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Research on the Teaching Reform of the Ideological and Political System of Engineering Courses in Sino Foreign Cooperative Education

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Abstract: *Taking the cooperative project between Northeast Forestry University and Auckland University in New Zealand as an example, this paper studies the reform strategy of the ideological and political education of engineering courses under the mode of Sino foreign cooperation in running schools, drawing on the international advanced teaching ideas and management experience. This paper will put forward specific measures in the aspects of teaching concept, teaching resources, teaching staff and textbook development, in order to explore the effective methods to further improve the teaching quality of engineering ideological and political course teaching content in the Sino foreign cooperative school running project.*

Keywords: *Sino foreign cooperation in running schools; Curriculum ideological and political education; Engineering teaching; Teaching reform*

1. Introduction

With the deepening of globalization, the public's demand for excellent foreign educational resources continues to grow, and the pace of internationalization in the field of education is accelerating. Using the platform of global education, Chinese educational institutions have been working with overseas higher education institutions since the 1990s. Cooperation, targeted introduction of international high-quality educational resources, aiming to improve the level of domestic higher education. So far, the number of undergraduate and above students in the Sino-foreign cooperative education projects registered by the Ministry of Education has exceeded 450,000. Chinese teachers generally have international education experience and incorporate many world-class curriculum elements into their teaching. In addition, Sino-foreign cooperative education projects effectively meet the learning needs of students who cannot study abroad for various reasons.

Due to the particularity of engineering courses [1], the three dimensions of teaching system, teaching model and education mechanism need to be considered in the teaching process. In engineering teaching, while integrating the concept of cultivating morality and cultivating people into all aspects of education, it is necessary to emphasize the integration and pertinence of ideological and political courses, and adopt inquiry-based teaching, network-based teaching and practical teaching that are consistent with engineering courses. The principles and strategies of the ideological and political system affect the high-quality completion of engineering teaching and the further improvement of the teaching system, and have important practical significance.

This paper takes the engineering courses of the Sino-Singapore (Auckland University) cooperative education project of Northeast Forestry University Olin College as the object, takes the ideological and political education of courses as the research core, follows the principle of all-round education, integrates the four aspects of "teaching philosophy, teaching resources, teaching staff, and textbook construction" curriculum construction strategies, and draws on domestic education management experience, aiming to strengthen college students' engineering technical capabilities. The research goal is to improve the quality of engineering education in Sino-foreign cooperative education, and provide reference for the construction and practice of the ideological and political education system of engineering courses.

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2. Background of current research on engineering teaching in Sino-foreign cooperative education projects

Ideological and political education needs to be combined with specific majors. Regarding the teaching methods of engineering in Sino-foreign cooperative education, domestic researchers have achieved some results in this field. Chai Yan et al. [2] carried out the unique engineering teaching of "mortise and tenon Luban lock" to cultivate undergraduate students to enhance their engineering-related abilities while deepening their understanding of the superiority of Chinese cultural traditions and achieving unity of knowledge and action in practice. Li Qiyue [3] combined the advantages of German manufacturing industry with the major of mechanical manufacturing and automation and proposed to comprehensively improve the practical ability of undergraduate students in applied universities. Zhang Ningguang [4] proposed to increase the teaching of engineering English in new engineering disciplines, so that while integrating the learned technical knowledge, it can be better applied to engineering and technical work, making good use of Chinese technology and telling Chinese stories. Fang Ziyan [5] et al. conducted an in-depth analysis of the optimization space of mechanical education in Sino-foreign cooperative education. It was concluded that the curriculum arrangement should be strengthened, the admission threshold should be raised, and the enhancement plan of teacher resources should be optimized. Yang Jianfeng [6] et al. discussed the content and practice of bilingual teaching of mechanical design in Sino-foreign cooperative education between Suzhou University of Science and Technology and the University of South Wales in the United Kingdom. They believed that teaching progress can be effectively promoted through teaching interaction, flipped classroom, diversified assessment, progressive teaching and teaching website construction. Guo Wen [7] et al. took the mechanical and electronic engineering major of Xi'an Aeronautical University as an example and believed that the current Sino-foreign cooperative education in engineering has problems such as unclear talent training goals, low scientificity and rationality of the curriculum system, and the need to further complete the teaching quality evaluation system. Wang Hongxin [8] et al. focused on the current situation of Sino-foreign cooperative education in mechanical majors, found the difficulties in the teaching process, combined with the source of students, teachers and training models, and clarified the training goals and key elements of undergraduate students in the teaching process of Sino-foreign cooperative education in engineering. Yang Jianfeng [9] proposed that the teaching of professional English in engineering should solve current practical problems. For example, the professional English part of courses such as "Basics of Control Theory", "Basics of Testing Technology", "Electrical and Electronic Engineering", and " ANSYS Finite Element Analysis" should be appropriately added. Zhao Shitian et al. [10] believe that the application of engineering project training and practical teaching should be strengthened in Sino-foreign cooperative education in engineering, so as to comprehensively train and improve students' quality and ability. In the process of ideological and political teaching in engineering education, students' ideological work should be done in advance to adapt to the ideological impact brought about by the changes in teaching modes of foreign teachers and the differences between Chinese and foreign teaching modes.

