

Strategy Exploration of Curriculum Ideology and Politics in Electronic Technology Experimental Teaching

Dongqiu Xing¹ Xinwei Gao² Jingna Cui³

^{1,2,3} College of Information and Communication, National University of Defense Technology, Wuhan, Hubei 430035, China

¹Corresponding author.

ABSTRACT

Electronic technology courses have a wide range of categories and strong engineering nature, requiring high experimental abilities and skills. The courses themselves contain rich ideological and political elements in the curriculum. Analyzing the necessity of ideological and political education in electronic technology experimental courses, this paper explores the ideological and political strategies of experimental courses from three aspects: improving teachers' ideological and political literacy, curriculum construction, and implementing ideological and political education in experimental classrooms. This paper also provides an evaluation plan to organically integrate explicit education of professional knowledge with implicit education of ideological and political education, cultivates students' correct values and professional spirit, enhances their comprehensive quality, achieves all-round education for all staff in the field of professional curriculum education, and returns to the original intention of education.

Keywords: *Electronic technology, Experimental teaching, Curriculum ideology and politics.*

1. INTRODUCTION

General secretary Xi Jinping emphasized that "we must adhere to the unity of explicit education and implicit education, tap into the ideological and political education resources contained in other courses and teaching methods, and achieve all-round education for all staff throughout the entire process". [1] The Ministry of Education has also issued the "Guidelines for the Construction of Ideological and Political Education in Higher Education Curriculum", which provides an overall design and comprehensive deployment for the construction of ideological and political education in higher education curriculum. Professional experimental course teaching should strengthen the integration of learning and thinking and the unity of knowledge and action, enhance students' innovative spirit of exploration and practical ability to solve problems. [2]

Electronic technology courses involve multiple categories, including circuit fundamentals, electrical technology, analog electronic technology,

and digital electronic technology. There is a strong correlation between courses, and knowledge and skills form a logical system. At the same time, these courses have strong practicality and obvious engineering and technical characteristics. Electronic technology courses require mastery of the composition and working principles of various circuits, and the ability to correctly use commonly used electronic instruments such as multimeters and oscilloscopes, being proficient in debugging and assembling commonly used electronic circuits, and having preliminary circuit design skills, as well as computer-aided design and simulation abilities in electronic circuits. The above characteristics determine that the practical teaching or activities of such courses inevitably contain rich ideological and political elements, which is another powerful tool to enrich the concept of ideological and political education in courses. Digging for practical ideological and political elements, exploring reasonable and effective ideological and political methods, can demonstrate the subtle cultural influence in the classroom, allowing students to

experience the philosophy contained in specific cases and the profound truth in vivid practice. The design and research of curriculum ideology and politics in practical teaching of electronic technology have practical significance, which is a beneficial attempt in the field of curriculum ideology and politics teaching in electronic courses. It is conducive to promoting educational upgrading and providing reference for innovative educational concepts.

2. NECESSITY ANALYSIS OF IDEOLOGICAL AND POLITICAL EDUCATION IN ELECTRONIC TECHNOLOGY EXPERIMENTAL TEACHING COURSES

Each course has an educational function, and appropriate strategies can help achieve results. In the talent training program system, there are specific goals and regulations for achieving knowledge and skills in each course. In addition, there will be clear guidelines for guiding students to have a correct outlook on life, values, worldview, and other educational goals. All types of courses must be designed and guided by the talent training outline, and their own educational goals must be planned. The basic path of ideological and political education in professional courses in colleges and universities is based on fostering virtue, with ideal educational beliefs as the core, cultivating and practicing core socialist values as the main line, and establishing and improving a comprehensive physical education mechanism for all staff throughout the process as the key, which aims to build a clear goal, complete content, sound standards, scientific operation, strong guarantee, and significant effectiveness system for ideological and political work in colleges and universities.

