

Research and Practice on the Construction of Undergraduate Class Platforms under the Training Needs of "Chief Engineer Type" Talents



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Abstract: This study is based on the construction of a education system with "moral education first, five education integration". It aims at the training requirements of "chief engineer type" talents at Northwestern Polytechnical University, and summarizes the previous teaching practice work experience and student management service work experience. On the basis of analyzing the specific problems faced by the construction of undergraduate classes in universities and the difficulties that may arise in the process of integrating the five educations, more targeted work ideas are condensed in this research. This study focuses on the basic organizational unit of university classes, with taking a basic class of the School of Power and Energy as the specific work object, to carry out the construction of a class level "moral education first, five education integration" platform, as well as to explore the practical cultivation of "chief teacher type" talents. This study enables students to become discoverers, participants, and promoters of innovative activities, thereby becoming beneficiaries of the cultivation of "chief engineer type" talents, enabling the research results to truly promote class construction.

Keywords: Education system, undergraduate classes, talent cultivation, "chief engineer type" talents, practical exploration

University is a key link in the life of young people. Young students must forge good character, enrich good knowledge, learn to be adults, and become talents on the university platform, so as to lay a solid foundation for entering the society and shouldering heavy responsibilities. Only in this way can we realize the hopes and expectations of the country for young people.

1. Background of the proposal for the cultivation of chief teacher type talents

The 2018 National Education Conference of China have issued the "Opinions on Deepening Education and Teaching Reform and Comprehensively Improving the Quality of

Compulsory Education", which proposes a guiding document for China to deepen education and teaching reform and comprehensively improve the quality of talent cultivation in the new era. The construction of a "moral education first, five education integration" education system has become an inevitable choice to complete the fundamental task of higher education education in the new era, and is a major theoretical and practical issue facing the current reform and development of universities. Academician Li YR of Northwestern Polytechnical University, emphasized in an interview with China Science Daily that: the so-called 'chief engineer' can be understood as a technology leader who not only has strong personal scientific research capabilities, but also has a certain international perspective and strategic height, more importantly, he also has appropriate organizational capabilities (Chen

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& Wen, 2023). It reveals the high degree of compatibility between the requirements for cultivating chief engineer talents and the national talent demand.

Undergraduate classes are the basic organizational form of school education and teaching activities. It also provides a place for students to learn, engage in activities, and live together, as well as an organizational carrier for teachers to influence and manage students. The Central Document No.16 clearly states that efforts should be made to strengthen the collective construction of classes, which will organize and carry out diverse themed class meetings and other activities, and play the role of uniting students, organizing students, and educating students. Therefore, as the basic organizational unit of the university, undergraduate classes play an important role in student behavior management, strength organization, psychological belonging, motivation stimulation, and personality cultivation. Especially in the education system that prioritizes moral education and integrates the five aspects of education, both the teaching and management systems cannot be separated from the key link of undergraduate classes. The role of the class directly affects the ultimate effect of educational practice reform. In the just concluded 2023 academician selection, alumni of the School of Power and Energy at Northwestern Polytechnical University, Liu YQ and Zhu JQ, were successfully selected. The two were classmates and lived in the same dormitory, which also confirms the important role of undergraduate classes in the cultivation of chief engineer talents.

2. The problems in current undergraduate class construction under the training needs of "chief engineer Type" talents

In recent years, some universities have also conducted exploration and practical research on the role of undergraduate classes in talent cultivation. Among them, the most representative ones are: The School of Animal Science at Zhejiang University has explored systems such as themed class meetings and class teacher meetings to address the issues that arise under the credit system and general category training model (Chen , 2014). A class at Xi'an University of Architecture and Technology has introduced a goal

