

Exploration and Practice of Ideological and Political Integration in Electronic Information Major Courses under the Background of New Engineering--Taking the course "Analog Electronics Technology" as an example

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Abstract: The construction of new engineering disciplines poses new requirements for the cultivation of professional talents in vocational colleges. "Analog Electronics Technology" is an important foundational course in electronic information majors, and is a key link in the ideological and political construction of new engineering courses. Based on the characteristics of the curriculum and the requirements for talent cultivation, this article clarifies the goal system of ideological and political education in the curriculum and proposes the teaching concept of "integrated teaching evaluation". By carrying out project-based and blended online and offline teaching, we aim to deeply explore and construct ideological and political resources and philosophical elements contained in the curriculum. The implementation part of this course takes the "Analysis and Production of Signal Generation and Transformation Circuits" project as an example to explore the path and implementation methods of integrating ideological and political resources into course design. Finally, teachers, students, team members, and the industry jointly participate in the assessment and evaluation of ideological and political effects, and guide continuous improvement in teaching practice. After testing, good teaching results have been achieved.

1. Introduction

The construction of new engineering disciplines is a strong demand for higher engineering education reform in the new economy characterized by new technologies,

industries, formats, and models. As a new type of leading talent shaped by national higher engineering education, new engineering talents need to adhere to the spiritual high ground, remember professional ethics norms, take serving the country and benefiting humanity as their own responsibility, take social development and people's happiness as the fundamental principles, be vigilant of technological alienation traps, and lead the construction of new engineering. Under the background of new engineering disciplines, new requirements have been put forward for the plans and models of talent cultivation in universities. In May 2020, the Ministry of Education issued the "Guidelines for the Construction of Ideological and Political Education in Higher Education Curriculum", which clearly requires "to integrate ideological and political education into the talent training system, comprehensively promote the construction of ideological and political education in higher education curriculum, give full play to the educational role of each course, and improve the quality of talent training in higher education"^[1].

Course ideological and political education refers to an educational model that integrates ideological and political education into professional courses in universities. It aims to cultivate students with correct values, ideological and moral values, and a sense of social responsibility, so that they have good political literacy and comprehensive qualities. As the main force of the country's future, college students are pioneers in the forefront of new things and social trends. At a critical stage of ideological formation, they are in an important period of personal growth. As the vanguard of leading ideological and political consciousness, schools establish a scientific ideological and political education system, and construct a systematic curriculum of ideological and political content. It is a necessary way to melt the excellent character and comprehensive literacy of college students, and a powerful measure to promote and uphold the ideology of universities and mainstream. This has profound significance for vocational colleges to achieve the important task of cultivating skilled technical talents who can adapt to the harmonious development of society^[2].

Professional curriculum education is the basic carrier of curriculum ideological and political construction, and the main battlefield for promoting curriculum ideological and political education. How to combine the education of Marxist standpoint, viewpoint, and method with the cultivation of scientific spirit in professional courses, improve students' ability to correctly understand, analyze, and solve problems, organically integrate professional courses and ideological and political content, and make the drops and stones of moral education and soul building education penetrate silently. Each professional course must thoroughly sort out and accurately grasp the characteristics of the course, and find the entry point for ideological and political integration.

2. Implementation plan, preliminary preparation, and goal system of ideological and political education in the curriculum

2.1 Implementation plan

Simulated electronic technology belongs to the category of compulsory courses in the talent training system of electronic information engineering technology in vocational colleges, and is a fundamental course of the profession. Through the teaching of this course, students will acquire the basic theoretical knowledge of electronic technology necessary for their major, cultivate the basic skills necessary for professional positions, and equip them with the ability to produce, inspect, maintain, and design electronic products. Based on the characteristics of the course, the teaching philosophy of integrating ideological and political resources into classroom design, integrating

ideological and political practice into the mind and heart, and promoting ideological and political effects through evaluation is proposed, as shown in Figure 1. According to the ideological and political goals, build a course ideological and political resource pool, and integrate ideological and political resources into course design, using case studies and ideological and political methods for course ideological and political practice; Finally, a pilot program will be launched to evaluate the effectiveness of ideological and political education courses, guide the continuous improvement of ideological and political teaching design, resources, and implementation strategies, and achieve moral education and soul building.



