Research and Practice on Reform of Experimental Teaching System Based on Computer

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Abstract. The teaching environment of experimental teaching has also changed with the continuous development of social economy. Traditional experimental teaching is mostly based on book teaching and multimedia methods, or supplemented by analyzers and simulation systems, but there are still certain limitations. This article is based on computer technology through the process of experimental teaching, all-round exercise of students' experimental teaching professional knowledge and application of skills, aiming to improve students' comprehensive ability.

Keywords: Computer, Experimental Teaching, System Reform

1. Introduction

In recent years, with the continuous development of social economy, the teaching environment of experimental teaching has also changed. Traditional experimental teaching is mostly based on book teaching and multimedia methods, or supplemented by analyzers and simulation systems [1, 2]. From the perspective of teaching effects, traditional book teaching is mostly limited to theoretical knowledge. Students generally lack intuitive and perceptual understanding of the realization mechanism and experimental links. It is difficult for students to grasp and understand, and the teaching effect is not ideal; while multimedia teaching makes up for traditional teaching The shortcomings and deficiencies in the system, but can not reflect the real process and performance in real time [3, 4]. Most of these methods are taught in a passive way. Without suitable teaching tools, students can't do it directly. Therefore, the entire college computer professional course teaching is calling for and exploring new teaching methods [5, 6].

This article is based on computer technology and implants the concept of experimental teaching into the experimental teaching system, aiming to exercise students' computer professional knowledge and skills application in an all-round way.

2. Problems in the reform of the experimental teaching system of computer science

As my country's social development is getting better and better, science and technology have also developed. Under the influence of this large environment, many schools have set up computer technology as a separate course. Because computers have their own complex and diversified characteristics, they also increase the difficulty of computer teaching. Because they are deeply
influenced by traditional teaching concepts, they only attach importance to the explanation and application of theoretical knowledge. Teachers are the mainstay and students are the supplementary. The teaching mode of the school has led to the phenomenon that students have a deeper understanding of professional knowledge and lack of practical ability. Specifically, the problems in the reform of the experimental teaching system of computer science are as follows:

2.1. The teaching method is too traditional and the teaching mode is relatively backward
In the traditional teaching mode, the theoretical knowledge is generally regarded as the key teaching object and the computer practice teaching is underestimated. This causes the computer technology to fail to keep up with the pace of new technology and new knowledge. Because the teaching facilities are too old-fashioned and the teaching methods are stagnant, a large number of experimental teaching is at the beginning stage.

2.2. There are defects in the experimental teaching system structure
In the traditional teaching mode, the teaching system is too closed, which will prevent the updating and replacement of new courses and new experimental projects in practical teaching. In the process of generally long teaching time, it is generally a four-year cycle. Affected the development of computers in our country. As a result, the teaching method is not close to expectations.

2.3. Experiment management is too backward
The reason for the backwardness of experiment management is the duplication of laboratory settings, and the main reason for this phenomenon is that teachers and laboratory managers do not understand their responsibilities and rights, thus wasting a lot of experimental teaching resources. Although many schools have established laboratories, the laboratories are merely furnishings, and they are not open or partially open. This also prevents students from getting better experimental learning.

2.4. Experimental teaching lags behind
In schools, most of the teaching teachers are younger teachers. After graduating from school, they are directly assigned to various schools for teaching. Although they have an innovative knowledge base, they lack practical experience. This also brings many problems to teaching. For example, because young teachers are not as highly qualified as old teachers, this also leads to gaps in work and attitudes. Due to lack of teaching experience, young teachers are not as good as old teachers in teaching ability and dedication.

3. Construct a scientific and reasonable experimental course teaching system
The experimental course teaching department takes the implementation of network-assisted experimental teaching as the main method to form a set of computer professional experimental teaching platforms that are conducive to individualized experimental teaching, and are conducive to cultivating students' self-learning ability and practical innovation ability, and promote the experimental teaching of other professional courses Unfold.