management model in the work of counselors to promote the healthy development of the class(He, 2017). Sun, (2022) and Huang, (2022) conducted research on the problems and solutions in the construction of cohesion in university classes, emphasizing the importance of selecting students with appeal to form a class student cadre team. Wang JF et al. Golden & Liu, (2021) explored the class construction management method of "enterprise class teacher + point system" at Gansu Agricultural University, and proposed several ideas such as the characteristics of class management, detailed strategies, methods of point recording, and organizational guarantees. Jin JY et al. studied the role and work strategies of university class committees in class self-management, but they have not completely deviated from the cognitive scope of traditional class management models. Huang et al., (2022) focused on the phenomenon of "marginalized individuals" in classes at Shaanxi Normal University, and analyzed the phenomenon from the perspective of interactive ritual chains, emphasizing the importance of classroom educational situations and emotional atmosphere. Huang et al., (2022) analyzed the reform prospects of the university class teaching system in the era of digitalization, networking, and intelligence in Education 4.0. They pointed out that only by constructing and improving the learning service system can a long-term mechanism for education quality be achieved, and at the same time, creating a ubiquitous class learning environment and constructing a personalized learning space for classes can ensure educational effectiveness. From the literature review results, it can be seen that most of the above studies have remained at the level of exploration and imagination, with little practical implementation on the front line of undergraduate classes. Moreover, the research content is far from meeting the requirements of the "moral education first, five education integration" education system, which is difficult to meet the practical needs of undergraduate class level education reform and development in current universities, especially in terms of supporting strategies and specific measures for cultivating chief engineer talents.

3. The method and approach of construction of undergraduate class platforms to meet the

training needs of "chief engineer type" talents

In this context, the author takes a basic class in the School of Power and Energy at Northwestern Polytechnical University as the specific work object, closely adhering to the characteristics of "chief engineer type" talent cultivation, firmly rooted in the fertile soil of the aviation engine industry that closely related to the college's profession, and carrying out specific practices with "Professional belief cultivation", "Basic academic improvement", "Innovative thinking exercise", "Developing healthy habits", and "Strengthening social practice" as the basic elements.

3.1 The method and approach of "Professional belief cultivation"

It is important to tell a good story about School of Power and Energy and tie the professional plot firmly. The development history of the college will be explained to undergraduate students through the form of education on the history and situation of the college, as well as to provide them with professional interpretations and industry development introductions. By focusing on industry hotspots, promoting innovative development, actively mobilizing students' interest in professional knowledge, stimulating their motivation to learn in professional fields, the students will be guided to establish lofty aspirations for the aviation engine industry, and cultivating and reserving future scientific and technological talents for the aviation engine industry.

It is important to create an atmosphere of pride in professionalism and promote the spirit of serving the country through aviation development. Full use of the advantages of the new media platform should be made in promotional activities. By taking the college's "Dong Li Yin Hang" official account as the main position, more efforts should be made in deeply digging, recording, sorting out, displaying and publicizing the touching stories of the older generation of activists participating in the college construction. More work should be done to focus on promoting outstanding teachers with noble moral character, rigorous academic research, and dedicated education in the college. It will set an example for outstanding students of School of Power and Energy, and inheriting the red genes of aviation for the country.

It is important to combine "inviting in" and "going out" to plan a strategic layout for employment in the internal combustion engine and aviation engine industry. Chief engineer and outstanding alumni of the Aero Engine series will be invited to enter the campus to share the struggles and true insights of the older generation of Aero Engine personnel, so as to deeply instill the spirit of dedicating oneself to national defense in people's hearts. Visits and exchanges will be arranged in-depth with internal combustion engine and aviation engine institutions and factories. Experience of national defense characteristic culture and frontline struggle sentiment on the spot will be accepted in the visits and exchanges. It promote students to move towards the main battlefield of internal combustion engine and aviation engine industry.

3.2 The method and approach of "Basic academic improvement"

It is important to respect the subject learning status of students. Focusing on meeting the growth needs of students, multi-dimensional education guidance is carried out to widely mobilize their learning enthusiasm, maximize their subjective initiative, establish correct learning goals, form a positive learning attitude, improve the level of learning atmosphere construction, and lay a solid academic foundation.

It is important to find the functional positioning and mission tasks of class teachers in the new pattern of talent cultivation. the new concept of talent cultivation will be integrated into all fields and processes of class work, as well as to build a grade and class work platform with the class teacher as the main body that resonates and cooperates with the same frequency to cultivate students.

It is important to strengthen the construction of class organization and consolidate the work functions of student backbone at all levels. Guidance and Professional training will be strengthened for college student leaders. A proactive and competent multi-level college student leader group will be organized to form a solid frontline academic stabilizer.