3. Difficulties in the ideological and political construction of engineering courses in Sino-foreign cooperative education

3.1. Engineering course teaching has not kept pace with the times

Educational philosophy constitutes the core foundation of university operations, which is gradually accumulated and formed in the long historical process. In the context of Sino-foreign cooperative education, there are significant differences in teaching philosophy between Chinese engineering courses and foreign core courses, which are mainly reflected in teaching methods and evaluation systems.

In terms of teaching methods, all engineering courses in the Sino-Singapore (Auckland University) cooperation class of Northeast Forestry University Olin College adopt the form of large-class teaching, which makes it difficult for every student to participate in classroom discussions. On the other hand, the core courses of foreign countries generally adopt the small-class teaching mode. In the classroom, foreign teachers encourage students to discuss in groups and form personal opinions through heuristic teaching, and welcome students to question the views of foreign teachers and other classmates.

In terms of the evaluation system, the final grades of engineering courses in China follow a ratio of 60% final exams, 30% regular grades, and 10% interim exams. Obviously, exam scores are the main criterion for evaluating student performance. Foreign courses emphasize the diversity of assessments, reduce reliance on written test scores, and attach importance to attendance, classroom discussions, group

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cooperation results, regular quizzes, and paper writing, which requires students to devote themselves to the entire learning process. In general, foreign education emphasizes the cultivation of students' independent thinking, critical thinking, and practical innovation capabilities. These educational contents and methods actually assume the role of ideological and political education; while Chinese engineering courses focus on the teaching of exam knowledge points, which is somewhat different from the educational goals of ideological and political education.

3.2. Serious shortage of ideological and political resources in engineering courses

According to the guidelines of the Ministry of Education, the standards that must be strictly followed in Sino-foreign cooperative education agreements include: the number of foreign courses introduced, the number of professional core courses, the number of hours taught by foreign teachers, and the number of professional core courses taught by foreign teachers, each of which should account for at least one-third of the total teaching volume. In the process of introducing teaching resources, intangible assets such as engineering education concepts and talent training philosophies are difficult to be effectively introduced, although these are the truly excellent parts of foreign engineering education. At present, international engineering schools mainly rely on teaching resources provided by the Chinese side, while foreign contributions are relatively small. The engineering courses responsible for the Chinese side focus more on the teaching of basic knowledge and examination skills, while the content of ideological and political education has been reduced from the original comprehensive coverage to the current few. The main reason for this change is that China's engineering ideological and political education focuses too much on " hard indoctrination " and lacks "equal and gentle guidance", which not only fails to inspire the resonance of students in Sino-foreign cooperative classes, but may instead trigger a fierce conflict between Chinese and foreign educational concepts, resulting in the embarrassing situation of "more is better than less, and less is better than no" in the content of ideological and political education in Sino-foreign cooperative education.

