



RESEARCH ARTICLE

Construction and Teaching Reform of Electrics and Electronics Experimental Teaching Demonstration Center

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Abstract: Experimental teaching is the main means to improve students' practical ability and independent innovation ability, and open laboratory is the most basic teaching and scientific research environment for cultivating innovative ability and compound talents^[1,2]. In order to meet the needs of high-quality talents in our country, the Electrotechnics and electronics experimental teaching demonstration center has broken the traditional closed teaching system and learning methods, and has carried out open-ended experiments in order to cultivate students' independent learning ability and innovative spirit, improve students' enthusiasm of integrating theory with practice, and solve class-hour conflicts and time-consuming problems. Disadvantages such as fixed and idle experimental resources.

Keywords: Electrical and electronic; Teach school; Electrical engineering

1. Teaching reform ideas and reform ideas

In order to improve the teaching quality, cultivate students' practical ability and innovative ability, the center is student-centered, laying equal stress on knowledge imparting and ability cultivating, coordinated development of Engineering quality, mutual promotion of learning, practice and innovation under the guidance of experimental teaching ideas; taking experimental teaching reform to promote laboratory construction as a train of thought, the center constructs basic and elementary types. Three experimental levels of high-level and innovative research, and a new experimental teaching system featuring multi-campus, multi-disciplinary and multi-specialty services, have been carried out; the modern experimental teaching management mode of digitization, networking and opening-up has been reformed to build an experiment with advanced educational concept, strong research ability and reasonable structure. The teaching faculty has promoted the teaching level and efficiency of the demonstration center to a new level.

2. Innovation management system and management means

The center carries out the two level management system of school level management^[3,4]. The school is mainly responsible for the macro-management of the construction planning and implementation of the experimental center, the appointment of the director of the center, the examination of the laboratory work and the appropriation of the required funds. The college is responsible for the construction of the experimental teaching staff, the specific construction objectives, the design of the experimental teaching system, the operation and quality control, the regular examination and the daily management of the demonstration center. And so on. The two-level management system guarantees the center's multi-disciplinary and multi-professional service orientation and construction resources, and guarantees the quality of experimental teaching and the efficient operation of the center.

The center institutionalizes and standardizes management^[5,6], formulates and implements laboratory plans, responsibilities of the director of the laboratory center, responsibilities of the laboratory teachers, managerial personnel, EDA

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laboratory rules and regulations, management methods of instruments and equipment, compensation system for loss and damage of instruments and equipment, management methods of low-value consumables, laboratory safety regulations A series of management systems, such as the rules of teaching management, the rules of students' experiment, the rules of students' experiment, the methods of examination of experimental results and the open management system of laboratory, are introduced.

During the construction period, the center further refined the phased construction objectives, including the laboratory internal organization and responsibility, laboratory operation and management mode, experimental content system and experimental teaching team, and put forward the laboratory management mode, laboratory opening, laboratory information management platform, basic type, improvement type and research innovation type. The three experimental levels, the reform of teaching methods and means, and the construction of experimental teaching materials are the main contents of the construction, which ensure the smooth progress of the construction of experimental teaching demonstration center.

The construction of the center is closely combined with the construction of the subject, which has played a very good supporting role for the specialty of automation at provincial level, and has played an active role in promoting the construction of computer science and technology, electronic information engineering, electrical engineering and automation specialty.

On the basis of the existing experimental teaching, basic work information and network management platform of instruments and equipment, the demonstration center has further strengthened the construction of the comprehensive experimental teaching management system, which has the experimental center information platform, experimental teaching management, experimental process management, experimental teaching resources website, students and teachers. The network management platform with various functions, such as households, has formed a digital, networked^[7] and open laboratory management mode^[8], and experimental teaching resources are shared by the whole school.

3. Fully open laboratory

The center constantly excavates and makes full use of the existing teaching resources.

