

# Talking about the Reform and Practice of Digital Logic Experiment Teaching

Heng Wang, Xinrui Chen

School of Electronics and Information Engineering, Jingchu University of Technology, Jingmen 448000, China

wanghengwh@126.com

**Keywords:** digital logic, experimental teaching, reform and practice

**Abstract:** In the light of experimental teaching practice, the traditional digital logic experiment teaching system is reformed. It is proposed that the establishment of digital logic experiment teaching under the new situation objectives, content, organization, means and evaluation measures. The comprehensive and scientific evaluation of the experimental results; Third, the formative evaluation and comprehensive evaluation combined to speed up the evaluation of the feedback rate and promote the further optimization of experimental teaching. This evaluation method in the trial process, By the students welcome, improve the enthusiasm of students experiment.

## 1. Introduction

At present, the environment and situation affecting digital logic experimental teaching in colleges and universities are constantly changing. Teachers and students are facing new opportunities and challenges --- the rapid development of electronic technology, the advancement of education modernization and the provision of education to teachers and students New information, new technologies, new models and new methods, we also put forward higher requirements on the quality structure of qualified personnel and experimental teaching of digital logic.

Many aspects of the traditional experimental teaching of digital logic have lagged behind the development of the situation and become a resistance to the modernization of education and the cultivation of innovative personnel. Therefore, it is necessary to carry out the digital logic experimental teaching reform, and only in the teaching practice, we must carefully analyze the traditional figures The advantages and disadvantages of logical experiment teaching, the advantages and disadvantages avoid disadvantages, the digital logic experimental teaching a full range of reform, can improve the quality of experimental teaching in order to adapt to the development of electronic technology and innovative personnel training requirements.

## 2. Digital Logic Experimental Teaching Reform Measures

Digital logic experiment teaching activity is a complex systematic project, which includes the establishment of teaching objectives, the setting of teaching contents, the selection of teaching organization forms, the adoption of teaching methods, the implementation of teaching evaluation and so on. These links are interrelated and mutually Constraints, jointly determine the teaching activities carried out. In these links, the teaching goal is to implement the premise and basis of experimental teaching, teaching objectives determine the teaching content, teaching content and determines the form of teaching organization, teaching organization situation through a certain Teaching methods to achieve, and teaching effectiveness ultimately to be achieved through the evaluation of teaching. Therefore, to carry out digital logic experimental teaching reform, it is necessary to carry out all aspects of teaching activities in all aspects of the reform. According to the following aspects of the relationship between teaching , According to the teaching goal of reform teaching content reform teaching organization reform teaching reform teaching evaluation reform "train of thought, through the analysis of traditional digital logic experimental teaching deficiencies, recognize the need for reform, and then propose measures for reform.

### **3. Digital Logic Experiment Teaching Objectives Reform**

The experimental goal is to implement the experimental teaching premise and the overall basis, whether the goal is scientific, objectivity, feasibility, directly related to the success of experimental teaching. Traditional digital logic experimental teaching most of the goals in the basic knowledge of students and basic skills Training and weaken the improvement of students' ability to innovate and develop the spirit of experiment. Therefore, in the process of digital logic experiment teaching reform, the repositioning of experimental objectives should be placed in the primary position, to develop a comprehensive Experimental training objectives.

### **4. Digital Logic Experimental Syllabus Revision**

Digital Logic Experiment Syllabus is based on the teaching plan to provide experimental teaching content of the guiding document, and therefore the content of the reform, the primary task is to comply with the outline of the purpose, cutting-edge, ideological and applicable principles [3], to further clarify the purpose and requirements of the experiment, re-set the experimental project, the preparation of a scientific and rational numerical logic experimental syllabus which experimental purposes can be concise, scientific and precise language to make it has strong maneuverability; The setting of experimental project is the main part of the outline. When selecting the experimental project, we should fully consider the proportion of each type of experiment at all levels, the allocation of class hours and the way of opening, so that the selected experimental project has strong representativeness and utility .

On the basis of the original outline, we compressed the basic and confirmatory experiments in the revising of the syllabus of logic coefficients of computer logic in our college, making the transition from design to synthesis and the first clear distinction between the experiment level and the experiment type. And the selected experiment project is divided into three levels, three categories and three ways to open, establish the "three levels, three types and three ways" digital logic experimental teaching organization mode.

