

Exploration and Practice in the Teaching of “Digital Electronic Technology” with the Integration of Ideological and Political Education

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Abstract: Comprehensively advancing the development of course-based ideological and political education is a strategic measure to fulfill the fundamental task of “fostering virtue through education.” It promotes the integration of ideological and political education with the teaching of various courses, implements the fundamental task of fostering virtue through education, and points out the direction for the teaching reform of engineering majors. Based on the context of course-based ideological and political education, this paper analyzes the importance of integrating ideological and political education into the teaching of Digital Electronic Technology and examines the current situation of ideological and political education in this course. It elaborates on four aspects: compiling ideological and political education cases, actively promoting project-driven teaching, integrating ideological and political education into virtual simulation training, and integrating ideological and political education into the teaching evaluation system. The aim is to improve the quality of ideological and political education in the Digital Electronic Technology course.

Keywords: Course-based ideological and political education; Digital Electronic Technology; Importance; Teaching paths

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1. Introduction

As a core course for engineering majors such as Internet of Things (IoT), Artificial Intelligence, Computer Science and Technology, and Electronic Information Engineering, Digital Electronic Technology aims to help students master skills such as digital circuits, electronic information engineering design and practice, and electronic technology application. It also aims to enhance their innovative capabilities, ability to handle complex engineering tasks, and moral literacy. Integrating ideological and political education into the teaching of Digital Electronic Technology is an objective requirement for the construction of the “Double First-Class” Initiative and an inevitable choice to fulfill the fundamental task of “fostering virtue through education.” However, there are currently problems in the integration of Digital Electronic Technology and course-based ideological and

political education, such as inadequate connection between knowledge points and ideological and political elements, a single mode of ideological and political education infiltration, and poor application effects of artificial intelligence technology. These issues have affected the effectiveness of course-based ideological and political education. Therefore, university teachers should, based on the context of course-based ideological and political education, explore the ideological and political elements contained in the Digital Electronic Technology textbook, clarify the relationship between professional knowledge and ideological and political elements, and integrate ideological and political education into teaching cases, practical training, and the teaching evaluation system. This will enable students to be influenced by ideological and political education during their course learning, thereby improving the quality of course teaching and talent cultivation.

2. The importance of integrating ideological and political education into the teaching of Digital Electronic Technology

2.1. Conducive to cultivating students' dialectical thinking ability

The development of digital electronic technology involves aspects such as scientific and technological ethics, law, and moral literacy, requiring students to view the dialectical nature of its development in a dialectical manner. This helps enhance their academic ethics, patriotism, and legal awareness^[1]. Therefore, integrating ideological and political education into the teaching of Digital Electronic Technology is an inevitable trend. It is conducive to guiding students to explore the relationship between digital electronic technology and social development, stimulating their enthusiasm for scientific research; helping students understand the potential risks of digital electronic technology, and strengthening their virtues, such as data confidentiality and honesty. In this way, the educational value of the discipline can be exerted, and a win-win situation between course teaching and ideological and political education can be achieved.

2.2. Conducive to improving students' comprehensive quality

In the era of artificial intelligence, digital electronic technology is widely applied in fields such as new energy vehicles, smart homes, and aerospace. This places high demands on practitioners in terms of innovative capabilities, scientific research spirit, practical abilities, and professional ethics. Against this backdrop, colleges and universities should actively promote ideological and political education in the Digital Electronic Technology course. Guiding students to understand the development history of digital electronic technology and the relationship between digital electronic technology and national strategies is conducive to cultivating their international perspective^[2]. In addition, ideological and political education can help students learn about the scientific research spirit of Chinese researchers, who broke the Western blockade on digital electronic technology and actively developed domestic lithography machines and chips. This enhances their sense of social responsibility and patriotic enthusiasm, enabling them to inherit the patriotic spirit of scientists^[3].

2.3. Conducive to enhancing students' sense of social responsibility

The widespread application of digital electronic technology is a double-edged sword, hiding problems such as personal information leakage and data security, which infringe on the legitimate rights and interests of the public. Therefore, teachers should actively integrate ideological and political education into the teaching of Digital Electronic Technology to enhance students' risk awareness, prevention awareness, and personal privacy protection awareness. They should also urge students to respect others' private data and abide by relevant national laws and regulations, which is conducive to improving students' sense of social responsibility^[4]. At

the same time, ideological and political education can strengthen students' sense of mission and responsibility, guiding them to pay attention to the development of national enterprises such as Huawei, Xiaomi, and Unitree Robotics. This helps students connect their personal dreams with national development and national rejuvenation, cultivate their sense of mission and responsibility, and enable them to undertake the mission of the great rejuvenation of the Chinese nation.

