

Research on Curriculum Ideological and Political Education Towards Engineering Majored Foreign Students in the Teaching Class of Engineering Mechanics

Qi Wu^{1,a,*}

¹*Beijing University of Technology, Faculty of Materials and Manufacturing, 100124, Beijing*
a. qiwu@bjut.edu.cn

**corresponding author*

Abstract: At present, with the rapid development of science and technology in China and the continuous strengthening of international strategic cooperation, the number of undergraduate students from abroad is increasing year by year. It is increasingly important to carry out curriculum ideological and political education for foreign students and cultivate all-around friendly and patriotic foreign students. Taking engineering mechanics as an example, this paper explores the methods and means of organically integrating curriculum ideological and political education into the course in the process of engineering teaching. This paper analyzes in detail the role of teaching method design, teaching technology innovation, and ideological and political scheme selection in the curriculum ideological and political education of foreign students. This paper demonstrates the organic combination of engineering teaching and foreign students' ideological and political education and explores new methods of curriculum ideological and political education for foreign students in the future.

Keywords: undergraduate oversea-students; engineering mechanics; curriculum ideological and political education; teaching innovation; engineering cases

1. Introduction

With the continuous improvement of China's comprehensive national strength and scientific and technological level, as well as the implementation of the national strategies such as "the Belt and Road" and "the 21st century Maritime Silk Road", the number of overseas students in China is increasing day by day [1]. As a multi-disciplinary key university in Beijing, our university has attracted a large number of foreign students to study in China year by year in the direction of advantageous disciplines such as civil engineering, environmental energy, materials, information, and machinery. Cultivating foreign students with solid professional knowledge and ability and all-around correct values is our educational goal for the group of foreign students.

At the 2016 national conference on ideological and political work in colleges and universities, the general secretary Xi pointed out that "to make good use of the main channel of classroom teaching, ideological and political theory courses should be strengthened through improvement, enhance the affinity and pertinence of ideological and political education, meet the needs and expectations of students' growth and development, and other courses should keep a good channel and plant a good responsibility field so that all kinds of courses and ideological and political theory courses can go

hand in hand to form a synergistic effect" [2]. In this context, it is an important task for teachers of engineering courses to do a good job in ideological and political education for the special group of students who come to China while giving good professional knowledge [3]. The overseas students have a wide range of geographical sources and complex cultural backgrounds and have a stronger international influence after graduation and employment [4]. The basic goal of carrying out ideological and political education for overseas students is to promote the understanding of overseas students of China's development strategy and scientific progress, enhance the recognition of overseas students of China's policies, cultivate overseas students in a new era with the idea of friendship and love for China, cultivate potential international allies for China's long-term development in the future, and achieve the purpose of the united front [5].

At present, there are also a number of research institutions and universities in China that have conducted preliminary research on the professional education and ideological and political education of foreign students. Li [6] discussed the training and education of Myanmar overseas students in border universities from the perspective of talent training strategies and methods. The research suggests that domestic universities should expand the types and characteristics of their majors to adapt to the actual situation of foreign students. Formulate training policies according to the actual level, strengthen international services, and build an innovation practice base. Huang et al. [7] conducted research on the practical teaching of the courses for foreign students of traditional Chinese medicine in China. The author comprehensively and carefully studied the simulated innovation of foreign students' training from the aspects of online and offline mixed teaching, examination standard reform, ideological and political penetration of the curriculum, and clinical probation internship. The research results have effectively promoted the internationalization of Chinese medical universities' acupuncture and moxibustion education for foreign students. Guan et al. [8] conducted research on the professional practice of textile science courses for undergraduate students in China under the background of the "the Belt and Road". The results show that, in the limited class hours, a relatively new curriculum cognitive system should be established. Using multimedia and online virtual simulation teaching means, improving the learning effect of textile courses for foreign students, and finally forming a set of relatively mature practical theory teaching methods. Zhang et al. [9] explored the application of Ideological and political education in medical human anatomy courses to the group of foreign students in China. This article discusses the characteristics of the overseas students in China and the problems in the study of medical specialty in the new era. It has conducted in-depth research on the recognition of the core socialist values and friendship with China International Medical Talents involved in the course of human anatomy for foreign students, which has improved the effect of teaching and education.

