

Construction of Ideological and Political Education of Professional Curriculum under the Background of Chinese Modernization

Wei Zheng^{a*}, Lingmi Wu^b

New Energy Equipment College, Zhejiang College of Security Technology, Wenzhou 325016, Zhejiang, China

Abstract. Aiming at the far-fetched connection of the current combination of science and engineering professional courses teaching and morality cultivation, ideological and political education of professional curriculum has been reformed in the “Sensor Technology and Application” course to explore the curriculum ideological and political education mode of the effective combination of professional education and morality cultivation under the background of Chinese modernization. Various ways of curriculum ideological and political reform have been tried in the course teaching process, curriculum ideological and political elements have been designed with regional, college-based and specialty group characteristics which have been also implemented and evaluated in the teaching process. The research results showed that the construction and implementation of the curriculum ideological and political education in the course of “Sensor Technology and Application” have improved students’ learning interests and professional qualities in multiple dimensions, and have received unanimous praise from teachers and students.

1. Introduction

Sensor technology plays an important role in basic research, modern industrial production and information intelligence system. From the vast universe on the macro, the particle world on the micro to the automated production, every process needs to use a variety of sensors to perceive and obtain external information. In the context of Chinese modernization, artificial intelligence, big data, cloud computing, robotics and other technologies with the Internet and industrial intelligence as the core are developing rapidly, and the sensor technology is a solid foundation and effective guarantee for intelligent manufacturing.

2. Necessity of curriculum ideological and political construction

The modernization of Chinese education is a precondition for the Chinese modernization, and higher education and higher vocational education should play a leading role. The ideological and political education work in colleges and universities [1] is of great significance in helping students grow up healthily, set up correctly the three views and improve the scientific and cultural accomplishment. Therefore, curriculum ideological and political construction and reform is imminent.

The intelligent manufacturing high-end equipment operation and maintenance specialty group should cultivate high-quality technical and skilled talents who

adapt to the needs of modern social development, have all-round ability in areas such as morals, intelligence, sports, aesthetics and labour education, full of patriotism, professional ethics, craftsmanship spirit and international perspective, have solid professional basic knowledge, and be able to engage in the installation, debugging and maintenance work of intelligent manufacturing equipment. At present, the combination of “Sensor technology and application” course teaching and morality cultivation [2,3] is far-fetched in science and engineering specialties, which is mainly reflected in two aspects: on the one hand, it is difficult to determine the ideological and political education resources closely related to the curriculum contents; on the other hand, it is difficult to organically integrate effective the ideological and political education resources into the professional curriculum teaching. The project team selected shared courses within the intelligent manufacturing high-end equipment operation and maintenance specialty group of Zhejiang College of Security Technology, including “Electrical and Electronic Technology”, “C language Programming”, “Sensor Technology and Application” and other courses, organized several teaching and discussion meetings for the curriculum ideology and political construction, and finally determined the “Sensor Technology and Application” course reflecting the characteristics of the professional group as a demonstration. Combining the characteristics of region, college and professional group, constructing the curriculum ideological and political teaching mode [4] that effectively combines professional education with moral education and talent cultivation under the background of

* Corresponding author: 20016263@zjst.edu.cn

^bwlm19910801@163.com

Chinese modernization is a positive response to the modernization of Chinese education, an effective way to enhance the adaptability of vocational education, and a necessary prerequisite for fostering high-quality technical and skilled talents for the country.

3. Construction of curriculum ideological and political education

3.1. Construction Plan of Ideological and Political Education

“Sensor Technology and Application” is a professional shared course of intelligent manufacturing high-end equipment operation and maintenance specialty group, which is a course for training students’ comprehensive practical ability and accomplishment which are from specialties such as UAV application technology, industrial robotics, intelligent control technology. The course plays a connecting role in talent training programs, which has a pre-course course of “Electrical and Electronic Technology” and also has following courses such as “UAV Assembly and Debugging”, “Machine Vision Technology” and “Industrial Robot Operation and Maintenance”, laying the foundation for subsequent competitions, internships, graduation projects, etc.

Based on local regional characteristics such as “Seven Mountains, One Water, Two Fields” and typhoon weather, as well as the “AI & Security” college-based characteristics and the intelligent manufacturing specialty characteristics, the knowledge and skill objectives of the “Sensor Technology and Application” course are set according to the needs of job talents, see Fig.1. Students are required to master the working principles of various common sensors, understand the working characteristics of sensitive components, master the measurement methods of common physical quantities, cultivate their ability to measure and control physical parameters according to actual needs, and be able to read technical documents, install and debug sensors, sensor systems and whole intelligent manufacturing equipment systems.



Fig. 1. Construction plan of curriculum ideological and political education

3.2. Design of Curriculum Ideological and Political Elements

The “Sensor Technology and Application” course has rich contents and multiple process, which are vivid, intuitive and highly plastic to integrate curriculum ideological and political elements. Starting from the main characteristics of Chinese modernization, the moral education resources

have been deeply excavated and classified in the four modules: “Material civilization”, “Spiritual civilization”, “Ecological civilization”, “Peace and security”, in order to strengthen moral education and talent cultivation throughout the whole process of the course, see Fig.2.

