

# **“Student-Centered” Teaching Method Guides Laboratory Equipment Maintenance**

**Haohui Zhao, Jun Luo**

Guangzhou College of Technology and Business, Guangzhou, China

**Keywords:** Student-centered, Laboratory, Equipment maintenance

**Abstract:** As an important part of higher education, the laboratory of colleges and universities is not only the main venue for experimental teaching and scientific research, but also the main venue for students to practice theoretical knowledge. With the increase in the number of laboratory use and the number of years of use, various problems will occur in the laboratory equipment, this article uses the "student-centered" education method as a guiding ideology to organize students to safely carry out laboratory equipment maintenance.

## **1. Introduction**

In 1999, the Ministry of Education of China issued the “Action Plan for Education Promotion for the 21st Century”, according to which the gross enrollment rate of higher education will reach 15% of the school-age youth, and the first university enrollment policy was carried out. Since the implementation of the enrollment expansion policy, the gross enrollment rate of higher education in China has exceeded 50%, and it has entered the stage of popularization of higher education.

As an area that has achieved universalization of higher education after the United States and the European Union, China has always faced the main problem of how to enable universities to become active teachers in teaching so as to improve the teaching level of higher education. This article will try to use the “student-centered” teaching method to improve students' enthusiasm and initiative in school from the perspective of laboratory equipment maintenance work.

## **2. Background and Concept of “Student-Centered” Education Law**

In 1952, the famous American psychologist Carl· Rogers put forward the “student-centered” point of view, American higher education put forward the idea of undergraduate education based on this point of view, which has caused various changes in the basic concepts, teaching methods, education and administrative management of colleges and universities. In 1998, UNESCO declared in the Declaration of the First World Higher Education Conference that “higher education needs to shift to a 'student-centered' sexual perspective and new model”, and also requires that international higher education should give priority to students and their needs The key point is that students should not only be passives in teaching activities, but to transform into changers and main participants in educational activities. This conference also targeted education based on the “student-centered” perspective. The concept is predicted to be “a great influence on the 21st century higher education community.”

Although “student-centered” is a kind of educational method, the essence lies in the timely change in space and time between “teaching” and “learning”, so that in the teaching process from “teaching” to “learning” “Centered transformation”, that is, the transformation from “teacher imparting knowledge to students” to “letting students themselves discover and create knowledge”, and from “transfer knowledge model” to “self-learning knowledge model”.

“Student-centered” is actually centered on the student's learning process and thinking process, and not only to change the concept of teaching, but also from the “classroom, teachers, teaching materials” of the teaching side. The change from the center to the “student, learning, learning process” of the learning side is a real focus on the process of student learning and thinking. [1]

### **3. Maintenance of Laboratory Equipment Work Requirements**

The laboratory serves as a main teaching site for students to learn from theory to test knowledge and practice, and also as a main place for scientific research capabilities. Therefore, major universities and colleges have increased investment in laboratory construction. As the daily teaching activities of the laboratory are gradually carried out and the scientific research activities are gradually deepened, the equipment in the laboratory is often worn due to the long running time of the mechanical components, the electronic components are damaged due to the increase in the number of work, and the circuit board is due to the equipment Oxidation of old circuits causes circuit problems, short circuits in the laboratory due to increased dust in daily cleaning, and laboratory consumables damage due to indoor water and fire caused by the failure of the “three defenses” standard.

When in the process of equipment maintenance in University Laboratory, in order to reduce the possibility of “repair”, we should take “maintenance” as the main and “repair” as the auxiliary to improve the times of “maintenance”. When performing laboratory equipment maintenance work, According to different laboratories, establish a variety of reasonable daily management and inspection systems according to actual needs, and improve the execution of the system, Increase the number of executions and the quality of a single execution, In order to reduce the probability of equipment failure. While performing laboratory equipment repairs, Often divided into three steps:

(1) When equipment failure is found, the equipment should be tested in detail, the cause of the failure should be confirmed and recorded, the cause of the failure and its impact on other components of the equipment should be analyzed, and the maintenance plan should be written according to the work technical manual of the failed equipment. The feasibility of the manufacturer's plan;

(2) When performing equipment maintenance, record the maintenance process, such as dismantling parts when disassembling the case, to avoid incorrect operation and loss when installing parts; when replacing spare parts, record the original parts and the manufacturer model of the replacement parts, etc. Data; when repairing a part without replacing it, record the fault point and repair steps of this part for future maintenance work, etc.

(3) Summarize the repair process, write a repair diary, elaborate on the cause of the fault, troubleshooting process, and precautions for daily use and maintenance after the fault is eliminated.

### **4. The Implementation Steps of “Student-Centered” Education Method to Guide Laboratory Maintenance Work**

#### **4.1 Use Question-Based Teaching to Observe Students' Initiative**

When teaching theoretical or experimental courses, students are required to preview before class, which helps the active atmosphere in the classroom and improve the quality of teaching. The effect of preview is particularly significant for experimental classes. In the experimental class, when the teacher asks questions about the key points of the operation, if it can resonate with the students' questions in the preparation for the preview, the students can immediately improve their initiative. When the teacher conducts demonstrative operations, prepare for the problems encountered in daily life related to this experiment, and ask students questions in a planned, targeted, and purposeful way, which can not only achieve teaching purposes, but also observe Students' enthusiasm helps to select leading students [2].

