

Research and Exploration on Ideological and Political Education in the Course of *The Principle of Automatic Control*

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Abstract

Ideological and political education is the key initiative to implement the fundamental task of fostering virtue through education in colleges and universities. “Curriculum ideological and political” education is an important way to train students to solve “complex engineering problems”. The Principle of Automatic Control is the core course of automation majors, and the teachers should make good use of the main channel of classroom teaching to actively explore methods for ideological and political education. Moreover, they should guide students to practice socialist core values and stimulate their patriotic enthusiasm and sense of social responsibility in a subtle way. They should foster new engineering talents with the spirit of craftsmanship, put equal emphasis on knowledge transfer and value leadership, and effectively improve the ideological and political education effectiveness of the course. Through the design and application of teaching materials such as typical cases, the “curriculum ideological and political” elements such as correct value pursuit, ideal belief and national feelings are integrated into the course content teaching. At the same time, they should endeavor to cultivate professional and technical talents who meet social needs in the context of new engineering.

Keywords

Principle of Automatic Control, Ideological and Political Education, Fostering Virtue through Education

1. Introduction

“Ideological and Political Education” is an important concept in promoting the reform of quality-oriented education in our country (Yi & Dan, 2020). General Secretary Xi Jinping stressed that we must adhere to fostering virtue through

education as the central link, put ideological and political work through the entire process of education and teaching, and educate students in all stages and at all levels. We need to make good use of the main channel of classroom teaching, make all courses and ideological and political theory courses co-evolve together to form a synergistic effect. How to integrate the ideological and political curriculum with the professional curriculum teaching and improve students' ideological and political awareness, moral quality and cultural accomplishment "moistening things silently" is the key to the classroom teaching in colleges and universities today.

The teaching team of the Principle of Automatic Control course in Inner Mongolia University should adhere to the fundamental task of fostering virtue through education and give full play to the function of the main channel of classroom teaching. They should actively promote the ideological and political education reform of the Principle of Automatic Control course, with emphasis on both knowledge transfer and value guidance. Moreover, they should carry out ideological and political education like salt dissolving in water to achieve the educational goals of shaping students' values, cultivating their capabilities and imparting knowledge. In addition, they should fully explore and deepen the connotation and elements of moral education in professional courses, improve the educational design of the courses, introduce innovative education and teaching methods, and develop good builders and successors of socialism with Chinese characteristics in the new era.

2. Ideas and Plan of Course Development

The quality of talent cultivation in colleges and universities directly affects the quality of higher education, and talents are mainly cultivated through the classroom. The content of ideological and political construction of the curriculum should closely focus on strengthening students' ideals and beliefs, take the love of the party, patriotism, socialism, people and the collective as the main line, and optimize the supply of ideological and political content of the curriculum around political identity, national feelings, cultural literacy, constitutional awareness of the rule of law, moral cultivation and other key points, and systematically carry out education of socialism with Chinese characteristics and the Chinese Dream, education of socialist core values, education of the rule of law, labor education Mental health education, Chinese excellent traditional culture education. The proposal of these requirements clarifies the specific contents of the five aspects of ideological and political education in the curriculum (Mao et al., 2021). Members of the course teaching team should give full play to the educational function of the core professional courses and exploit the ideological and political education resources and elements of the Principle of Automatic Control course. By designing and using teaching materials such as typical cases, they should integrate the elements of ideological and political education such as correct values, ideals and beliefs and patriotic sentiments into the content of the course. In addition, they should reform and practice the course from setting the knowledge

points and teaching methods to realize the ideological and political education for students in a subtle way. Thus, they can facilitate the unification of the three-dimensional teaching objectives of students' knowledge and capabilities, process and methods, and emotions and values, and improve the quality of education for all students in the whole process and in all aspects.

