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Practice and Exploration of Integrating Curriculum Ideology and Politics into Digital Logic Circuit Course

Biyun Chen¹, Xin Pan²

¹College of Computer Information and Engineering, Yancheng Teachers University, Yancheng, China
²Aviation University Air Force, Fuxin, China
Email: chenby@yctu.edu.cn

Abstract

The study of ideological and political courses can not only stimulate the research of academic theories, but also provide scientific theories for the current economic and social development. There are many ideological elements in the course of digital logic circuit, but as a professional course, the content of the course is difficult, with more homework, but less class time. Therefore, integrating thinking in teaching is a problem worthy of studying. This paper discusses this topic, puts forward the reform strategy of ideological and political teaching, revises the teaching syllabus, improves the teaching mode, teaching method and course assessment method. In the process of teaching, we hope to strength students' patriotic feelings, improve their innovation and entrepreneurship, and eventually form a correct outlook on life, world outlook and values. This paper is expected to make some contributions to the ideological and political education reform.

Keywords

Course Education, Digital Logic Circuit, Engineering Education, Reform of Teaching

1. Introduction

The integration of ideological and political elements in the course can not only stimulate academic research on this theory, but also provide scientific theories for the current economic and social development (Gao & Zong, 2017). Worldwide, both the new economic development and the new round of technological and industrial revolution have posed new challenges to the reform and devel-

opment of higher engineering education (Cao & Liang, 2012). Digital logic circuit course has the characteristics of strong engineering practice, complex teaching content, diverse teaching methods and differentiated course content (Boyd et al., 2005). It is a professional basic core course required for students majoring in electronics, electrical and information technology. The setting of this course plays a crucial role in the course system, and is closely related to the following professional courses, such as analog electronic technology, principle of single chip microcomputer and principle of micro-computer (Wang, 2016). At present, many colleges and universities in China are committed to the mode of teacher teaching and student learning, and have achieved remarkable results. The teaching reform and construction of digital logic circuits are also advancing steadily. Y.B. Dong et al. proposed a hybrid innovative teaching method for relevant courses, which mobilized students' subjective initiative and innovation (Dong & Li, 2017). S. Z. Jia and others proposed the introduction of modern scientific and technological means, flipped classroom and other methods to improve students' participation in class, and the introduction of inquiry-based discussion, curriculum design and other methods to promote students' active thinking and hands-on practice, and cultivate students' innovative spirit and engineering practice ability (Jia et al., 2018). However, these methods also have problems of low feasibility and excessive idealization, such as flipped classroom, which requires students to have a very high sense of independent learning, which is difficult to achieve in some ordinary universities.

2. Problems in Teaching Civics

However, the current digital electronics technology mainly adopts the "theory and experiment" mode of concentrated classroom teaching, while the classroom of Civic and Political Science education mainly exists in the public ideology and politics courses, and most of these courses are taught in the mode of "large classroom lectures and macro narratives" (Zhang et al., 2020). They have their own teaching system, teaching materials and teaching staff, and are not closely related to the professional courses. From the current teaching situation and the effect of listening to lectures, it can be seen that the attendance rate of students in traditional ideological and political courses is low, the classroom affinity is poor and the head-up rate in class is low, while teachers of professional courses mostly pay attention to the narration of students' professional knowledge and the training of specific skills, and pay little attention to the cultivation of students' values and outlook on life. This has led to the phenomenon of "two skins" between the teaching of ideological and political theory courses and the teaching of professional courses in terms of values education, and even to the situation where professional courses and ideological and political theory courses are "different, but not mutually exclusive". This dichotomy inevitably reduces the effectiveness of moral education and core socialist values education (Liu et al., 2019).

3. Strategies for the Reform of Civics Teaching

There are many elements of thought politics related to digital logic circuits, but this course is after all a highly specialised course with a lot of content, difficulty and a heavy lecture load, and the class time is relatively limited. How to integrate ideological and political elements into the teaching, without distracting, needs to formulate appropriate ideological and political teaching strategies in advance.

