Teaching Design and Implementation of Ideological and Political Education in the Course of Signal Analysis and Processing

Yuedong Xie[✉], Rui Wang, Hui Li, Jiangtao Sun, Xiaolei Qu, and Dezhi Zheng

School of Instrumentation and Optoelectronic Engineering, Beihang University, Beijing 100191, China

{yuedongxie,wangr,lihui,jiangtao_sun,quxiaolei}@buaa.edu.cn

Abstract. For the ideological and political education of the course "Signal Analysis and Processing", the implementation method suffers from indoctrination teaching and lack of student interest, etc. Starting from the learning habits and interests of contemporary college students, we intend to implement the ideological and political education by means of new media and information technology (WeChat official account, short video, bullet screen, anonymous Q&A, etc.). Firstly, divide ideological and political cases of "Signal Analysis and Processing" into three categories, including major-related cases, politics-related cases, and modern-characters related cases. Further, establish the practical cases that are strongly related to the course of "Signal Analysis and Processing". Combining the theory study and practical study will enhance and fasten the teaching and learning progress, and meanwhile to integrate the ideological and political elements fluently. At the end, match the theoretical knowledge of the course with the ideological and political elements by means of new media and information technology. The proposed flexible method aims to solve the indoctrination problem in the ideological and political education of the course, and create a relaxed and lively teaching environment, which is of great significance to explore the teaching design and implementation method of the ideological and political elements into the course of "Signal Analysis and Processing" .

Keywords: ideological and political education · media and information · cases classification

1 Introduction

"Signal Analysis and Processing" is an important major course in Chinese engineering colleges and universities, and contains indispensable basic knowledge for instrument-major professionals. This course involves a wide range of knowledge and has wide application, and is closely combined with engineering practice, aiming at cultivating high-quality innovative talents with deep theoretical foundation, broad professional knowledge and strong practical innovation ability [1–3]. It is imperative to carry out ideological and political education based on the major course of "Signal Analysis and Processing".

As the main body of ideological and political education, contemporary college students grew up in the information environment [4] They are a group with innovative ideas and distinctive personality: they emphasize self-consciousness, mature with childish, optimistic with confusion, confident with inferiority complex. At the cultural level, they want to be recognized rather than marginalized. At the value level, they are eager for effective guidance rather than being rudely interfered with. With the rapid development of information technology, digital learning resources are becoming more and more abundant, and teaching platforms such as "Rain Class" and "Mu Class" have gradually emerged. In the classroom, more and more students come to class with mobile phones and notebooks, and they will check knowledge points about teachers' current teaching online on the digital terminal at any time, and integrate information from multiple sources for constructive learning. Therefore, traditional teaching has been gradually transiting to mixed teaching, among which new media and information technology are the main means and interests of contemporary students [5].

At present, in the ideological and political education of Signal Analysis and Processing, there are problems such as "edification" teaching, "indoctrination" teaching, and students' lack of interest. Therefore, it is necessary to find suitable implementation method for the ideological and political construction by means of information technology and media technology. In addition, current ideological and political education still has the problem of attaching importance to theoretical knowledge and neglecting practical experience. Students can only be educated from the difficult and obscure theories, but they just lack the practical link that is most easy to stimulate students' interest in learning and improve their learning effect. Finally, students are still the main body of the class in the ideological and political teaching of the curriculum, and improving students' enthusiasm for active learning will greatly help teaching [6–8]. To sum up, the development trend of curriculum ideology and politics is as follows:

- The transition from traditional teaching mode to mixed teaching mode [9–11];
- The combination of ideological and political teaching and practice (simulation practice - role play and physical demonstration);
- Interactive teaching enhances learning interest

2 Methodology

In this work, we aim to explore the new method of constructing the ideological and political case library of the course "Signal Analysis and Processing" and the corresponding teaching design and implementation plan of the ideological and political case. We propose using media and information technology to deeply fusion the theory teaching, practice operation and ideological and political education together, as shown in Fig. 1, to construct three-in-one mode aiming to improve the teaching and learning efficiency and meanwhile to melt the ideological and political elements into the teaching with an increase of attention from students.

There are three steps to carry out the teaching design and implementation (Fig. 2).

- Step 1: Enrich the library of new media ideological and political materials by means of WeChat official account, short video and other new media means. The materials to be collected mainly include the following aspects:

Deep fusion between theory teaching, practice operation, and ideological and political cases by means of media and information technology

Fig. 1. Three-in-one method.

1. **Major-related cases**. Take Beihang University as an example: based on the professional background of Beihang University, the important applications of signal analysis and processing technology in aerospace are introduced; Introduce the important role of Beihang talents in major model tasks, encourage students to improve their professional skills through the power of example, and contribute to the construction of the motherland in the future;
2. **Politics-related cases**. For example, the signal analysis and processing technology used in the infrared thermal imaging detection of the anti-epidemic big data. Through focusing on national events, campus life, etc., cultivate students' sense of ownership and responsibility of "national affairs, family affairs, world affairs", and understand the responsibilities and responsibilities. At the same time, the Chinese power, Chinese spirit, Chinese efficiency and the image of a big country embodied in the nationwide anti-epidemic are very valuable, vivid and persuasive ideological and political education resources.
3. **Modern characters related cases**. For example, the lives and deeds of Shannon, Fourier, Alan Turing, Qian Xuesen and others, highlight their major setbacks and how to deal with difficulties. Encourage students to develop their original ability, tenacious character and quality, and exercise their ability to analyze and solve problems.