Efforts should be made to build and improve students' autonomous learning environment. The new experimental teaching system of students' autonomous learning should be set up from three aspects of time, content and opening of venues and equipment, and from two aspects of planned and unplanned opening, so as to strengthen the cultivation of practical and innovative abilities. At present, it has reached: 1) Opening time is more than 10 hours a day; 2) Of the 159 experimental projects planned, 50 experimental projects with different contents are provided for students to choose, accounting for 31%. Students can also bring their own projects and the center provides technical guidance and services; 3) On the basis of students' reservation and opening up, the site and equipment are guaranteed; 4) The planned experimental/practical teaching tasks completed so far in 2005 are 1.68 million hours, of which 1.29 million are open and 76% are open; To open the laboratory during winter and summer holidays, weekends or after-school hours, promote research and innovative experiments, and actively organize and participate in the "Challenge Cup", electronic design, robotics, embedded design and other national college students' competitions. The unplanned opening time exceeds 50% of the planned school hours. The Center website provides an open teaching management environment and rich network experimental teaching resources through public information platform, students and teachers portal.

4. Enrich teaching contents

The center has opened 34 experimental/practical courses for all kinds of specialties, including 23 experimental courses, 5 curriculum designs, 3 comprehensive training courses and 3 internships. It contains 159 experiments, including 58 basic experiments, 101 enhancement experiments and 50 experiments. 36%, 63% and 31%. It includes: independent experiment; in-class experiment; curriculum design; comprehensive training and practice; research and innovation experiment. By increasing the opening time of the laboratory, encouraging students to carry out research and innovative experiments, and actively participating in the National College Students' Challenge Cup Extracurricular Academic and Technological Works Competition, Electronic Design Competition, Robot Competition and Embedded Design

Competition, students' innovative ability can be cultivated.

During the construction period, the center completed the compilation and revision of the new experimental instruction books for the experimental links of public foundation, basic technical courses, curriculum design, comprehensive training and practice. The experimental textbooks reflect the achievements of experimental teaching reform and research, embody the modern experimental technology means such as new technology and new method, have three experimental levels of basic type, improving type and research innovation type, which can be selected by students of different majors, and actively develop and widely use multimedia experimental teaching courseware. The teaching effect is obvious. Obvious.

5. Improve teaching methods and assessment methods

According to the orientation of undergraduate talents training objectives and with the cultivation of engineering practice ability and innovation ability as the core, and according to the characteristics and specific requirements of different disciplines and specialties, a new type of experiment with various specifications, different school hours, including three experimental levels of basic type, improvement type and research innovation type, and the combination of in-class and out-of-class is constructed. The teaching system creates the conditions for students to train themselves, establishes a teaching model with students as the main body and teachers as the leading role, takes ability cultivation as the goal, implements hierarchical teaching and open teaching, adopts heuristic and discussive experimental teaching methods^[9], strengthens students' preview guidance before the experiment and makes the experiment accurate. Fully prepared, guided seriously, and focused on training students' rigorous scientific attitude and innovative ability. In the specific teaching process, students are required to fully understand the experimental basis before the experiment.

This knowledge, familiar with experimental equipment, experimental principles and methods, to leave more room for students, improve the ability of self-learning, while self-developed and widely used multimedia experimental teaching courseware.

In terms of the examination method, the examination method of experimental results was formulated^[10,11]. The students were assessed by means of experimental preview, experimental operation, experimental report and final comprehensive examination. Focus on encouraging innovation, for usually diligent thinking, hands-on ability, courage to explore innovative students, encourage them to explore the contents of the experiment in a deeper level, usually score points. In addition, the experimental teaching has a scientific and standardized assessment system, and actively carry out the two-way online teaching mutual evaluation between teachers and students.

6. Strengthen the construction of teaching staff

Training a high-quality experimental teaching team is the key to the success of experimental teaching construction and reform^[12,13]. By actively carrying out scientific research work and striving to improve the level of experimental teaching, a contingent of experimental teaching teachers with advanced educational ideas, strong research ability and reasonable structure has been built.