At present, although there have been some preliminary studies on the education and training methods and curriculum ideological and political education of foreign students in China, there are few studies on the relevant educational innovation methods and curriculum ideological and political education for engineering courses, especially basic mechanics courses, which are highly theoretical. Therefore, this work is devoted to the study of ideological and political education and teaching method innovation for foreign students in the process of engineering teaching in general colleges and universities. Taking engineering mechanics as an example, this paper expounds on the educational exploration for the integrated development of professional curriculum teaching and curriculum ideology and politics of overseas students in China from the aspects of theoretical teaching improvement, innovative experimental mode, ideological and political case design, etc. Combined with the implementation effect and evaluation, this paper looks forward to the future improvement ideas and ideological and political development planning for the engineering class of foreign students. The results of this study can provide reference and guidance for the ideological and political education of engineering students in colleges and universities.

2. Overview of the Course and Overseas Students

Engineering mechanics in our university is a professional basic compulsory course for engineering undergraduates. It is offered in the second semester of the freshman year and the first semester of the sophomore year. The content is coherent and has a total of 80 class hours. The course mainly teaches the theoretical knowledge of statics and material mechanics, supplemented by 16 class hours of innovative experimental teaching, so it is a course combining theory with engineering practice. The annual average number of students in the university is about 300, of which overseas students account for about 5-10%.

The background of overseas students in this class is complex. For example, in 2021, the students came from Kenya, Grenada, Mauritius, Cambodia, and other countries. Their native mother tongue is very different. The level of Chinese listening, speaking, reading, and writing is generally not high. When they encounter professional vocabulary, they have more difficulties in learning. In addition, due to the impact of the COVID-19, a small number of students in the class are overseas and cannot teach offline. They must adopt the classroom teaching method of online and offline live broadcasting. For the offline innovation experiment, new learning and assessment methods are also required for online students. The cultural backgrounds of overseas students are diverse, and their understanding of China's socialist system is not deep enough before they come to study in China, which has brought some obstacles to the ideological and political education in the course. Table 1 lists the research on the academic situation of foreign students' classes in China in the fall semester of the 2020-2021 academic year. It can be seen that foreign students' learning situation is complex, their background is not unified, and there are many teaching obstacles. And in the classroom, it puts forward requirements for ideological and political education.

Table 1: Academic situation of the international students' class in the autumn semester 2020-2021

Nationality	Mother tongue	Basic self-assessment	Main difficulties	Self-assessment of ideological and political awareness
Grenada	English	high school, relatively general	formula derivation, Chinese professional vocabulary	50%
Vietnam	Vietnamese	high school, good study	abstract concepts, specific application scenarios	80%
Cambodia	Cambodian	university, average study	advanced mathematics, poor English.	40%
Mauritius	English	high school, good study	mathematics and physics, abstract concepts, professional vocabulary	40%
Kenya	English	high school, poor study	mathematics and physics, poor mechanical concept	30%

During the teaching process, it is found that most overseas students were born after 2000. The students' overall thinking is active, they prefer to speak, have strong interaction, and have good expression, which is a favorable condition for teaching and ideological and political education. This student group is good at using mobile network technology to expand learning channels. The vast majority of students will obtain the required problem solving and course interpretation through the

WeChat official account, video website, and other channels. While using the mobile Internet, the student union will receive a wider range of information, expand from point to area, and integrate more information.

To sum up, to carry out ideological and political education in engineering mechanics classes for overseas students, we need to overcome language difficulties, ideological differences, cultural difficulties, online and offline technical problems, and other factors. In terms of actual teaching methods and ideological and political programs, we need to explore breakthroughs and improve innovation.

3. Teaching Methods and Technological Innovation

3.1. Improving Teaching Methods and Enlightening Ideological and Political Elements

The teaching part of Engineering Mechanics covers a large number of knowledge points requiring formula derivation, which is relatively difficult. How to attract the attention of foreign students at the beginning and letting them take the initiative to learn this knowledge is extremely important, and it is also the key to the success of Ideological and political education. According to the characteristics of the course, comply with the cognitive law of students' normal thinking, skillfully design and display some mechanical causes, and gradually guide students to study knowledge points and find the answers to questions by themselves. In this way, teachers can further teach the course, which will be natural and greatly reduce students' resistance.

