

# Exploration on Carrying out Ideological and Political Course Education for Biomedical Engineering Specialty

-Taking the Course of Introduction to Medical Instrument Overview as an Example

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**Abstract**—This paper has introduced the professional characteristics and professional quality requirements of biomedical engineering specialty, and then on the basis of the current phenomenon in which professional skills is more emphasized while ethics and professional spirits in the link of cultivating professional talents of biomedical engineering specialty are neglected, it has also put forward the necessity for carrying out the ideological and political course education for biomedical engineering specialty. It takes the professional basic course of biomedical engineering specialty, i.e., the course of Introduction to Medical Instrument as an example, and then introduces the exploration of ideological and political education courses in our college from two aspects, including the teachers and courses, puts forward that teachers should focus on improving their qualities, master solid business capacity, go deep into the industry, and constantly update knowledge reserves; meanwhile, this paper also proposes to integrate fresh and vivid cases into courses, and then through case analysis and teachers' guidance, integrate ideological and political education into classrooms to influence students unconsciously, and help them realize comprehensive improvement.

**Keywords**—*Ideological and political courses; Biomedical engineering; Introduction to medical instrument; Reform*

## I. INTRODUCTION

Ideological and political courses are the new concepts and new modes for the ideological and political work in colleges that focus on course value from the dimension of education, realize the integration of ideological and political education in courses, give fully play to the ideological and political education resources of all courses, and make joint efforts to improve students' ideological level, political consciousness, moral trait, and cultural quality; besides, it is also the current theoretical and practical problems attracting lots of attentions from the education field in colleges. For a long time, the party and the state have paid high attention to the educational effect of courses, especially over the recent decades; it has been repeatedly reinforced to exert the education effect of courses [1, 2]. CPC Central Committee and the State Council have printed and issued the Opinions about Reinforcing and Improving the Ideological and Political Work of Colleges under the New Trend, which as pointed out that "it is requested to fully dig out

and apply the ideological and political education resources contained in various disciplines, and perfect the classroom teaching management methods in colleges". During the National Conference of College Ideological and Political Work, Jinping XI pointed out that "it is requested to insist on regarding the setup of moral values and cultivation as the central link, implement ideological and political work in the entire education and teaching process, realize full-process and comprehensive education, and use well the main channel of classroom teaching; insist on reinforcing ideological and political theoretical courses in improvement, promote the ideological and political education affinity and pertinence, meet students' growth development demands and expectations; as for other courses, it is requested to guard the channel, and take full responsible for the field, make all courses march forward with ideological and political theoretical courses towards the same direction, and form synergistic effect" [3, 4, 5], and this is the scientific summary and intensive elaboration of "ideological and political courses".

## II. THE NECESSITY TO CARRY OUT IDEOLOGICAL AND POLITICAL COURSE EDUCATION FOR BIOMEDICAL ENGINEERING SPECIALTY

### A. Professional characteristics

Biomedical engineering specialty mainly uses engineering technology means, to study and solve the relevant problems in biology and medicine; it involves medical instrument, biomaterials, artificial organs, biomedical signal processing methods, medical imaging and image processing methods, etc.,. And the objective is to solve the relevant problems in medicine, ensure human health, and serve for disease prevention, diagnosis, treatment and recovery. The biomedical engineering specialty is the multi-disciplinary specialty that is developed in combination with biology, medicine and engineering theories.

In 2017, the Ministry of Science and Technology formulated "the Special Plan for the 13th Five Year Plan" Medical Instrument Science and Technology Innovation as per the National Innovation-driven Development Strategy Outline, the National Medium and Long Term Scientific and Technical Development Plan Outline (2006-2020), "13th Five Year Plan"

National Science and Technology Innovation Plan, "Healthy China 2030" Plan Outline, Made in China 2025, the Guidance Opinions about Promoting the Healthy Development of Medical Industry and other relevant requirements. In this Plan, it has been clearly pointed out that, advanced medical instrument is the important basis for constructing the health protection system, the main impetus for promoting the progress of medical diagnosis and treatment technologies, the core engine for optimizing medical service supply, and the transformational force that leads the conversion of medical mode, with high strategy, driving force and growth, its strategic position has attracted attentions from countries worldwide, and has become an important symbol of a country's scientific and technical progress as well as the people's health care capacity. It is no exaggeration to say that, the present is exactly the best time for the fast development of biomedical engineering specialty; meanwhile, higher requirements have been put forward for the talents of biomedical engineering specialty.