Combining the characteristics of the course can help improve the professional curriculum education system. Electronic technology courses belong to engineering courses, and the characteristics of the subject determine that in experimental courses, students can truly achieve experimental results, master operational skills, and eliminate safety hazards as long as they have a strong pragmatic spirit, maintain a rigorous work attitude, and strong operational abilities. The implementation of curriculum ideological and political education reform in electronic technology experimental teaching courses is based on respecting the laws of curriculum construction, realizing the basic functions of knowledge

transmission and ability cultivation, and exploring and highlighting its value leading function.

The psychological education faced by college students in their growth urgently requires implicit education of curriculum ideology and politics. The psychological crisis of college students is an extremely realistic and serious social problem, which includes the outbreak of psychological problems, long-term accumulation of emotions, and stress reactions to unexpected events. Whether in ideological and political classrooms or professional courses, it is always found that some students are absent-minded, and their subjective and proactive learning psychological factors have not been mobilized, and are even having a counterproductive effect. Psychological quality, as a comprehensive psychological quality, not only determines the level of individual psychology, but also restricts the formation and development of other ability qualities. Negative and positive psychology can lead people and things to different outcomes in the same situation. Integrating ideological and political elements unconsciously in the classroom can effectively improve negative psychological problems and stimulate students' learning motivation, organically integrating ideological and political education with professional learning, and achieving profound changes in the teaching operation mechanism, while avoiding occupying valuable time for students outside of class.

3. CURRICULUM IDEOLOGICAL AND POLITICAL STRATEGIES FOR ELECTRONIC TECHNOLOGY EXPERIMENTAL COURSES

3.1 Improvement of Teachers' Ideological and Political Literacy

The construction of curriculum ideology and politics is an important measure to comprehensively improve the quality of talent cultivation, covering five aspects: morality, intelligence, physical fitness, aesthetics, and labor. It is committed to promoting and integrating the five aspects of education. Electronic technology experimental courses should focus on the comprehensive development of student quality. In the construction of curriculum ideology and politics, it is necessary for teachers to implement it. The first test is the teachers' moral awareness and ability. Building a teacher team with a conscious awareness of moral education and strong moral education

abilities is a guarantee of talent resources to ensure that this type of curriculum "moves in the same direction and cooperates in educating students". Colleges and universities should strengthen the training of teachers, utilize various measures such as new teacher training, professional responsibility professor training, and specialized training on curriculum ideological and political education reform, effectively enhance teachers' moral awareness, cultivate and enhance their moral ability, and thus cultivate a conscious awareness of actively researching and strengthening the function of ideological and political education in curriculum teaching.

3.2 Curriculum Construction and Mechanism Support

The goal of curriculum ideological and political construction is "ideology and politics". Without good ideological and political education functions, curriculum teaching will lose its soul and direction, leading to the separation and even conflict between knowledge transmission, ability cultivation, and value guidance in curriculum teaching. The foundation of curriculum ideological and political construction lies in the curriculum. Without good curriculum construction, the function of curriculum ideology and politics becomes water without a source and a tree without roots. The focus of ideological and political education in courses lies in the departments and colleges. The reform of curriculum ideological and political education requires not only a change in educational concepts, but also optimization of teaching content and innovative teaching methods. It involves all types of courses in the school and is not limited to certain individual professional points. Therefore, it brings new problems and challenges to the layout of education and teaching reform in colleges and universities, and the organization of teaching activities. It is necessary to establish an operational mechanism that connects from top to bottom and involves diverse participation.

3.3 Ideological and Political Education in Electronic Technology Experimental Courses

In the teaching of electronic technology experimental courses in our school, there are six stages to complete the course experiment content: pre-class preview, clarifying the experiment purpose in class, reminding the experiment principle and precautions, independently

implementing the experiment, summarizing the classroom experiment, and completing the experiment report after class. The teaching objectives and experimental content of this course needs to be briefly clarified in the experimental purpose section; The experimental reminder section usually includes an introduction to the principles and all the details that need to be noted in the experimental implementation process; The implementation phase of the experiment mainly involves students independently completing the experiment; The experimental summary section is to sort out the knowledge and skills points, issues that should be noted, and experimental gains in this experiment. In the above stages, the teachers' role in the first two stages of the classroom is mainly to guide, while in the last two stages of the classroom, the teachers are mainly to guide and answer questions. For the teacher, they do not have the conditions to randomly carry out ideological and political education during classroom time. Therefore, for electrical experimental courses, in order to play a role in ideological and political education, in addition to fully integrating the ideological and political education concepts and resources contained in the course itself, appropriate methods and approaches should also be adopted.