The course of Principle of Automatic Control, which covers 64 + 32 hours for automation majors, is explored for ideological and political education reform. Through this course, students can establish the basic concept of feedback control theory, master and understand its basic theories, analysis methods and design methods. Teachers should cultivate students' ability to apply the basic theories to resolve practical engineering problems, so as to lay the foundation for them to study subsequent professional courses. At the same time, teachers should increase the lectures on the philosophical ideas behind cybernetics in classroom teaching to help students develop a correct world view, outlook on life and values, cultivate scientific thinking and innovative habits, and foster greater engineering outlook among college students. By deeply exploring the moral education elements contained in professional knowledge, it can effectively improve the cultivation quality of new engineering talents with craftsmanship.

3. Content of Course Development

This course integrates ideological and political elements into the design of teaching content. Through the teaching of professional knowledge, students' awareness and understanding of family feelings, social responsibilities and personal qualities will be enhanced, and the value leading role of curriculum ideological and political education will be maximized.

3.1. Basic Concepts of Automatic Control System

Teachers can introduce the significant breakthroughs and achievements of China in the aerospace and deep-sea exploration fields such as the deep-sea manned submersible Jiaolong, Tiangong space station and Tianwen 1 Mars probe to inspire students' national pride and patriotism. Teachers can assign students to watch the movie "Hsue-shen Tsien" and read "Engineering Cybernetics" to learn the patriotic spirit of Hsue-shen Tsien who returned China after his studies to serve the motherland and dedicate himself to the country, so as to enhance students' national sentiment and sense of responsibility (Zhu, 2021).

3.2. Mathematical Modeling of Control Systems

When describing how to derive the transfer function of a system by transformation of block diagrams, teachers should follow the principle of equivalent transformation and develop students' interpersonal skills. Moreover, they should teach students to observe the principles of freedom, equality, honesty, love, and justice, and carry forward and practice the socialist core values (Liao & Wang, 2021). From the epistemology in dialectical materialism, teachers should elaborate how

to discover scientific problems, and then how to recognize ourselves and how to get refined internally and externally.

3.3. Time Domain Analysis of Control Systems

Teachers should inspire students to improve their all-round qualities and enhance their competitiveness in the workplace by using stability indicators. In addition, teachers should use rapidity indicators to explain the effect of executive ability on individuals in the workplace, and accuracy indicators to motivate students to strive for success and happiness and to enhance their strengths in the workplace. Teachers should guide students to be aware of the overall situation in terms of the interrelationship between these three indicators (Wang, 2022). From the system's anti-disturbance improvement, teachers should elaborate how students can strengthen their capabilities.

3.4. Complex Domain Analysis of Control Systems

Teachers should analyze system performance through root trajectory diagrams, and suggest that the main contradictions and key problems should be addressed (Shi & Liu, 2022). Based on this, teachers should guide students to adopt a proper approach in their study, work and research, and become good at summarizing the development patterns of matters. Moreover, students should learn to see through the appearance to perceive the essence, grasp the main problems, and key issues. They should not go about several tasks at a time, or fail to distinguish between their priorities.

3.5. Frequency Domain Analysis of Control Systems

The theory of three frequency bands in the frequency domain contains the principles of how to be a human and how to do something, and how to set the corresponding goals according to our different life stages. Teachers should use the cut-off frequency indicator to guide students to behave with bottom-line thinking and establish red-line awareness (Wang, 2022). Moreover, teachers should guide students to keep their original intention by the relationship between frequency domain bandwidth and anti-interference, and not to let external factors interfere with their judgment and lose themselves.

3.6. Design and Correction of Control System

In teaching the theory of correction, teachers need to make students aware of the fact that the principles of systematic correction are also applicable to life. When students' lives deviate from their goals and aspirations, they should promptly reflect on themselves to correct their mistakes, avoid going astray, and move on to the right path in life. Moreover, teachers should guide students to keep in mind their original intention and mission by giving examples of corrections of laser manipulation control systems. Moreover, students should have the courage to reflect on themselves three times a day to avoid going astray (Liao & Wang, 2021).

