Exploration of the Teaching Mode for Circuit Analysis Fundamental

Dan Cheng\textsuperscript{1,a}, Qiang Yu\textsuperscript{2,b} and Liying Feng\textsuperscript{1,c}

\textsuperscript{1}School of Electronic Engineering, Tianjin University of Technology and Education, Tianjin 300222, China
\textsuperscript{2}School of Mechanical Engineering, Tianjin University of Technology and Education, Tianjin 300222, China

\textsuperscript{a}chengdan_tute@126.com, \textsuperscript{b}yuqiang95@yeah.net, \textsuperscript{c}fengliying_tute@126.com

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Abstract. Circuit analysis fundamental is an important basic course of electronic information specialty. In order to stimulate students’ interest and improve their application ability, the method of changing thinking mode and teaching method is discussed. The modern teaching methods, such as simulation software and multimedia technology, are effectively used to enhance teaching effect in class.

1. Introduction

Circuit analysis fundamental is the basic course of electronic information specialty [1-6]. The main task of the course is to lay a good theoretical foundation for the following professional courses. Under the background of cultivating the compound talents with good foundation and wide knowledge, the status of circuit analysis fundamental is further improved. Therefore, the basic course of circuit analysis is very important. However, the course emphasizes theoretical knowledge and the connection with practical application is not very obvious, so it is very difficult for classroom teaching to arouse students’ interest in learning. Therefore, it has become one of the focuses of the current teaching reform to consider and explore the classroom teaching of circuit analysis fundamental.

2. Present Situation and Cause Analysis of Curriculum

Compared with the basic courses of other engineering majors, the concept and the mathematical deduction are very strict, which makes the course like a specialized course of science. The content of the course will be used in many specialized courses in the future, but the purpose of the students is not strong enough to finish the study. The most important thing is that the elements in the course are analyzed on the basis of idealization. Many conclusions are not completely in line with the actual circuit. In the experiment, many students are confused and wonder how theoretical knowledge relates to practical problems.

The traditional teaching thought emphasizes the understanding and mastering of the basic concepts and basic principles. The teacher’s teaching thinking is basically fixed. The teacher stresses the focus and the difficulty according to the error-prone content of the students who have been taught before. But students are easy to feel sleepy, because they don’t have personal experience. The state of teachers and students is seriously out of touch. The final impression of many students after completing the course is column equation and solution equation. As for the principle, they know nothing. They almost equate circuit learning with mathematics. Even if the current value is tens of amperes, they will not consider whether it is reasonable. These problems are caused by the unreasonable teaching thinking mode of teacher. Teacher does not organize the teaching process from student’s point of view. It is only by means of teacher’s own understanding and feeling that the teaching effect is poor. The traditional cramming teaching form had been abandoned by educators, but the actual teaching thinking is hard to liberate from the traditional mode. Therefore, it is necessary to change the traditional thinking of teachers to cultivate students’ ability to contact practical problems and solve practical problems.
The course of circuit analysis fundamental has existed for many years. Although the technology in related fields is developing rapidly and changing rapidly, the content of classroom teaching is seriously lagging behind. Teachers don't present many new components and techniques to the students. Many teachers feel that the course is a basic course, and mastering the basics is the most important. They neglected the introduction of frontier knowledge. Some teachers feel that they do not have time to introduce practical knowledge because their course hours are compressed. Some teachers feel that the experimental conditions are not good, and there is no way to introduce practical problems. In fact, the full use of modern teaching methods and means can solve these contradictions.

3. Discussion on Teaching Methods

Teachers must pay attention to the improvement of their practical ability. Since some teachers are directly engaged in the teaching profession after graduation from school. Without practical experience, they can't guide students' practice well in teaching. This phenomenon leads to a vicious circle of talent training. Teachers and schools should get rid of this misunderstanding as soon as possible. Teachers can master all kinds of possible problems through the mastery of experimental instruments and drawing inferences from other examples. They can design a flexible and interesting experimental topic to stimulate students' interest in practice so as to promote classroom teaching. We can also combine theoretical teaching with practice by developing experiments and taking part in product development. In the classroom teaching, students should eventually master the ability of two aspects. On the one hand, students can analyze the circuit model and design the circuit. On the other hand, students can abstract the circuit model from the actual circuit to achieve the purpose of analyzing the principles. In this way, when the circuit fails, it can be repaired by theoretical analysis. Therefore, it is of vital importance for teachers to understand the frontier of subject technology, and to integrate the current new technologies and new electronic components into classroom teaching.