### B. Professional quality

Speaking of professional quality, we often think about professional skills, and such acquaintance is one-sided. For a qualified talent majoring in biomedical engineering, except for solid professional skills, it is also requested to be equipped with certain ethics and professional spirits.

Ethics mean that the relevant workers of biomedical engineering specialty shall always put the public interests above personal interests when conducting the R&D, manufacture, inspection, use, maintenance and management of medical instruments, and shall consciously undertake responsibilities for their own or relevant stakeholder's behaviors before, during and after the event. Follow the principle of people first, life caring, safety and reliability as well as the care of nature, fairness and justice, always adhere to performing our own ethic principles, improve social benefits of work, and practically ensure people's health.

Professional spirits refer to certain professional and characteristic thoughts, concepts and value orientation reflected by the relevant workers of biomedical engineering specialty when actively expressing them in work. The most important factor for professional spirits is "cherishing posts and devoting wholeheartedly to work"; the inner ethic criteria are "honesty and trustworthiness", and the basic requirement is "justice and equity".

In the current talent cultivation link of biomedical engineering specialty, there is the phenomenon of focusing on professional skills, and neglecting ethics and professional spirits, so it is necessary to carry out ideological and political courses, and use the main channel of classroom teaching to cultivate professional talents with high consciousness, good ethics, and exquisite business.

## III. EXPLORATION OF CARRYING OUT THE IDEOLOGICAL AND POLITICAL COURSE EDUCATION FOR THE COURSE OF INTRODUCTION TO MEDICAL INSTRUMENT OVERVIEW

The course of Introduction to Medical Instrument Overview is one of the professional basic courses for the biomedical engineering specialty of our school, and it is opened for the second grade of undergraduates, and aimed to lead students to the field of medical instrument, and understand the medical instrument industry; it is the leading course for the follow-up professional courses. Thus, in the cultivation system for the biomedical engineering specialty of our school, the course of Introduction to Medical Instrument Overview has an important position, so next; we will start from teachers and courses, and introduce the exploration about carrying out the ideological and political education for the course.

### A. Teacher

Comrade Xiaoping DENG used to point out that: "Teachers are the key deciding whether a school can cultivate qualified talents and educated workers with all-round development of morality, intelligence and physique as well as socialism consciousness for the construction of socialism" General Secretary Jinping XI pointed out that: "A good teacher should aim high, emulate those better than themselves, constantly improve moral cultivation and personality traits, and teach students correct morality." Thus, the quality of teachers is the key deciding whether the reform of ideological and political reform of courses can succeed.

First of all, as teachers, it is requested to possess good teaching styles and ethics, and should influence students' view of life and value concept unconsciously; They should take the lead, and set examples for students with their own behaviors; They should be optimistic, actively transmit positive energy and influence students with enthusiasm.

Secondly, teachers should have solid business capacity. The objective for the reform of ideological and political course education is to give full play to the effect of ideological and political education for courses, and it is not equivalent to the entire ideological and political orientation of professional courses, or the separate teaching of partial professional courses, and then another part of ideological and political courses, it should be the natural integration of professional contents and the ideological and political contents, and this has put forward an extremely high requirement for the teachers' business capacity, for they should not only understand professional knowledge, but also understand corresponding social and cultural background, such as the development history of medical instruments. Only by doing so can professional contents be well taught, ethics and professional spirits behind professional contents be dug out; and then it can make students think thoroughly and resonate, and then comprehensively improve students' comprehensive quality via accumulation.

Finally, teachers should go deep into the first line of the industry, and constantly update knowledge reserves. The medical instrument technology is rational itself, but once technologies are exerted on people, it is requested to fully consider the beneficial changes or negative problems brought by technologies to humans and the society, and then it will

reflect more technical sensibility; the technical development and social development are mutually supplemented. From the perspective of the ideological and political courses, teachers should go deep into the first line of the industry, and then reinforce the understanding of technologies about social development in practice, and then through constantly updating knowledge reserves, they should understand the current status about technical applications, improve their own consciousness about the national conditions, promote the sense of social responsibilities, and then transmit them to students through their personal experience, and this is the meaning of the ideological and political course education.