Figure 1. Professional Course Ideology and Politics Teaching Concept

2.2 Preliminary preparation

As a compulsory course for electronic information majors, this course is offered in the first semester of new students, with a total of 60 class hours. The "integration of theory and practice" teaching model facilitates the improvement of students' comprehensive literacy and value guidance due to the long contact time between teachers and students. Taking this course as an example, "Fundamentals of Electronic Technology (Module Electrical Part)" has multiple knowledge points, wide coverage, and strong practicality. Based on the characteristics of the course, task-based teaching is adopted to achieve functions such as LED lighting and signal amplification as project carriers for teaching. Whether professional course teachers can clearly reflect clear knowledge points and task requirements in the classroom, and cleverly integrate professional related ideological and political content, requires teachers to do a lot of teaching research and detailed teaching preparation at the beginning of the semester.

First, it is necessary to have a clear understanding of the source of students, understand their basic information, analyze their ideological dynamics, combine their knowledge background and skill level, grasp the weak links in ideological and political education at this stage, and make corresponding preparations, positioning the ideological and political teaching objectives of the course in the professional system.

Second, integrate high-quality resources and build professional network platforms. The course "Fundamentals of Electronic Technology (Module Electronics)" is a national high-quality video sharing course, a professional teaching resource library course of the Ministry of Education, and a course of the Ningbo University MOOC Alliance. It has abundant high-quality course resources, advanced course teaching systems and concepts, a large number of videos and micro courses, and a complete exercise and test bank, fully meeting the basic conditions of online teaching. Integrate resource libraries, high-quality video sharing networks, and the joint application of course teaching resources on multiple network platforms of China University MOOC.

Third, in addition to developing a teaching plan for professional knowledge and skill levels, it is also necessary to accurately grasp the alignment between teaching

knowledge points and ideological and political content based on the arrangement of knowledge points in each chapter, achieving a subtle and effective integration of ideological and political elements into professional courses. In addition, professional knowledge and ideological and political content teaching resources are well prepared.

At last, industry enterprises participate in curriculum construction and jointly develop talent training plans. Under the background of new engineering, enterprises have increasingly high requirements for applied talents, and we are deepening the promotion of talent training models through school enterprise cooperation^[3-5]. Docking with cooperative enterprises and discussing online course teaching content together can not only enhance students' understanding of the talent standards required by industry enterprises, enhance their professional literacy, but also enhance their interest in online learning. Classroom teaching is integrated with industry standards, forming a win-win community of shared future for universities, enterprises, and students. Construct a curriculum system based on the content of enterprise projects, combining online and offline teaching with enterprise practice, to ensure the completion of teaching tasks and ensure teaching effectiveness, while promoting the depth of cooperation between schools and enterprises in curriculum construction.

2.3 Goal system of ideological and political education

Engineering courses should focus on strengthening engineering ethics education for students, cultivating their spirit of striving for excellence as a great craftsman, and inspiring their patriotism and mission to serve the country through science and technology^[6]. Based on the analysis of the learning situation and the characteristics of the course, the ideological and political goal system established in this course is shown in Table 1. At the same time, it should be included in the curriculum implementation plan as a basis for teachers to arrange teaching activities and evaluate teaching.

Table 1. Curriculum Ideological and Political Goal System

Level 1	Level 2	Examples of Level 3
National awareness	Political identity	support the leadership of the CPC, strengthen the ideal and belief of socialism with Chinese characteristics, adhere to the four self-confidence, etc
	Patriotic sentiment	The excellent traditional culture of the Chinese nation, the revolutionary culture of the CPC, and the socialist culture with Chinese characteristics in the new era
	Cultural attainments	The excellent traditional culture of the Chinese nation, the revolutionary culture of the CPC, and the socialist culture with Chinese characteristics in the new era
	Global perspective	Global perspective on a community with a shared future for mankind, global issues, national competition, integration of China and the West, environmental awareness, energy awareness, etc
How to be a human	Moral cultivation	Socialist core values, civilization, harmony, freedom, equality, justice, integrity, friendliness, etc
	Legal awareness	Rule of law, rights awareness, responsibility awareness, and discipline awareness
How to do things	Scientific spirit	Scientific thinking methods, seeking truth and pragmatism, spirit of entry, spirit of cooperation, spirit of innovation, spirit of openness, etc
	Professional competence	Pursuing the ultimate in professional ethics, professional reverence, striving for excellence, craftsmanship spirit, etc

Table 2. Integration points of ideological and political education in the curriculum and corresponding ideological and political goals and philosophical elements