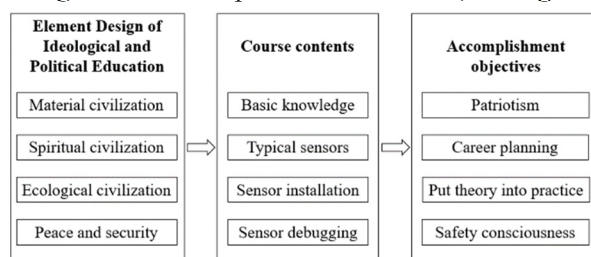


Fig. 2. Element design adapting to course contents and accomplishment objectives

Combining the regional, college-based and specialty group characteristics, the four modules with thirteen curriculum ideological and political elements have been designed to be integrated organically with the relevant knowledge and skills points of the “Sensor Technology and Application” course, as shown in Table 1.

3.2.1 Material civilization module

This module deals with people’s daily life, including industry, clothing, food, shelter, transportation and hospitalization. Firstly, starting from the basic knowledge of sensors, the current development status of Chinese industry is introduced through the theme of coexistence of opportunities and challenges of the intelligent manufacturing industry to encourage students to establish career ideals and plan their careers. Secondly, integrating the teaching contents of humidity sensor, resistance strain sensor, temperature sensor and ultrasonic sensor into the themes of Xinjiang’s “smart” cotton fields, smart restaurants, home automation, Intelligent parking, etc. On one hand, students can master sensor principle knowledge and skills in a specific application instances; on the other hand, students can stimulate their sense of national identity and sense of pride, foster their virtues of food cherishing, electrical energy saving and domestic goods support. These themes were designed to enable them to understand the development prospects of their industry and encourage them to develop a spirit of struggle that is not afraid of hardship and fatigue. Finally, the study of infrared temperature measurement and biosensors in the context of fighting against infectious diseases can call on students to wear masks in a scientific and standardized manner, unite as one to fight against infectious diseases.

3.2.2 Spiritual Civilization Module

This module contains the two themes: education and travel. Through the successful launch of the Mengtian space lab module of China, the working principle of MEMS sensors was introduced, which not only enhanced students’ national pride but also stimulates their interest in their major. By studying MEMS sensors in gyroscopes and accelerometers, as well as Hall sensors in magnetometers as typical cases, it was easier for students to know the sensor knowledge and skills necessary for intelligent

manufacturing high-end equipment operation and maintenance positions. Through the story of Kai Wu, the overall mechanical designer of the Mengtian space lab module of the Eighth Institute of China Aerospace Science and Technology Corporation, students experienced the spirit of manned spaceflight and craftsmanship, which is “particularly capable of enduring hardship, fighting, tackling challenges and dedicating”. These themes advocate for students to learn from others and have lifelong professional qualities.

In addition to busy studies, it is also important to balance work and rest. For drone enthusiasts, it means using drones to capture the beautiful scenery of our country. When designing ideological and political elements for the “Sensor Technology and Application” course, CCD image sensors are introduced from the largest aerial documentary in Chinese history, “Aerial China”, to help students understand the application prospects of drone aerial photography, connect theory with practice and put theory into practice [5].

Table 1. Design and integration of curriculum ideological and political elements under the background of Chinese modernization

No.	Curriculum ideological and political elements		Theme	Course contents	Accomplishment objectives
1	Material civilization	Industry	Intelligent manufacturing industry opportunities and challenges coexist.	Basic knowledge	Career planning
2		Clothing	Xinjiang’s “smart” cotton fields	Humidity sensor	Patriotism
3		Food	Smart restaurant: One second identification & accurate payment	Resistance strain sensor	Cherish food
4		Shelter	Home Automation : Enjoy the technological life	Temperature sensor	Electrical energy saving
5		Transportation	Intelligent parking	Ultrasonic sensor	Support domestic goods
6		Hospitalization	Smart medical care	Biosensor	Solidarity
7	Spiritual civilization	Education	Launch of the Mengtian space lab module	MEMS sensor	Craftsmanship spirit
8		Travel	Aerial China	CCD image sensor	Put theory into practice
9	Ecological civilization	Environmental protection	Garbage sorting and recycling	Infrared sensor	Environmental protection
10		Fire prevention	Hidden dangers in the open fire, prevention is better than disaster relief.	Smoke sensor	Sense of duty
11		Typhoon prevention	Safe Wenzhou City Construction	Wind transducer & Water level sensor	Consciousness of prevention
12	Peace and security	Peaceful development	War and Peace	Photoelectric sensor	International perspectives
13		Safety consciousness	Be alert to dangers even in times of calm	Proximity sensor	Safety consciousness

3.2.3 Ecological Civilization Module

This module covers three themes: environmental protection, fire prevention and typhoon prevention. The advocacy of establishing environmental awareness was integrated in the course content of infrared sensors of the garbage sorting bin of daily life. Taking into account the recent dry weather and the two forest fires in Daluo Mountain and Yongjia District in Wenzhou, combined with the regional characteristics of “seven mountains, one water, two fields” and typhoon weather, teaching contents such as smoke sensors, wind transducer and water level sensors [6] were integrated into the cultivation of responsibility awareness in forest fire prevention and “three prevention” of typhoon season, including flood prevention, typhoon prevention and waterlogging prevention.