#### **4.2 Selection and Training of Team Leader Students**

By observing the performance of students in the laboratory, we select each class with high enthusiasm, strong ability, good understanding, and responsibility while helping students. The important thing is that students with learning initiative and outstanding performance are the leading students as the next step. The reserve staff of the student group leader. As the saying goes: “The village looks at the village, the household looks at the household, and the masses look at the cadres. “ The growth of a good leader is often not selected, but cultivated. After confirming the list of the

student leader, according to the characteristics of different laboratories, before each experimental project, lead the leader student to familiarize with the equipment, pre-operation demonstration of the experimental project, and solve the problem in time when the leader student performs the project operation. Operation difficulty and doubts. In the training of group leaders, the focus should be on leading the group students to carry out daily equipment maintenance work, in-depth explanation of the structure and properties of the experimental equipment, so that students can reduce the strangeness of the experimental equipment and improve the initiative of learning and experiment Qualified study leader [3].

#### **4.3 Formation of Student Study Groups**

After the selection and training of the group leader is completed, the group leader is the core, and the class is divided into groups according to the number of the class. Nature, etc. are considered. The purpose of the formation of the student learning group is to improve the enthusiasm, enthusiasm, and learning effect of the self-learning of the class in which the students are studying. In the composition of each team, the deputy team leader should be assigned by the team leader and the teacher, and the remaining team members should be assigned to the team leader and teacher in a 2: 3 ratio. The formation of groups with this proportion of staff helps to coordinate the relationship among the group members and make progress together, to bring up students who lack learning interest with a positive learning atmosphere, and to achieve the basic purpose of mastering the operation of the experimental project. This method of personnel allocation comes from the observation result of the teaching process of 'observing the initiative of students using question-based teaching' in step 1. Therefore, it requires certain requirements for the teacher's ability to observe and organize data.

#### **4.4 Carry out Equipment Testing in the Mode of Students Taking Students**

Each group leader has learned and practiced experimental theories, procedures and precautions before the class. When the experimental course is conducted in parallel with the group leader leading the groups, the instructor needs to focus on students, supplemented by teaching. When the experimental project ends, the team leader will be the head to test the equipment related to the experimental project. At this time, the team leader needs to submit the equipment test plan, plan and discuss with the teacher before the class and discuss the feasibility. At the same time, the team leader should continue his leadership role in the classroom and be responsible for assigning the test contents and steps of the team members, and at the same time recording the fault problems and maintenance difficulties raised by the team members. At this time, the teacher of the department and the teacher of the laboratory need to strengthen the inspection between the groups, find the fault problems recorded by the group leader in time, give technical support, moderately guide the inspection work steps of each group, and propose corresponding measures according to the actual ability level of students Problems, let the group think and expand to diverge students' thinking.

#### **4.5 Organize the Team Leader to Perform Equipment Maintenance**

According to the general laboratory management system, the experimental equipment is mainly based on testing and maintenance. With the increase in the number and years of operation of laboratory equipment, the possibility of equipment failure is increasing, and maintenance work becomes inevitable. For students to participate in the maintenance of laboratory equipment is also a rare learning opportunity. It is also the consolidation of existing knowledge and the preview of future knowledge. It is also the best teaching method combining theory and practice. First, the experimenter teacher must first detect the faulty equipment and plan the maintenance plan and steps; secondly, when organizing the team leader to repair, the situation and symptoms of the faulty equipment should be described to the student in advance, and the general maintenance and thinking direction should be formulated for the student Finally, when carrying out maintenance, students are the mainstay, requiring students to carry out maintenance work according to the planned steps, and at the same time recording the difficulties, and according to the difficulties, the teacher puts forward targeted questions to guide the smooth progress of the maintenance work.

#### **4.6 Conduct Discussion and Summary within and between Groups**

After the end of the experimental project or the organization of student maintenance equipment, the team leader organizes the members of each group to summarize and summarize the problems that occurred in this learning and operation project, and complete the writing of the report according to the actual situation. Then score the communication with other groups separately. There is benign competition between these groups to help improve students' mastery of what they learn. Teachers can observe the actual situation of each student during the training process to effectively and accurately judge the student's learning situation, so that in the future course design, the general knowledge points can be more targeted.

#### **5. Effectiveness and Deficiencies**

The use of the “student-centered” teaching method in the maintenance of equipment in training rooms has obvious results. From the perspective of maintenance work, it effectively reduces the long maintenance cycle caused by too few maintenance personnel; from the perspective of student participation, it effectively and effectively improves the team leader's knowledge reserve ability and leadership ability, while forming a group and inter-group A benign learning environment; from the perspective of teachers' feedback after class, they can better grasp the situation of students, promote the teaching process purposefully, and improve the teaching content; from the perspective of laboratory management, they can use the laboratory to a greater extent After school time, increase the utilization rate of the laboratory and so on.

Due to various objective reasons such as the nature of the laboratory, the venue and the equipment, there are many deficiencies that need improvement. For example, the insufficient preparation of teachers in advance affects the smoothness of the maintenance progress; if the failure occurs beyond the ability of the team leader, it will affect the cooperation of the maintenance team; if the teacher's on-site patrol video rate is insufficient, the response ability is insufficient to deal with difficult failures in time.

#### **References**

- [1] Liu Xianjun. On “student-centered” [J]. Higher Education Research, 2012, (08): 1-6.
- [2] Yin Minghua. Adopt “student-centered” teaching method to improve teaching effect, [J]. Science and Technology Information, 2010, 8: 151.
- [3] Tang Yangbo, Zheng Lefan. Explore the application of “student-centered” teaching method in the practical training of urban rail transit control [J]. Southern Vocational Education Journal, 2013, (06): 30-32, 45.