No.	Project	Knowledge Point	Ideological and political entry points/typical cases	Ideological and political goals	Philosophical elements
1	Analysis and manufacturing of LED Lighting Circuit	Unidirectional conductivity of diodes; V-I characteristic curve; Basic application circuit; Measurement and analysis methods;	1. Watch the successful launch of the SHENZHOU 17 manned spacecraft and introduce the important role of electronic technology in the country's modernization construction; 2. Briefly describe the development history of lighting and understand the third-generation semiconductor lighting technology of LED, following incandescent lamps and fluorescent lamps; 3. Implement the Scientific Outlook on Development and actively respond to energy conservation and emission reduction;	Political identity; Patriotic sentiment; Professional competence; Global perspective;	1. Dialectical materialism. The principle of world material unity. All things and phenomena in the world ultimately belong to the manifestation of matter or the attributes and forms of existence of matter.
2	Analysis and manufacturing of typical amplification circuits	The amplification principle of transistors; Input and input characteristic curves of transistors; Static parameter analysis and calculation; Dynamic parameter analysis and calculation; Amplification circuit simulation and debugging;	Case introduction: By telling the story of three scientists, William Shockley, John Bardeen, and Walter Brattain, who overcame difficulties and successfully created the first crystal transistor at Bell Labs and jointly won the 1956 Nobel Prize in Physics, students are inspired to have a scientific spirit of fearlessness and exploration.	Patriotic sentiment; Strive for excellence; Collaborative spirit; Scientific spirit;	1. Subjective initiative in practice. The birth of the first crystal transistor reflects humanity's subjective initiative in transforming the world. 2. Look at the essence through phenomena. In a two-stage signal amplification circuit, amplification of the input and output voltage signals is observed. In fact, the amplification process is based on the principle of using a transistor to control a large current with a small current.
3	Analysis and manufacturing of signal generation and transform	Basic knowledge of integrated operational amplifiers; Integrated operational amplifiers for linear and	Case introduction: Chinese "chip" youth. By introducing the experiences and growth of a group of young people in domestic chip technology innovation, demonstrate their professional skills, innovation skills, and sense of responsibility. Thus inspiring the historical	Political identity; Patriotic sentiment; Scientific spirit; Socialist core	1.The subjective initiative of consciousness is mainly manifested in: actively understanding the world and actively transforming the world.

	mation circuits	nonlinear applications; Analysis and calculation of proportional amplification circuits; Construct circuits for generating sine wave, square wave, and triangular wave signals;	mission and responsibility of contemporary youth.	values;	Developing new quality productive forces is an inherent requirement and important focus for promoting high-quality development.
4	Analys and manufaturing of practical power amplification circuits	Basic knowledge of power amplification circuits; OCL and OTL circuits; Parameter settings and calculations; Analysis of amplification circuit principles;	Case introduction: Combining with real life, yearning and pursuing a better life. We often use audio equipment to play beautiful and pleasant music. The audio system includes a sound source, an integrated power amplifier, and a speaker. The integrated power amplifier is an integrated audio power amplifier, which amplifies the weak electrical signal sent by the front-end circuit to generate sufficient output power to drive the speaker to complete the electronic acoustic conversion.	Patriotic sentiment; Cultural literacy; Moral cultivation; Scientific spirit;	1. The law of conservation of energy. In this project, the input power of the DC power supply is equal to the sum of the output power and the power consumed by the components. 2. The superiority of the socialist system and the confidence of socialist culture.
5	Analys and product ion of DC stabilize d power supply	Unit module: bridge rectifier circuit; Voltage stabilizing circuit; Filter circuit; Analysis and calculation of sampling circuits; Protection circuit; Analysis and calculation of output voltage;	1. With the rapid development of electronic products in China, more and more technologies with independent property rights are being developed to cultivate students' national pride and enhance their confidence in socialist culture. 2. According to the operating standards for circuit board production and testing, the correct use of instruments and meters, and safety precautions. Based on the essence of cultivating job competence, guide students to cultivate a sense of job responsibility that follows rules and regulations, is rigorous and serious, and enhances job competence.	Global perspective; Cultural literacy; Professional competence; Legal awareness;	1. The whole and the part are dialectical unified, without the whole, there is no part. The whole is composed of parts, and parts are a part of the whole. The rectification circuit, filtering circuit, and voltage stabilizing circuit are organically combined to achieve the functional characteristics of the DC voltage stabilizing output of the circuit as a whole.