### **5. Digital Logic Experimental Teaching Materials Selection and Preparation**

In the traditional experimental teaching of digital logic, the contents of teaching are seldom updated due to the control of the original teaching objectives, and most of the teaching materials used are versions several years ago or even ten years ago. Obviously, the rapid development of technology, the original teaching content can not adapt to the new teaching objectives, so the reform of digital logic experimental teaching has become inevitable. In our country, many universities and research institutes have publicly published digital logic experimental teaching materials [1, 2, 4], provided abundant information for our experimental teaching, but each experimental textbook is compiled by the editor with the experimental conditions, teaching objects, professional training objectives and teaching practice of his unit, The actual situation is different, so these materials are not completely applicable to other units. Therefore, the preparation of experimental materials suitable for the use of this unit is very necessary, which is why the Ministry of Education to promote self-compiled textbooks of colleges and universities.

The preparation of experimental teaching materials should outline the syllabus, in accordance with the principles of the preparation of textbooks, reasonable arrangements for textbook chapters content. Computer Science Department of our hospital organized by the principle of "digital logic experimental guide" a book, not only in the book arrangement The basic contents of "Experimental Basic Requirements", "The Use of Experimental Instruments" and "Experimental Guidance" and other conventional contents [1, 2, 4] were also arranged with the "Experimental Common Problems and Troubleshooting Methods." For the conventional part, Of the experimental teaching materials are prepared, but there are still differences in the preparation of ideas, such as in the "experimental guidance" part of some too general, operational is not strong, there is no experimental thinking part is not conducive to raising the level of students, although some detailed , But failed to give students

the space to play. We absorb the advantages of various textbooks, to improve their deficiencies, according to "for what, what to do, what to think," the idea of setting: experimental purposes , Experimental requirements, experimental equipment, experimental principles, experimental content, experimental thinking of six parts, and on "how to do" (that is, experimental steps ) In the experimental guidance takes up less space, so as to ensure the integrity and operability of the experimental guidance, but also give students leave room for improvement, so as to improve students 'experimental skills but also more conducive to students' sense of innovation For the "common problems and troubleshooting methods" section, most of the experimental textbooks did not take into account, we arrange this part, designed to enumerate the problems in the experiment and reference for the solution, to guide students in the emergence Problem or failure, can calmly control the experimental teaching material independent thinking, conscientiously find the reasons and eventually troubleshooting, to avoid the students out of the question without thinking or asked to find their own problems but no way to start the phenomenon, thereby enhancing student independence The ability to debug and analyze the circuit, while also enabling students to succeed after troubleshooting, to stimulate students interest in digital logic experiments.

## **6. Digital logic Experimental Teaching Organizational Form Reform**

The form of teaching organization is the form of organization of teaching activities organized by the organization in order to effectively complete the teaching tasks, what kind of teaching objectives and teaching content, what kind of teaching organization form [3]. The traditional goal of digital logic teaching and Content determines the experimental teaching activities are basically confined to the outline of the class hours, in a fixed classroom and laboratory. With the compression of college hours, digital logic teaching objectives, teaching content enrichment, a single "class Teaching "system has been unable to adapt to the development of the situation. Therefore, in the process of digital logic experiment teaching reform, we must solve the teaching activities by time and place constraints, learn from or explore more and more effective teaching organization. As the popular American "Field practice teaching "," case teaching "and other teaching forms are all available for reference.<sup>3</sup> We adopted the form of interest group for extra-curricular electronic design in digital logic experiment teaching to make up for the shortage of single "class teaching "system The design team is volunteered by students who are interested in electronic design. Members under the guidance of specialized instructors (generally as a digital logic experiments teachers), the use of spare time, the use of self-study, group discussion, Online learning and other ways to learn modern digital circuit design method (programming simulation simulation debugging), the actual circuit development and research, teachers involved in scientific research, teaching and research project. In the event, the team members designed a "answer", "Automatic Dialing System", etc. The practice proves that through the activities, students' digital literacy theoretical literacy has been consolidated, the interest in participating in the digital circuit and system design has been stimulated, the innovative consciousness has been cultivated, and the problem solving problem analyzed Ability, research ability has been improved.

## **7. Digital Logic Experimental Teaching Reform**

Teaching content can take different forms of teaching organization, and various forms are always achieved through certain teaching methods. Therefore, innovating teaching methods has become an important aspect of digital logic experimental teaching reform, many teachers do this a great deal of research has been done and a great deal of achievements have been made. However, there is a lack of consensus on the role of modern educational technology and modern teaching methods in teaching, and there are different tendencies to one-sidedly exaggerate the positive or negative effects. First of all, we must establish a correct understanding of modern teaching methods: we must fully affirm its positive role, but also its negative effects and shortcomings; and then we can modernize under the guidance of modern education and teaching principles. The teaching methods and traditional teaching methods combined use.

