

Research on the Construction of Innovative Experimental Teaching System in Engineering Colleges

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Abstract : The construction of the teaching system of engineering colleges should focus on students' innovative and practical ability, which is very important and the key to the reform of the teaching system. Based on this, this article takes engineering colleges as the research object and discusses the construction of its experimental teaching system for reference.

Keywords : Engineering Colleges; Innovation; Experimental Teaching; System Construction

In the new era, various shortcomings of the traditional experimental teaching system in engineering colleges have gradually emerged. Simple experimental content and few innovative experiments have brought adverse effects on the cultivation of students' innovative ability. Especially in recent years, the enrollment scale and number of colleges and universities have been increasing, and laboratory resources have become less and less able to meet the teaching needs. Many colleges and universities have gradually relaxed their requirements for experimental teaching, with fewer class hours and simplified content. The status of experimental teaching was gradually weakened. In this case, the construction of innovative experimental teaching system in engineering colleges is very important.

1. Clarify teaching objectives and ensure the level of experimental teaching system

The construction of the experimental teaching system of engineering colleges must clarify the teaching objectives, focus on the cultivation of innovative and practical talents, and pay attention to the safety of experiments. The level of the experimental teaching system includes theoretical education, experimental teaching and technical skills education and parts. Among them, theoretical education is the foundation, and the focus is on letting students master the basic theoretical knowledge of various majors to lay the foundation for the development of experimental teaching activities; The experimental teaching link must implement safety education for students, that is, how to correctly apply experimental chemicals and how to regulate carry out experimental operations, etc., technical skills education, that is, the implementation of experimental teaching for a certain profession, by allowing students to participate in experimental activities, improve students' operational skills and level.

2. Establish an innovative experimental teaching system and update experimental teaching content

To carry out the reform of the experimental teaching system, the updating of experimental teaching content is the most important and difficult point. The innovative experimental teaching system must closely follow the needs of innovative education for talent training. It is necessary to pay attention to the integrity of the vertical knowledge system and the penetration of horizontal knowledge. It is necessary to meet the general needs of students, but also to pay attention to the development of students' personality; It is necessary to give play to the guiding role of teachers and to attach importance to the status of students as the main body. Establish an experimental teaching system that integrates basic experiments, comprehensive experiments, that is, special

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doi: 10.18686/ah.v5i11.4180

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experiments, to tap students' potential and cultivate students' innovative ability.

First, basic experiments. In this link, it is necessary to effectively set the basic experimental content, delete the existing experimental content that is lagging behind, and add experiments with high technical level and strong operability. The focus of basic experiments is to train students in basic theories and skills, and to correct their experimental attitudes. In the experiment, students obtain knowledge through observation and integration of various experimental phenomena, analysis of experimental phenomena.

Second, comprehensive experiments. Comprehensive experiment is mainly to train students' practical ability, and is one of the main ways to improve students' innovative practical ability. Teachers design comprehensive experiments in teaching, or allow students to design experiments independently under the guidance of teachers, and let students choose topics, formulate experimental plans, and carry out experimental activities. The content of the experiment meets the requirements of subject development, so that students can understand the latest trends in subject development. The difficulty of the experiment content should be well controlled and adapted to the student's ability level. The use of comprehensive experiments provides students with more opportunities to show themselves, fully mobilize students' enthusiasm and enthusiasm for experimental classes, develop students' innovative thinking, and lay the foundation for students to engage in professional work in the future.

Third, special experiments. In order to allow students to actively enter the laboratory and participate in scientific research or technology research and development, colleges and universities can appropriately increase this area of elective courses to provide students with more opportunities for exercise. For example, with regard to the "PC measurement and control technology" experimental course, students can master the knowledge of crisis principles, interface technology and other aspects by taking this course, which creates conditions for cultivating students' practical ability in this area of technology.

3. Deepen the reform and accelerate the supporting reform of the innovative experimental teaching system

The establishment of an innovative experimental teaching system covers a lot of content, and it needs the cooperation and help of all parties, which can be specifically carried out from the following aspects.

First, increase the strength of the construction of the senior management team. Teacher's reading materials are an indispensable part of the experimental teaching system. The construction of a high-quality experimental teaching team directly affects the effect of innovative experimental teaching. For this reason, engineering colleges should pay attention to the construction of the teaching staff, introduce more high-quality teachers, increase the training and assessment of experimental teachers, and improve their teaching quality and level. The training and assessment of teachers should be scientific and fair, and rewards for good assessment results, and for those with poor assessment results, we should focus on strengthening education.

Second, establish a sound laboratory management system. It is necessary to establish various guarantee and management mechanisms for open laboratories. Since it is an open laboratory, it is not only necessary to make provisions for open content and set standards, but also to make requirements for the internal construction and management of the laboratory.

Third, ensure the implementation of funding and supporting policies. To do a good job in the construction of an innovative experimental system, colleges and universities must ensure sufficient laboratory funding and set up special experimental funds. To transform and innovate laboratories, for example, physics laboratories can be built, focusing on the introduction of advanced technology to effectively make up for the problems existing in traditional physics experiment teaching, and electronic experiment centers can also be built. Institutions must also use various means to attract and support students to participate in laboratory work. Because many faculties will allocate these expenses to the teaching and research section, the funds allocated to the laboratory in the end are very small, which cannot meet the needs of laboratory construction and innovation, and the overall level of the laboratory cannot be improved.

Fourth, based on policy guidance, increase laboratory openness. In order to further improve the utilization rate of laboratories, avoid diversified investment and insufficient construction from the policy level, and promote the efficient development of experimental teaching in colleges and universities, it is necessary to build a laboratory management and control system centered on colleges and departments, as follows: ① According to the needs of various professions, build corresponding new laboratories, and the construction of laboratories must be strictly approved to avoid the problem of repeated construction. ② Collect the experimental projects of the whole school, and each professional experimental teacher selects or designs experimental projects independently. ③ According to the teaching needs of each major, each laboratory summarizes various types of experimental projects to meet the needs of students of each major.

4. Construct a scientific and perfect experimental teaching evaluation system

A scientific and complete experimental teaching evaluation system plays a key role in improving the quality of experimental teaching. To this end, engineering colleges must innovate the traditional assessment model and build an assessment and evaluation system that adapts to the cultivation of innovative talents, so that it can show the comprehensive ability of students. When assessing students, one should not only focus on the students' test scores, but also assess the students' experimental attitudes, operational abilities, and their ability to comprehensively use the knowledge they have learned to carry out the process of experimental operations within the specified time. Due to the differences in students' experimental foundation and thinking mode, there will be some differences in the experimental methods used when participating in the experiment. The teacher class evaluates the students based on the quality and innovation of the experimental program set by the students. In addition, when evaluating students, it is necessary to ensure that the evaluation subjects are diversified, such as teacher-student mutual evaluation, student mutual evaluation, student self-evaluation, etc. Teachers can also have a comprehensive understanding of their own experimental teaching process based on the feedback from students, correct the problems in their own teaching, and do a good job of teaching summary and reflection, so that they can better implement teaching in the future.

5. Conclusion

All in all, the innovative experimental teaching system of engineering colleges is the inevitable development of the times. It is to comply with the requirements of colleges and universities for the teaching reform of the proposal. When establishing an innovative experimental system, colleges and universities must clarify the teaching objectives to ensure the level of the experimental teaching system; Update the experiment teaching content, speed up the supporting reform of the innovative experimental teaching system; Build a scientific and perfect experimental teaching evaluation system to cultivate more high-quality innovative talents.

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