3. Current status of curriculum-based ideological and political education in the course Digital Electronic Technology

3.1. Inadequate connection between ideological and political elements and knowledge points

Against the backdrop of curriculum-based ideological and political education, the reform of ideological and political teaching in the university course Digital Electronic Technology is being vigorously promoted and has achieved certain results. However, there remains a problem of inadequate connection between the knowledge points in teaching materials and ideological and political elements. This leads to a disconnection between ideological and political education and the teaching of digital electronic technology, which impairs students' understanding of ideological and political elements ^[5]. For instance, in teaching, teachers only explain one specific ideological and political element corresponding to a knowledge point, while neglecting the exploration of other relevant ideological and political elements. They focus on expounding professional knowledge of digital electronic technology, and ideological and political education is only mentioned in passing. This makes it difficult to arouse students' emotional resonance and undermines the effectiveness of curriculum-based ideological and political education.

3.2. Single channel of ideological and political education infiltration

At present, the ideological and political teaching of the university course Digital Electronic Technology mainly relies on theoretical explanation and has not been extended to practical training. This causes ideological and political education to become a mere formality, affecting its effectiveness. For example, in practical training teaching, teachers pay more attention to explaining digital circuit design, complex engineering analysis, and practical processes, focusing on improving students' practical abilities. Yet, they neglect the infiltration of ideological and political elements, such as craftsmanship spirit and team spirit, in this process, failing to implement ideological and political education in practice. This is not conducive to cultivating students' craftsmanship spirit, scientific research spirit, and team spirit ^[6].

3.3. Disconnection between ideological and political education and practical applications

Currently, the content of curriculum-based ideological and political education in Digital Electronic Technology is disconnected from industrial development and job skills. As a result, students lack attention to the social responsibility and scientific ethics related to digital electronic technology, and their enthusiasm for independently exploring ideological and political elements in teaching materials and participating in project-based practical training is difficult to arouse, which hinders the improvement of students' moral literacy ^[7]. For example, when teaching knowledge related to semiconductors, teachers focus more on explaining circuit principles but neglect to connect it with the current situation of China's lithography machine technology blockade and core chip technology bottlenecks. This affects students' understanding of the development trends of the communication engineering and electronic technology industries, and restricts the development of

students' scientific research enthusiasm, innovative capabilities, and sense of national identity and patriotism.

4. Teaching approaches for Digital Electronic Technology integrating ideological and political education

4.1. Exploring ideological and political elements to promote the integration of knowledge points and ideological and political elements

From the perspective of curriculum-based ideological and political education, university teachers should base themselves on the characteristics of the Digital Electronic Technology course, comprehensively and in-depth explore the ideological and political elements contained in teaching materials, clarify the relationship between knowledge points and ideological and political elements, and promote the in-depth integration of professional knowledge and ideological and political elements. This enables students to subtly receive the influence of ideological and political education and enhance their moral literacy^[8]. For example, when teaching knowledge related to semiconductor memory circuits, teachers can focus on the principles of RS flip-flops, D flip-flops, JK flip-flops, T flip-flops, and memory as the key teaching content, while taking the scientific research spirit, patriotic feelings, and sense of social responsibility as the focus of ideological and political education. By closely combining the principles and applications of flip-flops with ideological and political elements, teachers can guide students to conduct an in-depth exploration of knowledge related to the principles and applications of flip-flops, thereby improving their independent learning ability. Regarding knowledge about semiconductor memory circuits, teachers can explain the development history of storage capacity in computers and mobile phones, and introduce relevant knowledge such as Huawei's 5G technology, domestically produced chips, and memory cards. This helps demonstrate the scientific research spirit and patriotic spirit of national enterprises and researchers in breaking the technological blockade of Western countries, setting a good example for students. It also inspires students to establish lofty aspirations of integrating into the development of science and technology and devoting themselves to scientific research, thereby enhancing their sense of social responsibility^[9]. In addition, teachers can incorporate relevant extracurricular ideological and political elements. For instance, they can introduce the noble spirit of Academician Huang Lingyi, the "Mother of China's Loongson," who rooted herself in the frontline of scientific research, dedicated herself selflessly, and overcame difficulties. This deepens students' understanding of the concept of "rejuvenating the country through science and education," thereby stimulating their enthusiasm for scientific research and innovation and improving the quality of curriculum-based ideological and political teaching.

4.2. Adhering to project-driven teaching and innovating the teaching model of curriculum-based ideological and political education

In the teaching of curriculum-based ideological and political education, teachers should adhere to the student-centered approach and innovate methods of ideological and political education, so as to stimulate students' enthusiasm for exploring ideological and political elements and participating in ideological and political education activities. First of all, teachers should actively carry out project-driven teaching: design ideological and political teaching projects based on teaching content, assign group cooperative project-based learning tasks, and encourage students to form groups freely. This allows students to complete tasks through group cooperation and achieve the teaching goal of "learning by doing and doing by learning." For example, teachers can design a group cooperative learning project themed "traffic light controller," integrating real projects into teaching. Each group is required to draw digital circuit diagrams, write controller codes, and build controller models. This guides