For example, when teaching the functional principle part, it is necessary to teach what is "elastic deformation", "plastic deformation" and "deformation energy and external force work". If the foreign students are taught only the mechanical definition and mathematical formula, it is difficult for them to understand. When I teach this part, I will play a 1-minute case video (high-speed camera shooting the impact deformation experiment of a tennis racket and car accident), to guide foreign students to deduce and understand the difference and connection of elastic-plastic deformation by observing two different deformation forms, and guess the corresponding mathematical description method by themselves. Finally, the teachers will correctly explain and analyze the relevant knowledge points to the students, which has significantly improved the overall teaching effect. And with this, the ideological and political elements of "self-breakthrough, self-innovation, and active learning" are imperceptibly taught to foreign students.

3.2. Innovating Teaching Technology and Promoting Ideological and Political Effect

For the practical problems of some foreign students living abroad. Share a large number of course videos and teaching materials with overseas students through cloud technology, and pull in the relationship between online students and students on campus. At the classroom teaching site, through high-definition camera technology, webcast technology, shared audio-visual and other technical means, students living abroad can seamlessly connect with students in the classroom. In the actual teaching, panoramic microphones are equipped on-site, which can switch the teaching center at home and abroad at any time. For example, the first half focuses on offline teaching in the school, and the second half is changed to online voice and video communication, so as to deeply understand the online students' puzzles and learning difficulties.

In view of the fact that some foreign students are unable to do experiments offline due to the impact of the epidemic, we have made full use of the scientific research advantages of the lecturer and introduced alternative content of computational simulation. Carry out computer numerical simulation experiment teaching for overseas online students across time zones. Provide rich cloud resource sharing (software, computing examples), as well as campus supercomputing, large workstation remote support, and provide online technical assistance. Let students understand that computational

simulation is another effective way to learn and investigate the knowledge of engineering mechanics. This measure, while teaching engineering mechanics, conveys to students the important ideological and political element of the dialectical thinking mode of mechanics learning, that is, the research means of theoretical analysis and numerical simulation.

3.3. Project Integration Helps Ideological and Political Sublimation

The course of Engineering Mechanics can be connected with many major projects in China, especially mechanical problems and difficult mechanical problems, such as the construction of the Hong Kong-Zhuhai-Macao Bridge, the research and development of new high-speed EMUs, the Three Gorges project, intelligent robots, the lunar exploration project, the China space station, large rockets, manned deep submersibles, "Tianwen" detector, Beidou navigation system, etc. During the course introduction and innovation experiment introduction, the above major engineering cases in China can be naturally introduced to students, and the key technologies used can also find knowledge points from our courses. Based on these cases, some important "Ideological and political" elements related to this course - "major projects, international strategies, institutional confidence, and realistic struggle" can be naturally introduced. According to the characteristics of foreign students' teaching, we can also appropriately reduce the length of theoretical teaching, increase the video introduction of major engineering cases in English and other innovative means, and raise the ideological and political level of foreign students' courses to a new level.

For the part of innovation experiment, in the beginning, foreign students often want to directly select common objects in life for the electrical measurement experiment, which saves time and effort and ensures the relative reliability of structural parts. But this will reduce students' practical ability and experiment design ability, and also lack practical significance, which is unfavorable to ideological and political education. Therefore, in the innovation experiment teaching part, the experiment content has been reformed and innovated. The basic principles are not too difficult and complex (feasibility), not too simple (innovation), and not too routine (practicality). Students are encouraged to make "miniature models" of major projects in China for experiments, and an innovative four-step teaching method with the core steps of "opening report - opening defense - actual experiment - examination and acceptance" is developed. This innovative content has greatly improved teaching efficiency and quality.

In terms of the content of the innovative experiment, it broke through the traditional model of the offline hands-on experiment, and simultaneously carried out the alternative finite element simulation analysis of engineering structural parts. This is organically combined with the deep and solid finite element numerical simulation strength of the research group, highlighting the team characteristics of the perfect integration of scientific research and teaching, and also well adapted to the educational goal of all-around training of talents and the actual needs of online teaching. Based on the above, the organic combination and introduction of engineering cases have sublimated the acceptance and educational effect of overseas students' Ideological and political education.

4. Ideological and Political Effects of Foreign Students' Courses

Through the above-mentioned teaching reform and innovation around the course of Ideological and political education, and the gradual exploration and development, the ideological and political education method suitable for the learning characteristics of overseas students in our university has been formed, and good teaching results have been achieved. The average score of international students in the 2020 and 2021 academic years is more than 84 points, with an excellent rate of about 20%, and there is no failure. Students' evaluation of teaching is above good. During the COVID-19, online courses were widely carried out to fully cover all students. Students obtained online resources

through different channels and actively exchanged and discussed them online. The teaching effect was almost the same as that of pure offline, ensuring the teaching quality of online teaching and improving the ideological and political education level of the course.