3. Integration points of ideological and political education in the curriculum

During the usual classroom teaching process, directly using low-level values education such as inserting advertisements and labeling not only makes it difficult to stimulate students' enthusiasm for learning, but may even cause students to feel

disgusted and resistant. Only by combining real-life cases of social development or the growth stories of scientists, can we deeply explore the practical, ideological, and philosophical values contained in the cases, organically combine ideological and political education with knowledge transmission, gradually internalize students in their hearts and externalize them in their sexuality, and ultimately achieve the teaching goal of value shaping, ability cultivation, and knowledge transmission in one^[7-9]. Table 2 illustrates the integration points of ideological and political education using project-based teaching content as an example. And further explore the philosophical elements contained in typical cases, in order to guide students to establish correct worldviews, values, and outlooks on life.

Following the principles of "knowledge-based, application-oriented, and thought-provoking", a "top-down, integrated design" approach is adopted to decompose comprehensive cases and project them into teaching resources, forming a series of distinctive and multifunctional standardized teaching cases.

4. The Implementation of Course Ideological and Political Education

4.1 Design ideas for ideological and political education teaching

The main learning content of this course will be set as several typical learning tasks, forming a learning context. The project structure and learning process of each project are shown in the following figure. Cover the main learning areas of this course through the five representative learning projects mentioned above. Each learning project relies on a complete work process, from the introduction of work tasks to understanding the analysis and simulation of components and circuits, to the production and testing of circuits, and finally to evaluating the implementation effect of the project. Typical learning tasks are gradually implemented from shallow to deep, from easy to difficult.

For vocational college students with weak learning ability and poor knowledge foundation, but their quick thinking, strong hands-on ability, easy acceptance of new things and concepts, and strong adaptability; Changing the traditional teaching method of teacher led and student-centered teaching, following the teaching philosophy of "project-based, teacher led, and student-centered", integrating course teaching content into practical projects, and learning by doing can not only cultivate students' operational abilities, but also enable them to learn theoretical knowledge in practice, improve their cognitive level, and improve learning efficiency. In addition, project-based teaching can help solve the common problem of students lacking initiative and enthusiasm in learning, and enhance their interest and motivation in learning. In addition, vivid and interesting cases can deepen students' understanding and mastery of relevant knowledge. Integrating ideological and political elements into typical cases effectively solves the dilemma of difficult exploration of ideological and political elements in professional basic theories and knowledge.

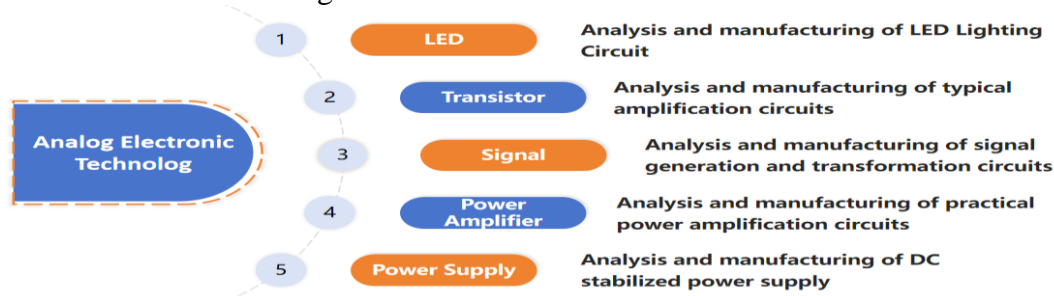


Figure 2. Structure of project-based teaching content for courses

4.2 The ways and teaching methods of integrating ideological and political elements into the curriculum

Carry out blended online and offline teaching of courses to promote the three-dimensional integration of ideological and political education elements and professional knowledge. Integrate the professional knowledge points of the course with ideological and political content, and integrate the goals of course ideological and political construction into the classroom teaching process through online teaching platforms such as micro course videos, topic discussions, and ideological and political case sharing. By adopting a three-dimensional integration method of online and offline, ideological and political education elements can be organically combined with professional knowledge.

Adopting diverse and effective teaching methods to enhance the organic integration of ideological and political education content with industry norms. To guide students to deeply understand the rigorous industry norms of the electronic information industry, and cultivate their professional qualities of love, dedication, and innovation; Adopting classroom demonstrations and visual demonstrations, teaching students to abide by operating procedures and safety standards, cultivating their sense of discipline, rigor, and seriousness in their job responsibilities, enhancing their job literacy, and guiding them to cultivate a rigorous, down-to-earth, and constantly improving spirit of craftsmanship as a great nation. For the current political hot topics and socialist core values involved in teaching, teaching and discussion methods are adopted to guide students to pay attention to national conditions and cultivate their sense of national pride. When conducting circuit principle analysis, simulation method is adopted to enable students to conduct independent thinking training through circuit simulation verification, cultivate scientific thinking ability, encourage students to break through inherent concepts and thinking, actively explore new ways and methods, and gradually develop innovative thinking habits.