– Step 2: establish the practical cases that are strongly related to the course of "Signal Analysis and Processing"

The cases library to be established includes: Prof. Wang Zhonglin, an expert in the field of friction nano-generator, and the invention of graphene at the University of Manchester, UK. For example, Prof. Wang Zhonglin, a famous scholar in the field of nano-self-power supply, first discovered that the friction nano-generator was due to an accidental experiment, from which hundreds of volts of signal were found by accident. When most people thought that the experiment was wrong or the signal was interference, only Wang Zhonglin analyzed the physical phenomenon behind it and invented the self-powered friction nano-generator. Encourage students to think about whether they have encountered similar problems in their daily life and how to solve them. Through students' answers, guide students to pay attention to the combination of theory and practice, actively participate in social practice, and promote students' self-reflection.
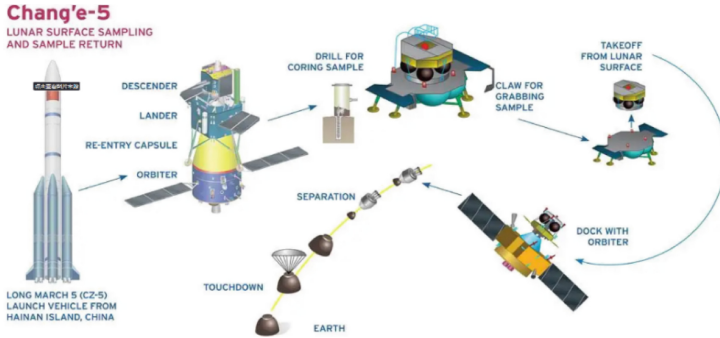
Fig. 2. The major-related case: Change V

In addition, we use the signal analysis and processing instrument for practice teaching, as shown in Fig. 3. From this instrument, there are DC power, signal generator, frequency counter, and millivolt meter, etc. With this instrument and related modules, students can divide extract a signal with different frequency, in order to help them understand the signal components.

– Step 3: match the theoretical knowledge of the course with the ideological and political elements by means of new media and information technology.

Match the cases collected in the early stage with the corresponding knowledge points, appropriately use modern educational technology to assist teaching, and flexibly apply heuristic discussion, answering questions, speeches, anonymous questions and other links to teaching. For example, explain that the encoding and decoding content in analog-to-digital conversion through the introduction of Alan Turing's story. Through playing the short video about Alan Turing's life, "Imitation Game", the students will think about "war" and "peace"; Qian Xuesen's deeds were introduced when explaining the impulse signal, and his outstanding achievements in the aerospace field were introduced through WeChat official account push, which led students to discuss in groups how to understand the sentence "science has no borders, but scientists have the motherland". When explaining the sampling theorem, the introduction of high-end AD is now monopolized by foreign countries, while Huawei and other enterprises have
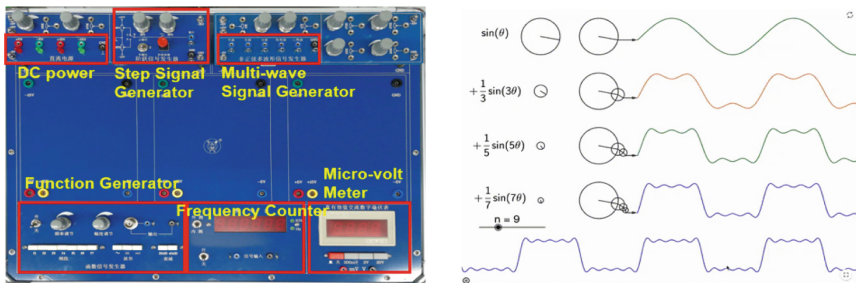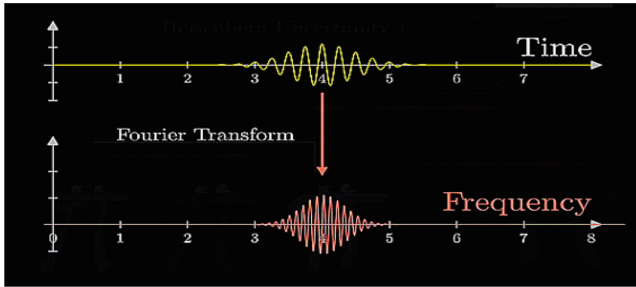

Fig. 3. Practical instrument and related explanation about the signal.

Fig. 4. The information technology to illustrate Fourier Transform

begun to research and develop their own chips, enhance students' cultural confidence, and theoretical confidence, cultivate students' national pride (Fig. 4).

There are two mainly novelty points regarding the teaching design and implementation. First, the advantages of new media means. With the help of WeChat official account, short videos and other new media means, we can achieve efficient teacher-student interaction, stimulate students' learning interest to the greatest extent, and finally achieve the "spring rain, moisten things silently" transmission of ideological and political content. Second, the combination of ideological and political teaching and practice (simulation practice - role play - physical demonstration). Students are encouraged to develop their original ability, tenacious character and quality, and the ability to analyze and solve problems.

3   Conclusion

To sum up, in view of the problems existing in "Signal Analysis and Processing" at the current stage and in combination with the learning habits and interests of contemporary college students, explore the design and implementation plan of the ideological and political case teaching of Signal Analysis and Processing. In this work, the teaching design and implementation of ideological and political education in the course of Signal Analysis and Processing is proposed. Three steps are included to form the "three-in-one" teaching mode to deep fusion the theory teaching, practice operation and ideological and political elements. The main content includes ideological and political cases classification, practical cases establishment, and matching ideological and political elements into the theoretical knowledge. The purpose of this work is to enhance and fasten the teaching and learning progress, and meanwhile to integrate the ideological and political elements fluently.

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