3.1. Reform of Teaching Ideas: The Element of Civics in the Classroom

Combining the characteristics of the Digital Logic Circuits course's own specialisation, we introduce elements of ideology and politics into the professional course, giving full play to the synergistic effect of the course's ideology and political theory courses in educating people. The new teaching model requires us to first clarify the approach to cognition, then integrate professional knowledge, link the knowledge of the professional course to the common theme of cognition of ideology and politics, and finally reflect on how we should plan our lives at the intersection of national development and personal future through the knowledge we have learnt.

3.2. Reform of Teaching Methods: Diversification of Teaching Methods

Diversification of teaching methods and multi-dimensional teaching contents are necessary to better differentiate talent cultivation, to realize teaching according to students' abilities, and to cultivate students' motivation, initiative, participation, collaboration and competitive awareness of learning. With the development of information technology, the teaching mode can now be MOOC (massive on line open-course), SPOC (small private on line course), micro-course, online and offline flipped classroom, etc. to meet the different needs of students.

3.3. Reform of Assessment and Evaluation Mechanisms: Diversified Assessment Methods

The traditional assessment method mainly relies on two parts, namely the usual homework and the final examination results, which leads to most students not paying attention to the usual study and trying to get good grades by improvising. In order to solve this problem, a diversified assignment design system and course assessment should be adopted to increase the assessment of students' learning process and cultivate their ability to identify, analyze and solve problems and their ability to be innovative, entrepreneurial and creative.

Above all, the reform strategies proposed in this paper are as follows:

1) At the end of the final exam, an oral section can be added. This section can give several digital circuit design and analysis questions. Students will decide which questions to answer by drawing lots and will be awarded points based on their answers the advantage of doing this is that students can be evaluated more

objectively and fairly, the chance of written test results can be reduced, and students are urged to learn solid.

2) Construction dominated by students in the classroom: reduce the teaching time, increase the students in the classroom discussion, each of them is set a discussion section, including ideological elements discussed imposed a team to complete for the unit, carries on the inspection in the form of class discussion, not only can make objective evaluation on the teacher to the student, can also exercise the minds of students, to strengthen the understanding of the classroom.

3) Strengthen the assessment of independent learning: each semester should leave certain knowledge for students to learn independently, independent learning knowledge cannot be too difficult, also cannot be too easy. At the same time, strengthen the assessment of independent learning. The form of assessment should be flexible, closely related to knowledge points. The content that the teacher teaches is limited, this kind of assessment method can cultivate students' self-learning consciousness, establish the concept of lifelong learning.

### 3.4. Reform of the Level of Ideological and Political Teaching in the Teaching of Professional Appointments

The depth and breadth of participation of professional teachers is the key to the reform of the ideology and politics of the curriculum, and the level of their ideological and political level has a profound impact on the effect of education. It is important to promote professional teachers to better find the combination of ideological and political knowledge and map it to the teaching of professional knowledge, so as to achieve the goal of "three-wide education".

4. Specific Ideas for the Reform of Civics Teaching

The goal of ideological and political teaching reform is to combine professional knowledge with ideological and political elements, so as to cultivate ability and cultivate virtue. In order to achieve this goal, the reform will be carried out from four aspects: first, guided by knowledge points, incorporating ideological and political education elements, revising the teaching syllabus; Then the ideological and political elements as the breakthrough point to improve the teaching model and teaching methods; At the same time with moral education as the goal, improve the way of course assessment; Finally, the ideological and political teaching level of professional teaching should be improved by taking "three integrity education" as the general leader. The Flow chart of ideological and political teaching reform is as shown in Figure 1.

4.1. Revision of Syllabus by Leading with Knowledge Points and Integrating Elements of Ideological and Political Education