Through the way of a sampling questionnaire survey, the international students in engineering mechanics class were investigated. The students all said that this course was an excellent practical learning experience; It expresses its recognition of China's science and technology and engineering development, as well as China's development policies and strategies; Other students said that through the study of this course, they broadened their thinking, deepened their understanding of mechanics, and played a good role in Ideological and political education. The after-school survey results of students in the fall semester of 2020-2021 and 2021-2022 academic years are shown in Table 2. It can be seen from the survey data on education effect in the table that, after various measures, the learning content and ideological and political education of overseas students in China are very good. For the learning of course knowledge, the self-assessment is good or above, reaching 100%. In terms of understanding China's scientific and Technological Development and strategic planning, the self-assessment above good also reached an average of more than 90%. This shows that the overall effect of Ideological and political education is good.

Table 2: Questionnaire survey on after class situation of international students in 2020-2021 and 2021-2022 academic years

Educational effect	Comprehensive grasp	Good understanding	General condition	Learning hard
The theoretical derivation is tedious chapters and knowledge points with a strict logical relationship	20%	66.7%	13.3%	0%
Application in national major equipment and cutting-edge science and technology	53.3%	46.7%	0%	0%
The connection between an innovative experiment and practical application, and the foundation of an innovative experiment	33.3%	66.7%	0%	0%
China's socialist core values	40%	60%	0%	0%
Strategic planning and international policies for China to become a strong country in science and technology and talent	80%	6.7%	13.3%	0%
The combination of China's major engineering planning, science and technology development planning, and engineering mechanics	66.7%	26.7%	6.7%	0%

5. Conclusions

This paper analyzes the methods and effects of ideological and political education in the course of Engineering Mechanics for foreign students in the author's college. It demonstrates the feasibility of improving the ideological and political education of overseas students by means of innovation in engineering teaching methods and means. For the ideological and political education of engineering international students in the new era in the future, we should solidly promote the improvement of bilingual teaching effect, the display and exchange of major engineering cases in China, the transmission of scientific research thinking methods, further enhance the integration of Ideological and political elements with the classroom, and realize the all-round ability and value training of international students in China.

Acknowledgement

The author would like to thank the support from (school allocated) special construction funds for ideological and political theory courses-Faculty of Materials and Manufacturing with project No. 048000513106.

References

- [1] Yan LX, Xue GW, Duan RJ. Achievements and development trend of "the Belt and Road" higher education. *Theory Observe*, 2021, 1: 164–167.
- [2] Dong HL, Zhao AN, Zhang S, et al. Making colleges and universities a strong position to uphold the leadership of the party. *People's Daily*, 2016-12-11.
- [3] Gao DY, Zong AD. From ideological and political courses to curriculum ideological and Political Education: constructing the curriculum system of Ideological and political education in colleges and universities from a strategic height. *China Higher Education*, 2017, 1: 43–46.
- [4] Qiao X. Research on ideological and political education for overseas students in Colleges and Universities. *University*, 2021, 48: 50–52.
- [5] Li RT, Zhao J, Deng S, et al. Ideological and political exploration of Engineering overseas students' courses in China in the new era -- Taking the energy and powerful discipline of Tianjin University as an example. *Journal of Higher Education*, 2020, 23: 10–12+15.
- [6] Li CY. A study on the Countermeasures of the frontier colleges and universities to train overseas students in Myanmar. *Theory Observe*, 2020, 2: 157–159.
- [7] Huang ST, Huang Y, Qu SS, et al. Teaching practice of acupuncture and moxibustion experiment course for MBBS international students in China. *The Journal of Medical Theory and Practice*, 34(21): 3849–3851.
- [8] Guan XN, Lin Q, Chen WJ, et al. Exploration and practice of textile experiment course for international student under the background of "Belt and Road". *Research and Exploration in Laboratory*, 2021, 40(8): 199–202+269.
- [9] Zhang SQ, Li L, Wang LL, et al. Innovation and practice of Ideological and political education in the course of human anatomy for Chinese medical students in the new era. *Anatomy Research*, 2021, 43(4): 379–382.