3.1. Analysis and classification of teaching experiments
The research group analyzes the three scientific forms of computer science-abstraction, theory, and design, puts practical teaching in an important position, and fully considers the diversification of the computer science experimental curriculum system to form a complete, systematic and scientific experimental curriculum system, To achieve the purpose of reasonably setting up experimental courses. From the different needs of learners, the following four experimental curriculum subsets can be constructed:

- Guidance: series of experiments on basic theory
  Numerical analysis, discrete mathematics experiments, and algorithm design and analysis courses are very meaningful for Qian to deepen the understanding of basic mathematical concepts and
experience the characteristics of computer numerical and non-numerical calculations.

Analysis and design: design experiment

Cultivate students' design ability and independent work ability. This type of experiment is the larger experiment in the course, such as the experiment of custom data types in "data structure" and "high-level language".

Design and realization: comprehensive experiment

Cultivate students' ability to analyze and solve problems. This type of experiment is what we often call "big homework". There are mainly "operating system", "compiling principle", "database", "software engineering" and other courses experiments.

Innovation: research experiment

Cultivate students' reasoning abstract ability and research ability. There are mainly "computer network", "graphics", "multimedia", "UNIX system" and other courses of experiments. Under normal circumstances, the graduation project also belongs to the scope of this type of experiment. Through summary and induction, the computer major has been established Practice architecture.

3.2. Reasonable organization of experimental teaching materials

Based on the above experimental analysis and classification, a scientific and reasonable experimental textbook was selected and compiled to clarify the connotation and function of university undergraduate experimental teaching.

(1) Textbooks must be targeted

Compile high-quality and distinctive teaching materials. The standard of measurement is pertinence. In this regard, we conducted a survey of students, and found that when students did not understand the university learning environment and did not master the learning characteristics and learning methods of the university. This course of high-level language programming was opened. Students generally report that this lesson is abstract and difficult to master. In response to the emergence of this problem, the organizational strength of the research group has compiled experimental textbooks that are in line with reality, starting from designing experiments on the basic principles of one to several units to cultivate students' perceptual understanding.

(2) Teaching materials highlight practicality

Characteristic teaching materials are of practical value. As a tutoring bibliography for students. Should pay more attention to its practicality. Therefore, it must be able to truly solve the problems of students in learning. At the beginning of the writing work, it was clear that the three points of scientificity, pertinence, and practicality were used as the standard for unifying the book. And use these three points to review the structure, framework, content and text of the book from beginning to end. Make it meet the standards and requirements as much as possible.

3.3. Open laboratory system scheme

In order to extend the laboratory in time and space. We propose to establish a unified, open, open teaching experiment platform system that covers computer professional teaching courses as the main content. Let learners or teachers not be restricted by time constraints, can collaborate with peers at any time, share data and computer resources, and establish an open and systematic modern comprehensive open laboratory management system, with different levels of characteristics, diversified comprehensive opening The experimental teaching mode and teaching method provide a more convenient practical environment for students of different levels and different levels. The experimental teaching and extracurricular interest group activities are integrated into the school’s subject teaching plan in an orderly and reasonable manner, and each subject The subjective initiative of each student in learning, use. Net technology, network communication technology, multimedia technology and other related information processing and dissemination technologies unify and integrate various experimental resources in the real laboratory, making the laboratory a student-centered, open and humane experiment Teaching support service system. The system is divided into four parts: resources, teachers, students, and experimental teaching management.
Resources: Contains a variety of teaching and tutoring electronic materials for students and teachers to learn reference. The resource library can be expanded and enriched by teachers and students.

Teacher: The main functions of the teacher's teaching management module include the organization and release of experimental teaching resources, experimental teaching objectives, the compilation of the outline, the compilation of experimental teaching guides, virtual experiment design, troubleshooting and guidance in the process of student experiments, and student experimental results. It provides teachers with a virtual environment for teaching and guidance; at the same time, it also provides a convenient and effective digital platform for teachers’ experimental teaching. Teachers can provide guidance to students through this function, and can understand the situation of students' experiments in time, and will conduct all-round, process-oriented and dynamic teaching and management of the entire experiment.