4.3 Integrating ideological and political education into project teaching

Taking the "Signal Generation and Transformation Circuit" project as an example, this project mainly uses students to build common sine wave signal, square wave signal, and triangular wave signal unit modules as teaching carriers. Students are required to master the principle of self-excited oscillation circuit generating sine signals, as well as linear applications based on integrated operational amplifiers, transforming sine signals into square wave signals and triangular wave signals. Multi sim virtual simulation software is used to assist in teaching, by observing oscilloscopes, comparing signal waveform, and mastering professional knowledge points. Guide students to reflect on the philosophical ideas contained: contradictions exist in all things and run through the development of things. Dealing with contradictions should organically combine the two point theory and the key point theory. In addition, the subjective agency of consciousness is mainly manifested in the active understanding of the world and the active transformation of the world. In this project, sine wave signals are generated by constructing unit modules such as positive feedback networks and amplification circuits. Comparing circuit modules and calculus circuits can achieve the transformation of sine wave, square wave, and triangular wave signal waveform. The frequency and amplitude of these waveform can be adjusted according to the circuit parameters as needed to achieve.

5. Assessment and evaluation of the effectiveness of ideological and political education in courses

The current evaluation of ideological and political effects is mainly aimed at teachers, but the main body of teaching is students, and the goal of cultivating morality and talent will ultimately fall on the development of students. The improvement of talent education directly affects the economic benefits of industries and enterprises. Therefore, it is necessary to fully mobilize the enthusiasm and initiative of students and industry experts in participating in ideological and political courses. Therefore, a student-centered curriculum ideological and political evaluation system has been established, with the participation of course team members, teachers themselves, and enterprises and industries. As shown in Figure 3.

The evaluation object of curriculum ideological and political education should not only include teachers, but also students, not only ensuring the implementation of curriculum ideological and political education, but also the reality of students. Therefore, in process evaluation, aspects such as student learning performance and ideological and political knowledge learning are included in the scope of process evaluation, emphasizing the learning process, promoting results through the process, and implementing learning in daily life. In the practical operation process of each project, not only will the completion of circuit production and debugging by students be assessed, but also whether they possess rigorous and standardized, united and cooperative, and constantly striving for excellence in their positions. They will comprehensively grasp the learning situation of students and provide comprehensive, fair, and reasonable evaluations. In addition, it is also necessary to consider adding course summary content, resource contributions, and other components in formative assessment. Timely conduct ideological and political evaluation after the course ends, comprehensively consider horizontally and vertically, summarize experiences and lessons, and guide the continuous improvement of integrating ideological and political education into the entire course.

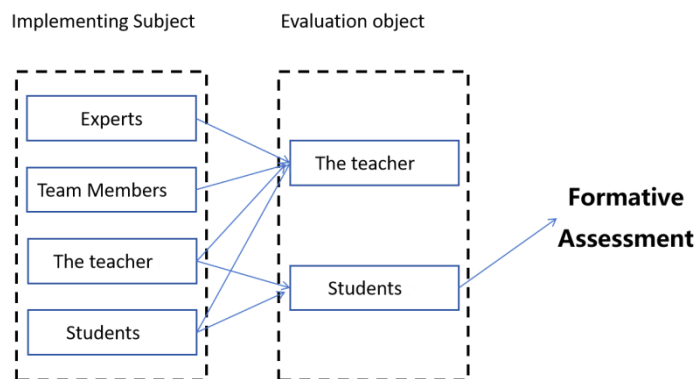


Figure 3. Evaluation system for the effectiveness of ideological and political education in courses

6. Conclusion

As an important battlefield for cultivating technical and skilled talents, vocational colleges and universities should return to the essence of education through curriculum ideology and politics. By exploring the elements of curriculum education, they can play a role in education and enable professional knowledge to carry more social responsibility and value guidance. In the information age, professional courses in ideological and political education should make full use of information platforms such

as smart vocational education, love courses, and China University MOOC. Through blended online and offline teaching modes, self-directed learning, group learning, and other methods, students' ability to search for information, socialize, and communicate should be fully stimulated. Industry enterprises should participate in the construction and evaluation system of professional courses, ultimately achieving full staff education, full process education, and all-round education.

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