

# Discussion on Analog Electronics Technique Experimental Curriculum Reform under the Influence of Novel Coronavirus

Yaya Wang<sup>1, a, \*</sup>, Juihui Liu<sup>2, b</sup>

1School of electrical engineering, Xi'an Traffic Engineering Institute, Xi'an, China.

2School of electrical engineering, Xi'an Traffic Engineering Institute, Xi'an, China.

<sup>a</sup>e-mail: 312157905@qq.com, <sup>b</sup>e-mail: 393190048@qq.com

## Abstract

Analog electronic technology is a professional basic course with theoretical and engineering and practical. This paper analyzes the existing problems in the practice the analog electronic technology course, introduced during the outbreak, using Multisim virtual simulation software for the exploration and practice of curriculum reform. The teaching practice shows that the proper introduction of Multisim virtual simulation in classroom teaching, experimental teaching and after-class learning can not only stimulate students' interest in learning and deepen their understanding of theoretical knowledge, but also exercise students' practical operation ability and ability to combine theory with practice.

## Keywords

Analog electronics, Multisim, simulation software, curriculum reform.

## 1. INTRODUCTION

Analog electronic technology as engineering such as communication, electric professional is an important specialized basic compulsory course, has a strong theoretical and knowledge, more abstract concept, and the characteristics of strong practicality, has the essential role in the undergraduate training plan. Taking electrical engineering and automation as an example, it not only makes an in-depth description of the knowledge points in the course of circuit analysis[1], but also provides a reserve of basic knowledge for the subsequent core courses of power electronics technology, power system analysis, etc. At the same time, it also provides necessary knowledge and skills support for students to participate in the "national college students' electronic design contest", "innovation and entrepreneurship skills training program" and other discipline competitions with innovation and practice ability as the main competitive point. Therefore, the teaching quality of simulated electronic technology experiment course is closely related to the quality of professional personnel training [2].

## 2. ANALOG ELECTRONIC TECHNOLOGY PROBLEMS EXISTING IN THE TRADITIONAL TEACHING MODE

According to the author's teaching experience for many years, the practice courses of simulated electronic technology are mostly verification experiments. In the process of doing experiments, students basically complete data measurement according to the schematic diagram of the experimental instruction book, experimental steps and preset parameters, and finally form a generally consistent experimental report [4]. In this mode, students only stay at the level of simple wiring and testing for the whole experiment. In addition, students do not have a thorough understanding of the theory, so it is difficult to use the theoretical knowledge

to guide practice in the experiment, and after completing the experiment, they cannot connect the experimental results with the theoretical knowledge. The above situation shows that the existing experimental teaching mode not only cannot effectively improve the students' comprehensive application ability and innovation ability, but also does not match the goal of cultivating application-oriented undergraduate talents.

At the beginning of the New Year, the sound of firecrackers had not yet been heard, and the battle of an epidemic without gunsmoke started suddenly. As the epidemic situation became more and more serious, education work also made corresponding changes. Affected by the epidemic, all kinds of schools postponed the return of students, and the ministry of education proposed to adopt a "no suspension of classes" approach to teaching. The original offline teaching has already had a lot of problems, but now the online teaching has been adopted and the practical teaching is facing great challenges. In order to respond to the policies of the ministry of education, the teaching team of xi 'an traffic engineering college carried out the teaching reform according to the current situation, making the practical teaching not only adapt to the current actual situation, but also develop towards the direction of engineering application.

### **3. UNDER THE INFLUENCE OF NOVEL CORONAVIRUS, A CASE STUDY WAS CARRIED OUT TO SIMULATE THE COMPREHENSIVE REFORM OF ELECTRONIC TECHNOLOGY TEACHING**

Multisim is a simulation tool launched by national instrument co., LTD., which is suitable for the design, test and characteristic analysis of various electronic circuits including analog circuit, digital circuit and radio frequency circuit. Use Multisim virtual simulation was carried out on the actual circuit can not only obtain matching precision and the real experiment results, and because of all the operations are done directly in the screen window, students can be in the absence of experiment box, virtual simulation based on Multisim link, complete the experiment content, master the knowledge points.

The following is an example of the teaching content of the basic amplifying circuit composed of triode in the course, and the specific measures of teaching reform by using the virtual simulation of Multisim are introduced.

The core content of the course of analog electronic technology is the analysis of amplifying circuit. The triode amplifying circuit is the most basic amplifying circuit. Learning this part will not only lay a good foundation for other amplifying circuits in the future, but also stimulate students' interest in this course. However, the basic concept of amplifying circuit is more, the principle of amplifying abstract difficult to understand, so most students learn more difficult, resulting in the practice of teaching do not understand. In order to solve this problem, the teaching team adopts Multisim virtual simulation, which allows students to build their own circuit under the guidance of the teacher and complete theoretical analysis. Then, Multisim is used to simulate the static and dynamic processes of the circuit. Virtual multimeter and oscilloscope in the software are used to visually display the static test results of different electric quantities in the circuit and its dynamic waveform diagram to the students. On this basis, through the comparison of simulation results and theoretical analysis results, students can understand the significance of reasonable approximate analysis in solving practical problems and understand the engineering features of the course. Finally, further in the simulation software by changing the resistance value to adjust the circuit of the static working point, lets the student observe dynamic circuit parameters and the change of the output signal waveform, at the same time, more normal amplifier output waveform and saturated (or as) distortion of the output waveform of the difference between, allowing it to understand the close relationship between the dynamic and static performance and the influence of static working point of waveform distortion. After the experiment is completed, students are guided to compare the

theoretical calculation results and simulation results of the circuit with the actual measurement results, and the reasons for the differences in the results obtained from different approaches are discussed and analyzed.

#### 4. EFFECT ANALYSIS

During the period of the outbreak, the introduction of Multisim virtual simulation software not only finish the teaching task, get rid of the limit experiment venues and facilities, inspire the students' interest in learning, independently of interest for virtual experiment circuit. In the process of learning after class, students can use Multisim as a theoretical derivation method to carry out simulation analysis on the exercises after class to verify the theoretical calculation results. Under the guidance of the teacher, we can carry out exploratory simulation experiments on the typical circuits in the course to study the characteristics of the circuits. For some students who have the ability to learn, Multisim can even be used to assist the design and simulation of works in the electronic design competition. Based on Multisim expand after class learning, enhance the student's capacity for independent innovation, effectively improve the ability of students to apply their knowledge to solve practical problems, to cultivate the engineering practice and innovation ability is of great importance.

#### 5. CONCLUSION

Discussed in this article will be coronavirus outbreak, using the Multisim virtual simulation software to simulate electronic technology practice teaching reform of the course of exploration and attempt, and with basic amplifying circuit as an example to the method in addition to the implementation of specific measures. Teaching practice shows that in the course of classroom teaching, experiment teaching and after-school study links properly introduce Multisim virtual simulation, not only can stimulate students' interest in learning, deepen students' understanding of theoretical knowledge, but also exercise the students' practical operation ability and ability to integrate theory with practice, cultivate the engineering consciousness and innovation consciousness, to achieve the expected goal of teaching reform.

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