to the training of experimental technical teams, incorporate the training of experimental technical teams into the university development plan and annual work plan, and formulate the training objectives and implementation methods for experimental technical posts. To improve the quality of the experimental technical team, multiple training paths such as “tutorial system”, “combination of self-study guidance and team growth”, “combination of coming in and going out” are adopted.

For the newly introduced experimental technicians, the “tutorial system” is adopted to cultivate them. Excellent teachers and experimental technicians are selected as instructors, and the multi-tutorial system of “experimental teaching tutor + experimental research tutor + experimental technology tuto” is implemented. For the experimental technology with strong application, the double tutorial system of “college tutor + industry tutor” is implemented to supplement it. At the same time, online and offline training will be mixed, enrich online training resources and increase the use of resources. The training assessment adopts the combination of online and offline assessment. Online assessment is mainly based on data reading, video viewing, and discussion and exchange, emphasizing both process assessment and result assessment, and taking student assessment as an important reference.

For the “old staff” of the laboratory, the training adopts a combination of self-study and team growth. The experimental technicians should make full use of the internet resources and participate in various academic conferences. Encourage the experimental technicians to participate in the teaching team, scientific research team and competition team, and promote the improvement of the professional ability and comprehensive quality of the experimental technical team through teaching research competition, so that the experimental technicians can keep up with the development pace of the teacher team.

“Please come in and go out” is adopted to broaden the training channels. Invite well-known experts at home and abroad to carry out special lectures on experimental technology, broaden their horizons and inspire learning;

In order to improve the ability of experimental teaching and technology development and innovation, excellent technical personnel from enterprises are invited to conduct training on the construction of experimental teaching platform and the use of advanced instruments and equipment. Encourage experimental technicians to learn and exchange experimental technologies across disciplines, platforms and colleges, Establish the training mechanism of university association and university-enterprise cooperation, keep abreast of technological development trends, and improve technological capabilities

[13]. Experimental technicians are encouraged to pursue advanced studies, pursue doctoral degrees, or go abroad for further studies, and participate in academic exchanges and training programs at home and abroad.

### **3.4 Improve Evaluation Standards and Set up Special Incentive Measures**

In 2020, the Central State Council officially issued the overall plan for Deepening the Reform of Educational Evaluation in the New Era, which proposes to “improve the outcome evaluation, strengthen the process evaluation, explore value-added evaluation, and improve the comprehensive evaluation” for the reform of educational evaluation, this plan is to break the “Five Only” and let the evaluation return to the standard, so as to promote the healthy growth of students and the sustainable development of teachers.

Local colleges and universities should establish their own classification evaluation standards and methods for different experimental technical posts. While paying attention to the assessment of teachers’ ethics and style, the assessment standards focusing on scientific research papers and scientific research projects should be weakened. Laboratory management post assesses the construction planning, equipment management, information statistics and team building of the laboratory. The experimental teaching post assesses the teaching process of experimental courses, experimental program design, experimental teaching research and experimental project reform and innovation. Laboratory technology service post assesses teaching assistance of experimental courses, safe use, maintenance, function improvement and development of equipment [14].

The assessment method can adopt a variety of flexible methods, such as personal reporting, interview defense, peer review, practical operation, performance display, etc. Pay attention to the combination of individual evaluation and team evaluation, and the combination of qualitative evaluation and quantitative evaluation [15]. Reward the personnel who have been assessed as excellent, and give extra points in the aspects of evaluation and promotion of professional titles.

The combination of multiple special incentive measures can fully stimulate the enthusiasm of the experimental technical teams. Under the condition that the salary system cannot be changed, colleges and universities should, within the controllable range, give preference to the outstanding personnel in the experimental technical teams, set up a special reward allowance for Experimental technicians, and reward the Experimental technicians who have made outstanding contributions to the laboratory work; In terms of professional title promotion, although our university has introduced the senior professional title of the experimental series since 2018, it is difficult for the Experimental technicians to complete the assessment requirements of the senior professional title without guiding the students, not following the team and not having projects. Therefore, a special scientific research fund for the laboratory can be set up to ensure that the Experimental technicians have a greater opportunity to apply for scientific research projects. In terms of excellence evaluation, we have set up awards such as experimental teaching achievement award, experimental technology achievement award, laboratory excellent team award, laboratory excellent individual award, and laboratory excellent asset management award [16] to affirm the work achievements of the experimental technical teams in all aspects.

## 4 Construction Measures

In recent years, in order to build a high-quality experimental team with noble professional ethics, excellent business, reasonable structure and vitality, our university insists on the simultaneous development of cultivation, guidance and assessment and incentive, and has formulated the policy documents such as “Implementation Plan of Hubei Engineering University on Establishing and Improving the Long term Mechanism for the Construction of Teachers’ Ethics”, “Management Method of Hubei Engineering University Teachers’ Further Training”, “Management Measures for Qualification Review of Professional and Technical Positions of Hubei Engineering University (Trial)”, “Qualification Requirements for Professional and Technical Positions of Experimental Technology of Hubei Engineering University (Trial)”, “Qualification Requirements for Senior Laboratory Teachers of Hubei Engineering University (Trial)”. The construction of experimental technical team has been written into the university’s “14th Five-Year” development plan, and the introduction of high-level experimental technical talents has been done solidly. More measures have been implemented, for example, to promote the “doctoral program for young teachers” to constantly improve the academic level of experimental technicians; to promote the “International Growth Project for Young Teachers” to improve the international level of the experimental technical team; to implement the “young teachers’ post practice training project” to promote the upgrading of the teaching and research level of the experimental technicians. We have established a planning system for the construction of teachers at two levels of schools and universities to coordinate resources and increase the investment in the construction of teachers. Through the continuous efforts of schools and universities, the scale of high-level talents in the experimental technical team has been further expanded. The proportion of master’s degree and above has reached more than 80%, and the proportion of deputy senior professional titles has increased to more than 20%. Some high-level experimental technicians have participated in student competition tutorship and won national awards. More of them have applied for scientific research projects and published high-level papers. The comprehensive level of our experimental technical team has been greatly improved.

## 5 Conclusion

Strengthening the construction of high-quality experimental technical team is an important guarantee to enhance the teaching, scientific research and practical innovation ability of local universities, and a strong support to achieve the goal of establishing a high-quality education system in local universities. The existing problems of the experimental technical team in local universities have been long-standing. In order to solve these problems, our university has optimized the introduction of experimental technicians, training and further study, work assessment, promotion channels and other aspects, and the comprehensive level of the experimental technical team has also made great progress. In the new situation of high quality development, facing the new requirements of the country and society and the increasingly fierce competition among colleges and universities, the leaders of local universities must update their ideas, implement the reform measures into practice, and explore the development road of high-quality experimental technical

teams with local universities characteristics. Only in this way can we cultivate a high-level experimental technical team which is in line with the development needs of local universities under the new situation and is consistent with the high-quality education system.

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