There is no fixed method in teaching, and the value lies in obtaining the laws. "Having laws" refers to the teaching of different disciplines having certain rules to follow; "No fixed method" refers to the universal and fixed method that does not exist in specific teaching. Everything is determined by people and circumstances, and ultimately, the value lies in obtaining the laws. For electronic technology experimental courses, reasonable design can be carried out through pre-class preview, clarifying the purpose, listening to prompts, implementing experiments, summarizing experiments, and completing experimental reports, so that the integration of curriculum ideological and political elements in the course is not abrupt and achieves a subtle effect.

Electronic technology experiments can be divided into confirmatory and design experiments. Taking the confirmatory experiment of a single-stage common beam amplifier circuit as an example, the following designs can be made.

3.3.1 Pre-class Preview for Experimental Classes

This experiment is a classic experiment that verifies typical circuits after studying the

mechanism of transistor current amplification and the basic amplification circuit. Theory guides practice and practice feeds back theory. Students are required to preview the experimental content before class, review the circuit principle of the basic amplification circuit of the partial voltage bias common emitter, and use a circuit simulation software they have mastered to assist in experimental preview. They need to use the simulation software to build the experimental circuit and write their own experimental results. Students record the input and output waveforms of a single-stage common beam amplifier circuit, analyze the experimental process and conclusions, and may have some questions before consulting books to verify the conclusions. And this process has actually taught students the idea of discovering and solving problems, using simulation operations to drive deep theoretical learning. For unresolved questions, students should also pay more attention in the experimental classroom, practice experiments with questions, find answers to problems, and improve experimental effectiveness. Reflecting the idea of "standing tall when everything is anticipated, and abandoning it if not anticipated" is beneficial for cultivating students' good academic style and lifestyle habits.

3.3.2 Clarifying the Purpose

The purposes of the experiment on a unipolar co-emitter amplifier circuit are: the first is to understand the basic circuit principles firstly; The second is to understand the impact of base static current on the working state of the transistor; the third is to be proficient in the use of various instruments and apparatus. In the clear purpose section, it is a must to guide students to use experimental methods to verify the principles in theory, achieve the goal of digesting the theoretical circuit principles again, and help students understand the principle that theory and practice complement each other.

3.3.3 Experimental Reminder

In circuit debugging, students need to set the appropriate base current. Setting the base current parameters will affect the entry of the transistor into different three areas, permeating the concept of small parameters and large effects. Even an ordinary parameter can also affect the quality of the entire circuit. As craftsmen, it is necessary to optimize the parameters to the extreme to reflect their value. During the experimental process, the

single-stage common beam amplification circuit experiment can achieve in-phase amplification from small current to large current, and inverse amplification from small voltage to large voltage, guiding students to master the concept of phase and deeply understand the relationship between the input and output of the circuit [4]. The amplification here is essentially the amplification of energy, and where does the amplified waveform energy come from? This is a topic worth exploring in depth. Energy neither generates nor disappears out of thin air. It inspires students to understand that energy comes from a power source, and ultimately guides them to think about "energy conservation". The ideological and political point is "energy conservation, and time conservation". Even if energy is consumed as thermal energy, it has a clear origin and can even emit light or provide warmth. And how much do people gain from their daily time, are they clear about where the time goes, and should people pay for the time. There will be a must to encourage students to cherish their time, make efficient and planned arrangements for time, and not waste their time.