Starting from the teaching objectives, we use the knowledge points as the medium, the scientific knowledge formation as the basis, the thinking ability with
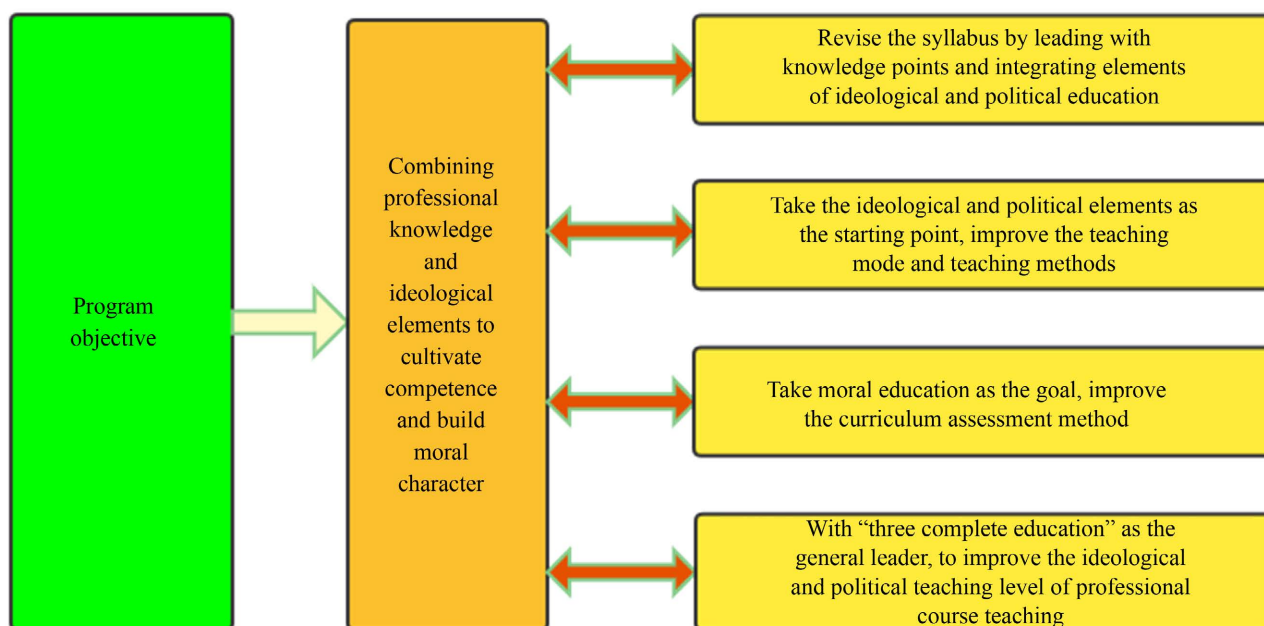
Figure 1. Flow chart of ideological and political teaching reform.

scientific characteristics and the innovative practical ability as the goal, and revise the teaching syllabus and the nurturing objectives by digging deeply into the ideological and political elements of the course. The teaching and learning strategy of this course is the focus of this project. Before teaching each knowledge point we will explore its ideological and political elements, and then integrate ideological and political nurturing elements in the teaching process and revise the syllabus. The whole process of teaching will be based on five main lines of thinking and political education to integrate the elements of thinking and political education.

1) It is an introduction to the importance of the circuit industry, its strategic nature, and the positioning of the industry in major policies to deepen students' sense of honour and mission for their major and course of study.

2) It is to introduce the current disparities at home and abroad as well as some recent hot events to arouse students' sense of worry, enthusiasm for science and technology and commitment to the country.

3) It is to cultivate build students' national self-esteem and self-confidence by introducing the dominant areas of the domestic IC industry and the deeds of advanced teams and individuals.

4) It is to inspire students' passion for innovation and entrepreneurship by introducing the start-up and development of famous companies at home and abroad.

5) By introducing the analysis and design of electrical circuits, students are guided to look at the relationship between "whole and part", which leads to issues such as "family and nation" and "individual and team", so that Students will develop a holistic perspective and a sense of teamwork.

4.2. Using Ideological and Political Elements as an Entry Point to Improve Teaching Models and Teaching Methods

The course is based on an ideological and political element as the entry point, using a hybrid "online + offline" teaching method.

1) "Online" teaching. Through the digital electronics MOOC asynchronous SPOC course introduced by the school (with the textbook), students select and study online under the school's cloud platform; the teacher, according to the syllabus and credit hour requirements, allows students to study through videos for basic knowledge and easy-to-understand content, and incorporates the learning content into the scope of assessment; for formula calculation and circuit design, etc., through For formula calculation and circuit design, students are taught through the Tencent Course.