### *B. Courses*

In order to conduct well the ideological and political course reform of the Introduction to Medical Instrument Overview, we have based on the existing course contents, dug out the cutting point for the ideological and political education courses and then through looking up references, we have focused on the ideological and political education and integrate lots of vivid cases into it. Through taking the chapter about the relevant instruments of angiocardiopathy as an example, the examples are as follows:

For instance, when mentioning artificial hearts, we have introduced the stories about the first artificial heart transplantation. In 1982, Doctor William Devries from the Medical Center of the University of Utah led a surgery group to implant the first artificial heart named Jarvik-7 to a dentist from Seattle--Doctor Barney Clark, and created the precedent for artificial heart transplantation. In this case, we focused on the spirits of Doctor Clark et al. for bravely devoting themselves to the development of medical technologies, and just because of such testers, people back then correctly recognized the disadvantages of Jarvik-7 (for instance, the outer conductor can cause injection, the device will be subject to mechanical faults, with heart structure matching problems), and then constantly improved the device. On the basis of this case, and in combination with the actual conditions at present, it is also applicable to carry out discussion with students considering "body donor" (this is the respectful name of body donors in the medical field).

For another example, when mentioning cardiac pacemaker, we can introduce the stories about the hackers' remote manipulation of cardiac pacemakers. On August 9, 2017, during Las Vegas Black Hat Security Conference, the information safety researcher Rios and Barths showed the possibility of damaging the cardiac pacemaker of certain famous manufacturer in real time. This is because that the software upgrading of cardiac pacemaker transmits through unprotected protocol, and the firmware itself is not protected by digital signature, which has made it possible for analyzers to write in malicious programs, and such program can manipulate the functions of the cardiac pacemaker, without being noticed by doctors, for instance, changing the times of heart beats. In this case, we focus on the professional spirits of the information safety researchers for actively revealing the potential risks of medical instruments and urge production enterprises to improve products. Sometimes, the potential risks of some "tiny" problems can directly endanger the life of

patients. In the face of life, we must hold a prudent and serious attitude, and this is also the professional quality that must be equipped for each employee of medical instrument industry.

For another example, when mentioning intravascular stent, we have introduced the report about the innovative product--Firehawk Stent of Shanghai Wicresoft cracking the medical "heart" difficulties that have been bothering the world for a long time. On September 3, 2018, the world's leading authoritative medical magazine--Lancet published the research result about the Firehawk Coronary Rapamycin Targeted Elution Stent System in the European large-scaled clinic tests in full text, and this research has cracked the major difficulties that have been bothering the world's cardiovascular intervention field for above 10 years. Since the foundation of Lancet, this was the first time when a Chinese medical instrument appeared over about 200 years, marking that Firehawk Stent has become the leader for the new standard of the world's new generation of heart stent industry. In this case, we have seen that domestic medical instrument has a brilliant performance on the international stage, and this has reinforced our sense of national pride and confidence; meanwhile, we have also noticed that this product is also a hard-won achievement, the R&D team finally succeeded after 15 years of concentrated research and development, so if you want to succeed, you shouldn't have fluky mentality, instead, you must work down to earth, and work hard.

As can be seen from the aforementioned three examples, with one "good" case, and the guidance of a "good" teacher, ideological and political education can be integrated into all corners of the course of Introduction to Medical Instrument, and then unconsciously influence students, and help them make comprehensive improvement.

## IV. CONCLUSION AND OUTLOOK

Ideological and political courses are innovations with rich connotation and foresight, it can integrate ideological and political education into professional courses, enrich the connotation of professional courses and dig out the value of education [6]. This paper is carried out through focusing on the ideological and political education for professional courses of biomedical engineering, and has elaborated the professional characteristics and the requirements of the professional quality of biomedical engineering, and put forward the necessity for biomedical engineering specialty to carry out the ideological and political course education. After that, it starts from teachers and courses specific to the professional basic course for biomedical engineering specialty of our school--Introduction to Medical Instrument Overview, introduced the specific approaches and requirements for the ideological and political reform of courses; according to the practice result in the near semester, this has not only replenished course contents, made the classroom atmosphere active, but also made students accept the professional education and ideological and political education, with good effect. Of course, in order to truly implement ideological and political courses into each professional course, except for teachers that must have unified thoughts, and actively improve their personal quality, there are also lots of teaching data (such as the textbook, teaching

materials, teaching plans and courseware) that must be updated or remade, so there is still a long way to go.

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