3.7. Analysis Methods of Nonlinear Control Systems

When teaching the stability of nonlinear control systems, teachers should guide students to apply the purposefulness of system control in their life planning and educate them to actively practice socialist core values and become qualified socialist successors (Wang et al., 2021). Students should learn about Dujiangyan, appreciate the wisdom and hard work of our ancient people, and deeply realize the philosophy of making the best of the situation and the harmony between man and nature.

3.8. Analysis Methods of Discrete Control Systems

When teaching about the stability of discrete systems, students are taught to face the errors between theory and practice objectively based on the relationship between “quantitative” and “qualitative” changes. Moreover, students should realize that errors are normal, no one is perfect, and everything is not always satisfactory. Moreover, students should learn to think of ways to reduce errors (Wang et al., 2021).

3.9. Modern Control Theory

Through the study of energy-controlled and energy-observed standard systems, students should develop the habit of strictly complying with various standards and norms, and consciously abide by the professional ethics and norms of honesty and trustworthiness in engineering practice (Zhang, 2021). By learning about the dyadic system and the dyadic principle, students should be guided to understand the connection between action and reaction, external guidance and self-enlightenment.

4. Initiatives in Teaching the Course

The traditional mode of teacher’s lecturing should be reformed in the classroom teaching of automatic control theory. Teachers should adopt the six-stage teaching method of introducing questions—inspiring thinking—lecturing theories—summarizing—case study—incorporating ideological and political education. Based on this, teachers should try to make ideological and political education active, alive, vibrant, and bright.

4.1. Comprehensively Revising Course Syllabus and Teaching Courseware to Activate Ideological and Political Education

Teachers should revise the syllabus, lesson plans and courseware of the course “Principle of Automatic Control” with the objectives of reforming the ideological and political education. Teachers should incorporate the teaching reform of ideological and political education into the teaching quality management system of the university. Moreover, they should standardize the revision of ideological and political education syllabus, teaching schedule, teaching records, and feedback and continuous improvement to ensure the effectiveness of education and

teaching.

4.2. Establishing a Faculty Team of “Ideological and Political + Professional Courses” to Revitalize Ideological and Political Education

Colleges and universities should strengthen the exchange and convergence between the ideological and political education team of the Principle of Automatic Control and the faculty team of professional courses, encourage and attract teachers through teaching competitions, teacher training and other forms. Teachers can fully cooperate and innovate in the teaching team, course content, teaching organization and teaching methods, so as to effectively improve their awareness and ability of moral education.

4.3. Integrating Inside and Outside the Classroom to Heat up Ideological and Political Education

Colleges and universities should fully mobilize teachers' enthusiasm and initiative, and encourage them to extend classroom education and engage in extracurricular academic practice teams of students. It should establish a teaching system of ideological and political education inside and outside the classroom, in which the first classroom and the second classroom, theoretical teaching and practical teaching, classroom teaching and online teaching are mutually supportive.

4.4. Building a Resource Base and Case Base for Ideological and Political Education, and Brightening up Ideological and Political Education

Relying on the teaching and research department of automation and the faculty of automation, colleges and universities should organize to collect and compile a collection of typical cases and excellent achievements of ideological and political education in their faculties. They should launch a number of excellent demonstration courses of ideological and political education, and initially build a resource base of ideological and political education in colleges.

Through the study of the course of Automatic Control Principle, we can help students establish a core idea of automatic control theory, that is, the idea of feedback, master the use of automatic control theory to analyze and solve problems, so that students have the ability to solve practical problems in future practical work, and exercise and improve students' ability to solve problems in practical projects.

5. Conclusion

Teachers should integrate ideological and political elements into the teaching of the Principle of Automatic Control course. Combining the specific knowledge points of the course, teachers should start with the integration of ideological and political elements to guide students to establish a correct worldview, outlook on life and values, and implement the fundamental task of “fostering virtue through

education” of the course. At the same time, teachers should adopt the six-stage teaching method, and put equal emphasis on knowledge transfer and value leadership, so as to improve students’ independent learning ability, understanding and application of knowledge. Based on this, colleges and universities can cultivate professional and technical talents in automation who meet the needs of the new era.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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