2) Teaching "off-line". In the classroom, students are introduced to important knowledge points and difficulties, exercises and homework, experiments and circuit making. When teaching offline, we dig deeper into the ideological and political points of the course and record the relevant content as micro-videos to create a library of ideological and political teaching cases; when teaching theory in the classroom, we introduce the content of the ideological and political case library, using the case teaching method, problem-led teaching method, task-driven method, etc., to improve students' enthusiasm and participation; when explaining complex circuit analysis, we use the practical teaching method to bring the simulation software Multisim When teaching complex circuit analysis, the simulation software Multisim is introduced into the classroom, teaching students to build circuits and carry out real-time simulations, so as to effectively mobilise the initiative of learning.

3) Interactive management of "online" + "offline". The "Blue Ink Cloud Class" intelligent teaching platform is used to monitor the teaching process, and the teacher uses the mobile phone app to sign in, ask questions, do homework, take tests, answer questions and other interactive management of students, so as to keep track of each student's learning status and dynamics, realising "online + offline" the teacher can monitor the teaching process through the mobile app.

4.3. Improve Course Assessment with the Goal of Building Moral Character

Different assessment modes and ratios are set for this course according to the "online" and "offline" teaching content. Students will receive a final overall grade of 100, with a pass being awarded if the overall grade is 60 or above. The grade is proportional, i.e. total assessment grade = 10% of the usual grade + 20% of the process assessment grade + 10% of the laboratory grade + 60% of the final examination. The ideological and political assessment points are mainly reflected in the process assessment, experiments and final examinations.

1) In the process assessment, in addition to the video study of professional knowledge points, the study of ideological and political library cases is also included. By setting assessment points, students' attitudes and practices towards

things, their ability to distinguish between right and wrong, their ability and efficiency in independent learning, their management of time, and their tolerance in the face of setbacks and difficulties are tested, and this part of the assessment accounts for 10% of the process assessment grade.

2) In the experimental assessment, safety norms for the operation of the laboratory bench, cases of scientists and the practice of craftsmanship are included so that students can realise that these are skills that must be possessed by technical workers in relevant positions in the electrical and electronics industry, and this part accounts for 5% of the experimental grade.

3) In the final theory examination, some of the relevant ideological and political knowledge covered in class is included within the scope of the questions asked. For example, for design topics, philosophical ideas and teamwork are included in the assessment, so that students can deeply appreciate the importance of teamwork and the spirit of innovation, which accounts for 15% of the final grade.

4.4. To Improve the Level of Ideological and Political Teaching in the Teaching of Professional Courses with the "Three Comprehensive Education" as the Overall Leader

The depth and breadth of involvement of professional teachers is a key aspect of the curriculum reform of Civics, and the level of their ideological and political skills has a profound impact on the effectiveness of education. The following are possible ways to improve.

1) Using the "Learning Nation" software, we continue to strengthen our own political theory study and improve the moral education of our professional teachers by taking the "Four Good Teachers" as the standard.

2) Relying on the General Party Branch of the College and the party branches of the departments, the political theory study time on Tuesdays is used to strengthen the knowledge of the teachers of the professional courses they teach on the intrinsic values, scientific ethics, social values, responsibilities and missions, so that every teacher can "think about politics, dare to think about politics and be able to think about politics".

3) We have set up various levels of course discussion groups on ideology and politics in the college, departments and teaching and research departments, constantly urging teachers to combine the content of their teaching with the guidelines and policies of the state and the Party, to strengthen the practice of core socialist values, and to use their knowledge, experience and charisma to ignite the ideological and political fire in the hearts of students.

5. Concluding Remarks

In the process of teaching reform, through continuous exploration and practice, the fundamental task of establishing moral education is carried through the whole process of talent cultivation and classroom teaching, integrating ideological education into the relevant knowledge points of the teaching of Digital Logic

Circuits course, promoting the continuous integration of professional knowledge education and ideological and political education, effectively improving the quality of new engineering talents, cultivating the spirit of craftsmanship, guiding every student's professional knowledge and patriotic sentiment, and helping students to form a correct world view, outlook on life and values.

Project

Conflicts of Interest

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

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