The center has formulated "relevant regulations and implementation programs on the training of young teachers" to encourage young teachers to pursue academic degrees and further professional studies. We have set up a system of curriculum refresher and professional training, and reformed it from pre-job training, post assessment, post allowance and workload calculation. Full-time teachers have been trained on the job. Teachers are encouraged to engage in experimental teaching reform and college students' innovative activities; theoretical teachers are encouraged to engage in experimental teaching in part-time form and experimental teachers are encouraged to engage in theoretical teaching, and theoretical teachers are required to participate in experimental guidance, so as to achieve the integration of experimental teaching and theoretical teaching. Form a teaching team of experimental teaching and theoretical teaching, teaching, scientific research, technology compatible, the core of the relatively stable backbone of the experimental teaching.

Scientific research and teaching research have promoted the construction of teaching staff. In recent years, the center has undertaken dozens of scientific research projects and published more than 100 scientific research papers. The center also actively carried out teaching and research activities, completed a number of teaching and research topics,

improved the teaching level and level, and published four textbooks, such as "Electrical and Electronic Technology Experimental Guidance", "Microcomputer Principle and Interface", "Electrical Control Technology and PLC" and "Automatic Control Principle", to publish experimental teaching. More than 20 research papers. The electronic experimental device, automatic control principle comprehensive experimental instrument, intelligent dynamic signal tester and other experimental instruments have been developed.

7. Strengthening laboratory hardware construction and maintenance

The center consists of three electrical technology laboratories, four electronic technology laboratories, one electronic practice base and EDA, motor and drag, microcomputer principle and interface technology, automatic control, digital signal processing, signal system, electronic measurement and University Students'innovation laboratories. The layout of space and structure is reasonable, which can better meet the needs of experimental teaching. Laboratory design, decoration, facilities configuration is reasonable and practical, laboratory building video monitoring and other safety facilities are complete.

During the construction period, a total of 4.6 million yuan was invested in the allocation of instruments and equipment, the selection of high-quality brands, the preferential input of basic experiments with a wide range of benefits, the guarantee of experimental instruments conducive to capacity-building, the emphasis on combination and optimization, the improvement of equipment utilization efficiency, and the satisfaction of experimental teaching at the three experimental levels of basic, improved and innovative research. Learning requirements. We have developed 119 sets of electronic experimental apparatus, 14 sets of automatic control principle comprehensive experimental apparatus and intelligent dynamic signal testing apparatus. The efficiency of instrument and equipment is high, and the annual number of experiment / training hours exceeds 370 thousand persons / year.

The management system of instruments and equipment is sound, and the coincidence rate of fixed assets accounts and materials reaches 100%. The demonstration center has special funds to ensure the normal maintenance and maintenance of instruments and equipment. The intact rate of instruments and equipment is above 95%. The average annual renewal rate of the instruments and equipment meets the standards (over 6% in mechanical and electrical categories, over 9% in electronic instruments and over 15% in computers).

8. Junctions

The construction of demonstration center is a long-term systematic project^[14-16]. The scientific and standardized management system and the construction of experimental teaching system are the core. After a long period of exploration and practice, the demonstration center has continuously improved, optimized and innovated the management system and experimental teaching system, forming a distinctive feature. The establishment of a scientific management system improves the operational efficiency of the center, forms a digital, network, open laboratory management model, and promotes the improvement of experimental teaching level; the construction of a new experimental teaching system, effectively promoting the formation of students'autonomous learning, cooperative learning and research-based learning methods. It improves students' practical ability, practical ability, ability to solve practical problems and innovation and entrepreneurship. In the future, the center will continue to reform and explore, so that students'innovative ability, scientific thinking and comprehensive quality can be improved to better meet the national demand for comprehensive, innovative and high-quality personnel.

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