3.2.4 Peace and Security Module

This module includes two themes: peaceful development and safety consciousness. Unmanned aerial vehicles play an important role in people’s daily life [7] and also the current regional conflicts in the world. These themes have been introduced into the teaching content of photoelectric sensors to cultivate students’ international perspectives and emphasize that Chinese modernization follows the

path of peaceful development, science and technology is a double-edged sword, science and technology are for people and for good. China is one of the countries with the best security in the world. This is introduced in the section of proximity sensor, to warn students to be alert to dangers even in times of calm, make them aware of the rapid development and progress of science and technology in our country, stimulate their patriotic resonance and strengthen their belief in helping to build a strong country.

3.3. Implementation of Ideological and Political Education

The implementation of curriculum ideological and political education is mainly covered by “Three Integration, Three Entries and Three Classes”.

“Three Integration” has three levels: Firstly, vocational education and ideological and political education need to be highly integrated, emphasizing the cultivation of the spirit of great craftsmanship and a work style of striving for excellence; Secondly, professional learning is highly integrated with emerging technologies, paying attention to the integration of engineering and learning; Finally, there is a high degree of integration between value leadership and corporate culture, focusing on the cultivation of students’ professional ethics and international perspectives [8].

“Three Entries” requires the integration of the ideological and political education goals into the curriculum system and course standards, and also the immersion of ideological and political elements into specific sensor cases in the course to finally achieve the imperceptible goal.

“Three Classes” demands various class forms such as online and offline, in or out of school, knowledge and action, to achieve class linkage and all-round talent cultivation.

4. Conclusion

This project aims at the far-fetched connection problem of the current combination of science and engineering professional courses teaching and morality cultivation. The “Sensor Technology and Application” course has rich contents and multiple process, which are vivid, intuitive and highly plastic to integrate curriculum ideological and political elements. This project has explored the curriculum ideological and political education mode of the effective combination of professional education and morality cultivation under the background of Chinese modernization, tried various ways of curriculum ideological and political reform in the course teaching process, designed curriculum ideological and political elements with regional, college-based and specialty group characteristics and implemented and evaluated them in the teaching process. The research results showed that the construction and implementation of the curriculum ideological and political education in the course of “Sensor Technology and Application” have improved students’ learning interests and professional qualities in multiple dimensions, and have received unanimous praise from teachers and students.

R. B. G. thanks to Zhejiang Provincial Education Department for the support of Grant number [SKCSZ202207] “Research on Curriculum Ideological and Political System of Intelligent Manufacturing High-end Equipment Operation and Maintenance Specialty Group --Three Integration, Three Entries and Three Classes” monitored by Zhejiang College of Security Technology.

References

1. Men, Shuyuan, and Chao Yuan. "The Ideological and Political Education in Colleges and Universities Based on the Concept of Cooperative Education." 2021 2nd Asia-Pacific Conference on Image Processing, Electronics and Computers. 2021.
2. García-Moriyón, Félix, et al. "Research in moral education: The contribution of P4C to the moral growth of students." *Education Sciences* **10.4** (2020): 119.
3. Begum, Abida, et al. "Environmental and Moral Education for Effective Environmentalism: An Ideological and Philosophical Approach." *International Journal of Environmental Research and Public Health* **19.23** (2022): 15549.
4. Khushnazarova, M. N. (2020). WAYS TO USE INNOVATIVE METHODS TO INCREASE THE PROFESSIONAL ACTIVITY OF FUTURE TEACHERS AND EDUCATORS. *Scientific Bulletin of Namangan State University*, **2**(4), 535-543.
5. Quamar, Md Muzakkir, et al. "Advancements and Applications of Drone-Integrated Geographic Information System Technology—A Review." *Remote Sensing* **15.20** (2023): 5039.
6. De Fazio, R., et al. "A sensor-based drone for pollutants detection in eco-friendly cities: Hardware design and data analysis application." *Electronics* **11.1** (2021): 52.
7. Esposito, Marco, et al. "Drone and sensor technology for sustainable weed management: A review." *Chemical and Biological Technologies in Agriculture* **8.1** (2021): 1-11.
8. Nargiza, Yunusalieva. "Social and moral education of students and development of values." *Galaxy International Interdisciplinary Research Journal* **10.1** (2022): 300-305