3.3. The ideological and political team of engineering courses is not perfect

At present, four engineering courses in four different semesters at the Northeast Forestry University's Olin College are taught by foreign teachers from the University of Auckland for one to two weeks, and then continued by Chinese teachers in English. These Chinese engineering teachers belong to different colleges in the school. There is not much communication between teachers, and the inheritance and mutual assistance of teaching have not been fully utilized, so an effective teaching team cannot be formed. Due to the lack of management and supervision of foreign teachers by China, foreign teachers still have significant problems in teaching effectiveness, teacher-student interaction, and cooperation between Chinese and foreign teachers. In addition, it is not realistic to let foreign teachers take on the teaching tasks of some ideological and political courses, because foreign teachers teach in full English, which is very difficult for Chinese students who are mostly newly enrolled and have limited English proficiency to understand the ideological and political content. However, building a complete ideological and political teaching system that meets the training goals of Sino-foreign cooperation with only two Chinese teachers also faces many challenges, because ideological and political courses require teachers to invest a lot of time in preparation, and for students in Sino-foreign cooperative classes, it is difficult to grasp the scale of teaching ideological and political content.

3.4. Engineering instruments and equipment are seriously outdated

For the core courses of some engineering majors, our school has introduced foreign original engineering textbooks and supporting teaching PPTs, videos, etc., which is conducive to the students of the cooperative class to learn foreign original engineering technical knowledge and lay a solid foundation for students to study abroad. However, in terms of engineering instruments and equipment, the equipment used by the Sino-foreign classes is either self-prepared equipment on campus or international general equipment provided by foreign parties. Whether these equipments can meet the needs of foreign professional courses is still in the formal review stage. The advantage of the self-prepared equipment on campus is that students can operate it skillfully, and the disadvantage is that some students think that the equipment has a single function and is backward, which is inconsistent with the concept of "advanced technology" advocated in Sino-foreign cooperative teaching. The advantage of international general equipment is that it is powerful and forward-looking, and students can more easily master new technologies. The disadvantage is that sometimes students are afraid of using the equipment because of the complicated operation. However, how to equip engineering equipment suitable for Sino-foreign

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cooperative projects and with advanced technology is a difficult problem, and this work has not yet been carried out.

4. The model of ideological and political teaching reform in Sino-foreign cooperative education courses

4.1. Reform of the main body of engineering teaching

Taking our school as an example, when seeking teaching concepts that suit their own characteristics in Sino-foreign cooperative projects, higher education institutions should take into account the actual situation of the country and the historical development trajectory of the school, and avoid indiscriminately copying the educational concepts and teaching models of foreign cooperative institutions. Regarding the study of engineering courses in cooperative classes, although the form of large-class teaching may be difficult to adjust in the short term, we can explore cooperative learning methods based on project teams. The key points and difficulties in engineering courses are subdivided into multiple parts and assigned to the project team leader in the form of tasks. Team members participate in discussions and complete the established tasks according to the guidance of the leader, so as to stimulate students' independent learning ability and let them feel the joy of being valued and recognized.

In terms of the evaluation mechanism, the assessment of engineering courses should include both hard and soft assessments to adapt to different educational goals. Hard assessments are mainly applicable to students who need written test scores or face the pressure of further study. The subject scores are determined by the weighted average of the final exam and the usual scores. Soft assessments are more suitable for students who pursue open learning. The goal of engineering courses is to use them as a tool for innovation. For example, Internet+, entrepreneurship and innovation competitions, engineering papers, and writing patents can all be regarded as manifestations of innovation, and the corresponding assessment scores are assessed accordingly. With the changes of the times, the recognition standards of the value system will also be updated, which is also a manifestation of the ideological and political education system in practice.