3.3.4 Experimental Implementation

The experimental implementation phase is the main part of the experimental course, with students completing it independently as the implementation strategy. The single-stage common beam amplifier circuit experiment adopts the method of building discrete component breadboards. During this period, students will be clear about the function and usage of each component. Once a circuit fault occurs, during the troubleshooting process, they will further deepen their understanding of the specific functions of each component, thereby achieving a deep understanding of the entire circuit. This is a unit circuit and also a small system. Improper installation and wiring at any point can cause errors in the overall circuit. There is a necessity to dialectically view the relationship between the whole and the parts. During the learning process, emphasis should be placed on cultivating students' scientific thinking methods and establishing systematic concepts; At the same time, in the process of fault analysis, the ultimate foothold will be on a certain component or branch, which is the best embodiment of the "breaking down the whole" thinking and analysis approach.

Based on the analysis of the common emission characteristic curve of the transistor, this paper explores the specific reasons for the amplification,

saturation distortion, and cutoff distortion of the amplification circuit, analyzes the working conditions of the amplification, saturation, and cutoff regions of the transistor, and at the same time, clarifies the boundary conditions of the three working regions and knows how to convert the working state of a single-stage common emission amplification circuit [5]. In the process of exploration, students will find that the numerical changes of key parameters directly affect the working state, which reflects the concept of "degree", such as "a drop in the bucket is a thousand miles away" and "quantitative change leads to qualitative change", which inspires students to be rigorous and meticulous in completing experiments, and not to be careless at all.

For difficult experimental problems, it is difficult to achieve a thorough effect if only language explanation is used. By using the method of demonstration by the young teacher, students can intuitively observe the experimental phenomena and data changes, which can stimulate individual enthusiasm of students and activate the atmosphere of classroom participation. In order to further leave a deep impression on students, during the experimental operation, combined with the core components of the experimental circuit, the teachers should timely provide witty analogies and examples to help students understand and remember the types of transistors, which can easily resonate with students. Even if students forget the experimental content later, they may recall the specific situation of the experiment due to the teacher's description. This kind of ideological and political content should contain humor and inspiration. For example, when choosing the type of transistor in a single-stage common beam amplifier circuit, it can be said: "Transistors have two genders, one is PNP and the other is NPN, and their common gene is PN junction. It is necessary to choose which one, but it cannot be gender neutral." For students, it is both impressive and unforgettable. This humorous analogy is inspiring and helps students consolidate the differences in transistor types. Using a point to surface memory method is a means of intellectual inspiration. Intellectual education focuses on knowledge and skills education and the acquisition of logical reasoning ability. Intellectual education belongs to the base position and is the foundation of educating people.

3.3.5 *Experimental Summary*

Experience summary can help students integrate isolated and scattered knowledge, forming a complete knowledge structure system. It is a highly summarized teaching content, a concentrated exposition of teaching ideas, and a slight refinement can lead to corresponding ideological and political connotations. The first step of this experiment is to determine the polarity of the transistor, followed by the construction of the experimental circuit and the testing of specific indicators. At the end of the experiment, the teachers can guide students to summarize and summarize the precautions during the experimental process, including how to analyze and solve circuit faults. Teachers can assist students in refining and summarizing with catchy mnemonics, divergent mind maps, or charts, which are clear and easy to remember. In terms of external form, beautiful charts are more likely to generate interest than textual terms. For example, "It is not difficult to analyze a common beam circuit, the polarity of the tubes should be aligned, the static current should be set properly, and the output should ensure waveform." At the same time, a functional mind map of each component in a typical circuit should be configured. This vivid and impactful form of expression belongs to aesthetic education, which can teach people to develop a sense of beauty.

3.3.6 *Report Completion*

There are many knowledge and skills used in this experiment, from the recognition and application of transistors to the common emission amplification circuit composed of transistors, and then to the experimental phenomena generated by the circuit. In addition, various instrument usage skills need to be integrated layer by layer, and they are intertwined. Students are required to reflect and truthfully record each one in the experimental report, invisibly teaching students scientific and rigorous academic methods. In the experimental report, students are also required to think about the improvement direction of the experiment and encouraged to put forward their own ideas and suggestions. By cultivating students' innovative thinking, the aim is to enhance their problem-solving abilities and creativity. Integrating ideological and political elements into experimental reports can cultivate students' sense of social responsibility, ethical awareness, scientific morality, and innovative thinking, helping them to develop comprehensively.