4. Solutions to the reform of the experimental teaching system of computer science

4.1. Experimental teaching should pay attention to fostering innovative consciousness
School education is the core of social development. With the continuous progress of social development, the teaching methods, teaching content and basic tasks of school education have also changed. With the development of science and technology getting better and better, people's demand for learning new skills and knowledge is getting higher and higher. Therefore, the requirements for school education are becoming stricter, especially for higher education. The concept of school education is not only to transfer knowledge, but also to focus on the cultivation of students' skills, so that when they enter society, they will quickly keep up with the pace of society. Therefore, in modern teaching, in addition to the cultivation of theoretical knowledge, more attention should be paid to the practical education of students' skills. The structure of the experimental teaching management module is shown in Figure 1.

![Figure 1](image)

**Figure 1.** The structure of the experimental teaching management module.

In order to achieve the above-mentioned results, the school must first reform the traditional teaching concepts. Not only should the teaching progress not be affected, but also the imperfect parts of the traditional teaching concepts should be supplemented. The good teaching models should be retained and matched with the new teaching methods. This way not only consolidates students’
professional knowledge, but also trains students’ professional skills. Secondly, strengthen the
knowledge training of teaching teachers. The school can use the winter and summer vacations to
organize teachers to visit company units. Teachers can also communicate with company employees on
professional technology, so that teachers can better understand the current advanced technology, and at
the same time increase the teaching content.

The concentration index is used to calculate and analyze the degree of attention to elective
experimental courses. The calculation formula is as follows:

\[ G = 100 \times \sqrt{\frac{\sum (x_i - S)^2}{S}} \] (1)

In the formula, \( x_i \) is the network attention of the i-th experiment; S is the sum of the network
attention of each experiment; n is the number of all experiments. The G value should be between 0 and
100. The larger the G value, the more spatially the network attention Concentrated, on the contrary, the
more scattered.

4.2. Experimental teaching should be combined with practical engineering applications
In order to better cultivate computer application talents, strengthening experimental teaching is an
indispensable link. To enable students to fully understand and master computer professional
knowledge and skills, in addition to strengthening the management of experimental courses, it is
necessary to cooperate with enterprises to create creativity for students Practice opportunities broaden
students’ horizons and strengthen students’ understanding of modern technology.

4.3. Maintain the advancement, modernity and directionality of experimental teaching
In order to maintain the advanced, modern and directional characteristics of experimental teaching, we
must start from three aspects: First, make use of the teaching facilities that the school has, and provide
the school with directional teaching content. Second, the school's teaching software and hardware will
be updated, and the traditional teaching equipment and environment will be advanced. Third,
modernize and improve the functions of old equipment and instruments to realize the value of turning
"waste" into "treasure".

4.4. Experimental teaching must be combined with the improvement of scientific research level
With the development of advanced technology getting better and better, the level of scientific research
can be combined with experimental teaching to create a science and technology learning mutual aid
group for students. At the same time, the school should open the laboratory to the outside world so that
students and teachers can use their spare time to conduct scientific research activities in the laboratory,
which not only helps students consolidate their knowledge of books, but also expands their horizons
and learns knowledge that is not in the books.

4.5. The construction of the experimental teaching base should be combined with the construction of
the production, study and research base
In order to strengthen students' practical ability and innovation ability, many schools combine the
construction of experimental teaching bases with the construction of production-learning-research
bases.

It allows students to put themselves in the hands of practical learning, and at the same time allows
them to have a further understanding of high and new technology, thereby enhancing the students' practical ability.

5. Conclusion
With the continuous development of computer technology, experimental teaching methods and means
have become diversified. Relying on the "Internet +" education method, the experimental teaching
mode has been continuously enriched. Relying on computer technology, this paper implants the concept of experimental teaching into the experimental teaching system, through the training of students' practical teaching and comprehensive quality, and aims to exercise students' computer professional knowledge and application of skills in an all-round way.

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