4.2. Reform of Engineering Teaching Resources

In the cooperative teaching mode of engineering courses, for students participating in cooperative classes, obtaining rich and high-quality teaching resources is an important means to improve their competitiveness. These resources include advanced teaching and experimental methods, stable school-enterprise cooperation projects, high-quality resources of partner institutions, and experienced Chinese engineering course ideological and political teachers. Specifically, in terms of teaching methods, information technology can be used to combine engineering theory teaching with practical teaching through specific cases to help students understand and master engineering knowledge more deeply. In addition, teachers can also use multimedia tools (such as pictures, sounds, and animations) to explain course content, which can not only enhance the interactivity and fun of the classroom, but also stimulate students' interest in learning. Case analysis and multimedia teaching can make students realize that course ideological and political education is closely related to everyone and is closely connected with actual engineering, thereby prompting them to be more actively involved in learning. In terms of school-enterprise cooperation projects, on the one hand, students can participate in actual engineering projects; on the other hand, schools and enterprises can, on the basis of establishing a long-term and stable cooperative relationship, recommend outstanding graduates or interns to participate in enterprise projects in a timely manner according to enterprise needs to achieve cross-border integration. At the same time, foreign engineering teachers should be encouraged to hold academic lectures or small seminars, and they should be invited to China as much as possible for face-to-face exchanges and sharing of the latest research results, so as to strengthen the teaching and scientific research cooperation between Chinese and foreign teachers. In addition, we should take the initiative to communicate with foreign partner universities and strive to share their excellent online teaching resources to improve the weak ideological and political teaching system in China.

4.3. Reform of Engineering Teaching Resources

In the teaching practice of engineering students, the implicit ideological and political education of students in cooperative classes places high demands on the professional skills of teachers. First, teachers must be fully prepared before class, carefully select appropriate engineering cases, projects, and group

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discussion topics, and design situations that can stimulate students' learning interest and participation. For post-00 students, activities such as role-playing are very attractive, and these activities require teachers to make detailed plans before class to avoid problems such as discussion deviating from the topic, inactive classroom interaction, or out-of-control of the scene. Secondly, engineering teachers need to have strong classroom management skills and set clear rules in advance for students' discussion and speaking time, content direction, etc. Finally, engineering classrooms urgently need a willing ideological and political teaching team. These teachers should adopt interactive rather than traditional one-way narrative teaching methods, promote active communication between teachers and students and between students, and pay attention to the growth of every student in the classroom. This is the key to determining whether ideological and political education can succeed in the future.

4.4. Reform of English textbooks for engineering majors

Engineering teachers in Sino-foreign cooperatively-run schools should make appropriate revisions and improvements to the current engineering English textbooks to better meet the actual needs of domestic engineering. Considering that the English level of students in cooperative classes may not be enough to fully understand the textbooks, developing a set of bilingual learning manuals for engineering that integrates self-compiled materials in the school is a practical strategy. In particular, the manual should include some engineering examples and ideological and political content that reflect Chinese characteristics, so as to cultivate students' engineering enthusiasm and practical operation ability.

5. Conclusions

Taking the cooperative education project between Northeast Forestry University and the University of Auckland in New Zealand as an example, this paper deeply explores the reform strategy of the ideological and political system of engineering courses under the Sino-foreign cooperative education model. Through the analysis of teaching concepts, teaching resources, teaching staff and textbook development, this paper reveals the difficulties in the construction of ideological and political courses in engineering courses in the current Sino-foreign cooperative education, and proposes a corresponding reform model. In the future, Sino-foreign cooperative education projects should continue to deepen the reform of ideological and political courses, integrate the concept of moral education into all aspects of engineering teaching, explore more effective teaching methods, and improve students' comprehensive quality and innovation ability. At the same time, it is also necessary to strengthen exchanges and cooperation between Chinese and foreign teachers, jointly build a more complete ideological and political system of engineering courses, and contribute to the cultivation of all-round socialist engineering college students.

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