4. TEACHING EVALUATION OF IDEOLOGY AND POLITICS IN ELECTRONIC TECHNOLOGY EXPERIMENTAL COURSES

Usually, course exams are an important means of testing the effectiveness of course teaching. In this stage, specific knowledge and skills can be tested, and creative questions containing ideological and political elements can be designed to effectively test the effectiveness of curriculum ideology and politics. For example, in the assessment of operational amplification experiments, the theoretical value of the amplified input signal will reach the power supply voltage, but the experimental test results are not so, always slightly lower than the power supply voltage. Students can analyze the objective reasons for this phenomenon. It is precisely the amplification circuit that reflects the objective law of energy conversion. In addition, educational experiments on student participation, teacher-student communication, teaching quality evaluation, and teaching methods are all different perspectives for testing the effectiveness of ideological and political education. Comparison between pilot classes and regular classes can also be used to verify the effectiveness of ideological and political education.

In the management and quality evaluation of teaching processes, value orientation can be regarded as an important monitoring point indicator, which can be strengthened from the source, goals, and processes to make electronic technology experimental courses have moral education functions. This concept can be implemented through a series of teaching construction, operation, and management mechanisms. Specifically, in the approval of important teaching documents such as talent training programs and teaching outlines, the degree of simultaneous improvement of knowledge transmission, ability enhancement, and value leadership should be considered; Value guidance or moral education function indicators should be set in the selection, evaluation, and acceptance of high-quality and key courses; Observation points for the "effectiveness of moral education" should be set up in the formulation of curriculum evaluation standards.

5. CONCLUSION

When conducting electronic technology experimental teaching, attention should be paid not only to the cultivation of traditional practical skills,

but also to the clever implantation of ideological and political elements in the teaching process. It is a must to design around the core competencies of electronic technology experimental courses, as well as conceal correct values and essential character elements, naturally integrating the connotation of curriculum ideology and politics into the course content, and achieving the goal of teaching and educating students. The construction of curriculum ideology and politics cannot be achieved overnight, which requires the collaborative efforts of the college, department, and department levels, strengthening top-level design, and implementing precise strategies. It is necessary for teachers to study hard, deeply explore ideological and political elements, continuously innovate teaching methods and methods, and strive to improve their moral education level in order to integrate ideological and political education into the entire system of talent cultivation, make the transmission of values more knowledgeable, make curriculum teaching have the connotation of ideological and political education, and return to the original intention of teaching and educating people - not only cultivating talents, but also educating people.

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REFERENCES

- [1] Xinhua News Agency, Xi presides over a symposium for teachers of ideological and political theory courses in the school [OB/OL]. http://www.gov.cn/xinwen/2019-03/18/content_5374831.htm, 2019-03-18.
- [2] Ministry of Education, Guidelines for the Construction of Ideological and Political Education in Higher Education Curriculum [OB/OL]. http://www.moe.gov.cn/srcsite/A08/s7056/202006/t20200603_462437.html, 2020-06-01.
- [3] Gao Depeng, Yao Wenshan, Chen Pinghai, Analysis of the Effectiveness of Psychological Stress Relief Strategies for College Students [J]. *Modern Communication*, 2020(5): 124.

- [4] Zhang Ling, Zhang Pengzhan, Chen Zelong, Exploration and Practice of Ideological and Political Education in Analog Electronic Technology Experiment Course [J]. Journal of Science and Education, 2022, (24), 115-118.
- [5] Yuan Xiuxiang, Exploration and Practice of Ideological and Political Construction in Electronic Technology Experimental Courses [J]. China Electric Power Education, 2020, (08), 77-78.