

The Study on the Reform of Comprehensive and Designed Experimental Projects

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Abstract

The development of comprehensive and designed experiments plays a very important role in cultivating students' innovative thinking and practical ability. In view of some problems existing in the current comprehensive and design experiments, this paper puts forward some ideas and ways of setting up the comprehensive and designed experiments in the future, and walks out of some misunderstandings in the process of opening the comprehensive and designed experiments in the early stage.

Keywords

Reform; Comprehensive and designed experiment; Experimental teaching.

1. Introduction

Experimental teaching is an important part of higher education, which is an important teaching means to develop students' intelligence, cultivate students' experimental skills and scientific thinking methods, cultivate students' ability to observe problems, analyze and solve problems, and cultivate students' innovative ability and scientific research ability. The basic experiment is of great significance to the cultivation of students' theory and practice, and lay the foundation of the follow-up course, but in the cultivation of students' innovative thinking and spirit, and in the cultivation of students' ability of comprehensive application of knowledge, it is necessary to rely on comprehensive and design experiments. Comprehensive design experiment is one of the important contents of experimental teaching content, method and means reform. Setting up comprehensive and design experiment is the trend of experimental teaching in the new period, and it is also an important way to train applied talents.

2. The Definition of Comprehensive and Design Experiment

The comprehensive experiment is a compound experiment on the comprehensive training of the students' experimental skills and experimental methods based on the basic knowledge and basic operation skills of the students. The comprehensive experiment has the characteristics of the compound of the experimental content, the pluralism of the experimental method, the diversity of the experimental means, the comprehensive nature of the personnel training and the like. The purpose of the comprehensive experiment is to train the students' experimental skills, to train the students' ability to access the data, to test the ability of the experiment, the data processing ability and the comprehensive analysis ability. The design experiment is an experiment designed for the purpose, requirements and experimental conditions of the given experiment, which is designed by the students to select or make the instrument and implement it. The design experiment has the characteristics of the initiative of the student's study, the exploration of the experimental content, the diversity of the experimental method and so on. The purpose of the design experiment is to stimulate the initiative and innovation consciousness of the students' learning, to train the students' independent thinking, to use the knowledge comprehensively, to put forward the problems and to solve the complex problems.

3. Problems Existing in Comprehensive and Design Experiments at the Present Stage

According to the investigation, the following problems exist in the process of the comprehensive design test: The comprehensive design experiment in a single course is a simple “retrofit” of the original verification experiment. The application knowledge is relatively simple, lack of depth, the knowledge points involved are similar, it is difficult to reflect the comprehensive, the characteristics of the design experiment and so on. Therefore, it is recommended to open some comprehensive and design experiment as a comprehensive course, so as to avoid the shortcomings set in a single course and improve the students' ability to apply knowledge in multiple disciplines. the comprehensive and designed experimental teaching syllabus and teaching materials should be compiled according to the specialty characteristics based on the goal and orientation of the school's personnel training.

4. The Principle of Setting Up Comprehensive and Designed Experiments

- (1) The experimental content should be novel. Under the premise of meeting the professional requirements, the content of the design experiment has a certain novelty and is as close to the frontier of science and technology as possible, which also requires the teachers with scientific research projects to transform their research content into some comprehensive and design experimental projects in time.
- (2) The experiment should be reasonable. The experimental project involved in the outline shall ensure that most students can end within 4 hours on the premise that the experimental scheme is correct. The requirements can be relaxed for the comprehensive and designed experimental project of the outside-class quality expansion.
- (3) The experimental examination is to be scientific. The comprehensive and designed experiment is mainly to exercise the comprehensive ability of the students, the examination of the experimental results must be comprehensive, such as the pre-study of the students, the rationality of the scheme, the treatment of the data results, etc., all should be reflected in the final results, and should not only pay attention to the experimental results.
- (4) Pay attention to the whole thing. From the feasibility analysis of the experiment, it is necessary to think that the students must avoid the emergence of high-risk drugs as far as possible, and the dangerous operation must have the guidance of teachers to ensure the safety of the experiment.
- (5) The teacher should study in depth. Comprehensive and designed experiments requires teachers to invest a lot of energy, any comprehensive, design experiment project needs to be discussed in the teaching and research room, analyze the feasibility of the experiment, and ensure the opening of the experiment.

5. The Open Procedures

- (1) The teacher compiles the experiment outline, compiles the experiment instruction book, and implements it after collective discussion in the teaching and research office.
- (2) Before the beginning of the experiment, the instructor arranges the experimental task at least two weeks in advance, explains some experiences in the experiment to the students, and recommends the use of the experimental guidance book. According to the requirements of the instruction book, the students retrieve, consult the relevant data, determine the direction of the experiment, and draw up the experimental plan within the specified time.
- (3) In the implementation of the experiment, the students are required to think independently, to analyze the problems by teamwork, to solve the problems, to guide the teachers to encourage

the students to open up and innovate within the scope of the experimental requirements, to guide the problems existing in the students' experiments, and to ensure the smooth progress of the experiments.

(4) After the experiment, the students wrote the experimental report, and summarized the problems found in the course of the experiment, the solution and the outstanding problems. Instruct the teachers to give the experimental results according to the students' experimental scheme, the performance of the experimental process and the experimental report.

6. Assessment and Management

Comprehensive, the examination of design experiment should include the whole process of students participating in the experiment, each department (college) should perfect the students' comprehensiveness, the examination method of design experiment, improve the enthusiasm of students to participate in comprehensive and design experiment, and improve the quality of comprehensive and design experiment.

The school formulates the comprehensive, the design experiment guides the teacher workload calculation method, formulates the related policy measure on the comprehensiveness, the design experiment investment and the salary, the result cognizance and so on. The results of comprehensive design experiments will be linked to the annual assessment of units to improve the enthusiasm of departments (colleges) and teachers.

References

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