In the process of making "digital logic experimental CAI courseware", the author always aims at improving the quality and efficiency of experimental teaching, emphasizing the key and difficult points and enhancing the applicability of courseware by combining the teaching practice of this unit; Friendly interface, embodies the convenience of the use of courseware. Using a variety of media, to absorb a wealth of material, improve the visualization and vividness of courseware. In the process of using courseware to teach, I will CAI courseware and other teaching resources combined use, to "guide" principle, with the help of courseware and other teaching media to introduce students to the key and difficult, the rest by the students with courseware and instructional materials self-study. This has received good results, courseware in our hospital the first teacher outstanding courseware appraisal Competition won the first prize, excellent student evaluation teaching practice shows that the rational use of modern teaching equipment, the use of multimedia, Internet and other modern educational technology for teaching, is indeed conducive to overcome the traditional teaching methods (chalk plus blackboard, teachers explain plus demonstration , Students imitate the operation) is not conducive to expanding the scale of education, favorable Individualized, will help improve teaching quality, efficiency and effectiveness [3].

## **8. Numerical Logic Experiment Teaching Evaluation Reform**

Successful teaching or not, the success of the reform, ultimately reflected in the evaluation of teaching quality, efficiency and effectiveness, and the results of teaching evaluation will in turn affect the teaching later. The teaching evaluation system is rich in content, including curriculum evaluation, Student academic evaluation and teacher evaluation, etc. In the traditional evaluation of digital logic experiment teaching, the main indicators of student academic evaluation are too single and depend too much on students' experimental documents (preview report, experiment report, Test volumes, etc.), while neglecting students 'operational skills assessment, experimental quality assessment, innovation ability evaluation and research results evaluation. Therefore, in the reform process, the emphasis should be placed on the optimization of the students' performance evaluation system.

In the process of digital logic experimental teaching reform, our college computer department put forward a new evaluation method of experimental achievement --- first, boldly adopted the evaluation methods of student self-evaluation, student mutual evaluation and teacher's total evaluation, breaking the students' The results of a teacher have the final say, enhance the evaluation of openness, fairness and fairness; Second, the student's experimental attitude, experimental skills, experimental results together with the experimental documents as the basis for the evaluation of the experiment, improve The comprehensive and scientific evaluation of the experimental results; Third, the formative evaluation and comprehensive evaluation combined to speed up the evaluation of the feedback rate and promote the further optimization of experimental teaching. This evaluation method in the trial process, By the students welcome, improve the enthusiasm of students experiment.

## **9. Conclusion**

This article is summarized from the practice of digital logic experimental teaching reform in our hospital, some of which are proved correct and feasible, and have some promotional value. But with the continuous development of electronic technology, education the further promotion of modernization, our reform results will show some limitations. Digital logic experimental teaching reform is a repeated process of "practice - knowledge - re-practice - re-understanding", is a long-term project, it needs We continue to practice, constantly sum up experience and lessons, continue to explore more conducive to digital logic experimental teaching programs.

## **Acknowledgements**

Top Innovative Talents Training Program of Jingchu Institute of Technology in 2018 ("Jiuyuan

Program").

## References

- [1] Z.Y.B, ed., Digital logic and digital system solution to experimental guidance (first edition) [M] Beijing: Science Press, 1999.
- [2] Y.S. Computer circuit foundation (1) experiment (first edition) [M] .Beijing: China Radio and Television University Press, 2000.
- [3] A.X. Higher Education (first edition) [M] Beijing: Higher Education Press, 1998.
- [4] J.H. Basic experimental electronic technology (second edition) [M] Beijing: Higher Education Press, 1991.
- [5]Y.H.Yang. Application of genetic algorithm in reactive power optimization of power systems. Proceedings of the Chinese Journal of electrical engineering, 1995,15 (5), 347-353(Chinese).
- [6] Q.S.L. Reactive power optimization of distribution network based on improved genetic algorithm. Journal of electric power, 2005,20 (1), 17-20(Chinese).
- [7] Y.D.Z, David J.Hill,Yuri V.Markarow, Advanced Reactive Power Planning by a Genetic Alogorithm,IEEE Trans. on Power Systems:2004:Vol.11,No.4:1843 -1850.
- [8] G.T, G.S.K. Energy loss reduction in distribution system by capacitor placement through combined technique 1998:6-97.