Teachers should change their teaching thinking and try their best to proceed from reality. The change of teaching thinking should focus on the actual teaching effect. Firstly, we should consider whether the content will be used directly in the future specialized courses. This requires teachers to understand the professional courses. Secondly, teachers should consider the application of engineering and supplement the relevant advanced techniques and methods into classroom teaching. This will enrich the content of the course. For example, in the explanation of Thevenin's theorem, teacher can show students the actual circuit of a radio, as shown in Fig. 1. In this complex circuit, you only need to know the current and voltage on the load. If the entire circuit is directly solved, it is too complex or infeasible. We can use the Thevenin's theorem to simplify the circuit into a simple circuit that a voltage source and a resistor are connected in series, as shown in Fig. 2. Then it's much easier to solve the voltage or current on the load. The concepts of two terminal network, equivalent resistance and open circuit voltage are introduced. As another example, when we teach the first-order circuit, we can introduce the example of touch time-delay switch into the lecture process. The corresponding circuit can be seen in Fig. 3. From the figure we can see that after touching the switch, the charge brought by the body can instantly make the triode step on, the light is lit, and the 12V power supply charges the capacitor. After the charge is consumed, the capacitor discharges through the discharge circuit so that the triode can still be conducted for a period of time. When the discharge is completed, the triode is cut off and the lamp is extinguished. The working principle of the touch time-delay switch is the embodiment of the interaction between the zero state response and the zero input response of the RC first-order circuit. The introduction of the example makes it easier for students to understand the principle of charging and discharging of the capacitor. It is also easy for students to accept the basic concepts in practical applications.
Figure 1. Radio circuit.

Figure 2. Thevenin equivalent circuit.

Figure 3. The circuit of touch time-delay switch.
Teachers can improve classroom quality by modern educational means. The circuit analysis fundamental is a comprehensive course. In addition to different characteristics and different levels of training objectives, it should also include the use of equipment training, experimental basic knowledge, device application common sense and practical knowledge of engineering and so on. Therefore, the introduction of multimedia demonstration, computer simulation technology, LAN teaching and other means of teaching, can stimulate students’ interest in learning and improve teaching efficiency and quality of the necessary conditions. Through the experimental operation, students can intuitively understand the nature of components, and understand the relevance and difference between theory and practice. But relying on students to do a few experiments in the laboratory, often fail to achieve the purpose. Teachers can introduce simulation software into classroom instruction, such as Multisim [6]. Through the dynamic experiment chart to expand the existing experiment, it can not only increase the atmosphere of the course, but also make a deep impression on the students. In addition, modern education also includes QQ, Fetion, WeChat and other means. Because fundamental is a basic course, several classes are often taught together. The exchange time between teachers and students is very limited. At the end of a semester, it is difficult for teachers to call out most of the students. Therefore, the use of modern means of communication is also very useful.

Teachers should carefully design the content of the class and improve students' interests. At present, many colleges and universities pay particular attention to scientific research, which results in insufficient teachers' devotion to teaching. Some teachers do not attach importance to teaching, and classroom lectures are almost on the list. This kind of examination environment has a great impact on the quality of the classroom. Some teachers don’t have competent problems but attitude problems. Teachers should be conscientious, responsible and teaching oriented. Teachers should carefully designs the content and means of each class, and try to show students the most perfect teaching process. When students are tired, they should be adjusted in a timely manner by telling jokes, humorous reminders or questions.

4. Conclusion

Based on the long term experience in circuit teaching, this paper analyzes the content, characteristics and problems of the basic course of circuit analysis. Through the classroom teaching reform, some suggestions are summed up. In a word, for teachers, we should reexamine how the traditional basic courses can be developed in modern education. From the change of thinking mode and teaching way, the classroom teaching can be combined closely with practical problems. We should make full use of modern educational technology to arouse students' initiative in learning so as to train students' creative ability.

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6. References