students to conduct cooperative learning and cultivates their teamwork and communication abilities. Specifically, each group can first analyze the working principle of the “traffic light controller,” select the required electronic components, draw the controller circuit diagram, discuss the controller code, conduct tests using a simulation system, and finally complete the “traffic light controller” model through cooperation ^[10]. Secondly, teachers should encourage each group to present their project learning results. Groups can send representatives to explain the design principle of the “traffic light controller,” elaborate on the design drawings, and display the “traffic light controller” model. Meanwhile, teachers should encourage mutual evaluation among different groups to enliven the classroom atmosphere. Finally, teachers should comment on each group’s “traffic light controller” model, in-class speeches, and mutual evaluation performances. They need to point out the problems existing in each group and help them adjust their project-based learning plans. Through these measures, students’ sense of teamwork and innovative abilities can be cultivated, and the quality of ideological and political education in the course Digital Electronic Technology can be gradually improved ^[11].

4.3. Empowering ideological and political education in courses with AI to enhance its appeal

Teachers in colleges and universities should seize the opportunity of the “Internet +” era, utilize new technologies such as virtual simulation and artificial intelligence to carry out ideological and political education in courses ^[12], create immersive teaching scenarios, and enhance the appeal and affinity of ideological and political teaching in courses. First, teachers can integrate ideological and political education into virtual simulation experimental teaching, introduce typical work scenarios of enterprises, simulate the operation process of complex projects, guide students to solve problems in virtual environments, and cultivate their craftsmanship spirit of pursuing excellence, seeking truth from facts, and striving for perfection ^[13]. For example, teachers can use Multisim simulation software to create digital circuit experimental scenarios, assign online tasks, and guide students to design digital circuit diagrams, connect electronic components, and debug circuits in the virtual environment. This helps students standardize every operation step rigorously and improves their craftsmanship spirit as well as their ability to solve complex engineering problems. At the same time, teachers should encourage students to discuss Multisim simulation experimental projects, clarify details such as experimental operation procedures and precautions, and inspire them to conduct project debugging and fault troubleshooting. This cultivates students’ learning attitude of daring to question, seeking truth from facts, and being rigorous and careful. Second, teachers can use big data to analyze the teaching data from Multisim simulation software, summarize the common problems existing in students’ simulation operations, record review teaching videos, accurately push learning resources to students, and implement personalized teaching to help students solve learning difficulties. In the review teaching videos, teachers can focus on explaining the operation steps of digital circuit experiments and application cases, take craftsmanship spirit and scientific research spirit as the entry point for ideological and political education, and guide students to practice Multisim simulation experiments after class, thereby accelerating the cultivation of their craftsmanship spirit and scientific research spirit.

4.4. Enhancing the evaluation of ideological and political education and improving the ideological and political education system

Against the backdrop of curriculum-based ideological and political education, teachers should integrate ideological and political education into the teaching evaluation system of Digital Electronic Technology. On the one hand, it is necessary to add evaluation indicators for ideological and political education ^[15] to promote

the connection between ideological and political education and curriculum teaching; on the other hand, it is essential to guide students to participate in teaching evaluation, cultivate their self-reflection ability, and facilitate their all-round development of morality, intelligence, physical fitness, aesthetics, and labor skills. First, teachers can formulate ideological and political education evaluation indicators based on teaching content, and closely link the key and difficult points of teaching with ideological and political education evaluation. This helps enhance students' attention to ideological and political education and improve their moral literacy^[14]. For example, teachers can take craftsmanship spirit, scientific and technological ethics, academic ethics, innovation ability, patriotism, scientific spirit, and teamwork as evaluation indicators for ideological and political education. These indicators can be used to conduct a comprehensive evaluation of the theoretical and practical teaching of Digital Electronic Technology, as well as students' learning performance and effects. In this way, ideological and political education runs through every teaching link, thereby improving the quality of curriculum-based ideological and political teaching. Second, teachers should guide students to participate in the evaluation of ideological and political education and encourage them to conduct self-evaluation and mutual evaluation. Students can evaluate themselves and their peers in aspects such as enthusiasm for classroom participation, teamwork spirit, innovation ability, and patriotism. This helps cultivate students' good learning attitudes, such as modesty, eagerness to learn, pioneering spirit, and courage to take on challenges. It also lays a solid foundation for their professional course learning and future employment, and comprehensively improves the quality of curriculum-based ideological and political teaching in Digital Electronic Technology.

5. Conclusion

In conclusion, the reform of curriculum-based ideological and political teaching in Digital Electronic Technology is an inevitable trend. It is conducive to improving students' moral literacy and their ability to solve complex engineering problems, as well as enhancing the quality of curriculum teaching. Teachers should deeply explore the elements of ideological and political education to make ideological and political education complement curriculum teaching. They should adhere to project-driven teaching to improve students' teamwork and scientific research spirit, enable curriculum-based ideological and political education with AI to innovate the methods of ideological and political education, and add evaluation indicators for ideological and political education to improve the teaching system. Through these measures, the quality of both the teaching of Digital Electronic Technology and the ideological and political education can be comprehensively enhanced.

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