3.3 The method and approach of "Innovative thinking exercise"

It is important to make full use of the resources of peers and build a platform for communication and

exchanges between undergraduate and graduate student. Full play of the guiding role should be given to the outstanding graduate students in the college. It will achieve positive motivation in students' personal professional direction selection and graduate application, and encourage students who have spare energy to carry out graduate professional courses in advance.

It is important to deeply explore the innovative potential of the power system energy-saving and emission reduction innovation practice base established by School of Power and Energy. Proactive measures will be taken to actively promote students to participate in various domestic and international science and technology competitions. It is helpful to enhance the organizing, guiding, and coordinating abilities of the class in science and technology competitions, and achieve a win-win effect of promoting student abilities and producing competition results.

It is important to build a cooperation platform between the class, research institutes, and enterprises. Teaching and education should be guided based on actual scientific research needs. Students will be encouraged to enter research groups and laboratories early, leverage the research team's educational function. It will enable them to exercise their research thinking, cultivate innovation awareness, and improve their innovation ability in specific research tasks.

3.4 The method and approach of "Developing healthy habits"

It is important to innovate labor education methods. Based on the historical museum and engine exhibition room, a new model of combining professional learning and labor practice will be explored, which can integrate labor practice education into the process of professional knowledge education. The key labor practice points, such as dormitories, will play full role to promote grassroots labor practice. It will encourage more outstanding students to actively serve society, and deepen their understanding of grassroots work.

It is important to strengthen the organizational leadership and overall planning of aesthetic education work. The promotion of aesthetic education and the popularization of aesthetic knowledge will be actively promoted. It highlights

the multi angle display of beauty in art, environment, labor, craftsmanship, etc., which bases on artistic practice and innovative activities such as calligraphy, literature, art, and music appreciation. It assists students in mastering necessary basic knowledge and skills, leverage the psychological counseling and educational role of aesthetic education, and make it an effective tool to alleviate students' psychological problems.

It is important to improve the coordination and supervision mechanism for sports activities among college students, and integrate sports education into the college's education system in a reasonable and orderly manner. From the perspective of class group health, it is necessary to adopt positive measures to promote the implementation of popular and interest oriented sports activities. At the same time, the sports skills needs of college students will be taken into account and specialized sports competitions will be carried out. It is an effective approach to meet their physical fitness needs, enhance their competitive skills, and strengthen their spirit of hard work.

3.5 The method and approach of "Strengthening social practice"

It is important to strengthen international exchange and cooperation. Based on the professional characteristics of the class, information on international exchange and cooperation will be summarized and organized. It can promote policy promotion and interpretation, expand students' international perspectives, stimulate their enthusiasm for international exchange and participation, and play a demonstrative and leading role in project guidance and resource allocation. More efforts should be made in exploring ways to cultivate talents through joint training both domestically and internationally, and increasing the depth of international exchanges and cooperation.

It is important to actively leverage professional characteristics. Combining student clubs to enrich social practice forms is helpful for carrying out diversified practical activities. It enables students to combine social practice with understanding the national conditions and serving society. Through effective social services, grow in practice, comprehensively improve and perfect one's own qualities. It will Provide opportunities for students to grow in practice, comprehensively improve and

perfect their own qualities through effective social services.

It is important to carry out the cultivation of students' competitiveness in employment. This helps to enhance the ability of cultivating students to have a correct understanding of themselves, evaluate themselves, and highlight themselves. On the basis of students adjusting their employment mentality and establishing a correct learning perspective, students can timely benchmark their personal conditions against employment needs, strengthen their spirit of innovation and entrepreneurship, and effectively improve their core competitiveness.

4. Comparison with exploratory practices in other universities

Shandong University conducted research on the construction of characteristic undergraduate classes (Yu & Jia, 2012). They analyzed the connotation and characteristics of characteristic classes, summarized the models, existing problems, and related solutions of characteristic classes. Comparing with the present study, their research did not focus on mass undergraduate classes, but instead focused on professional development oriented classes, second degree oriented classes, joint training oriented classes. They proposed that the construction of characteristic classes should focus on innovating work concepts, optimizing characteristic curriculum systems, transforming classroom forms, and strengthening teacher team building, without conducting in-depth research on class construction itself.

Northeast Agricultural University had explored and practiced the construction of first-class undergraduate education (Ma et al., 2018). They analyzed the problems and challenges faced by universities in undergraduate education in terms of educational philosophy, professional settings, talent cultivation mechanisms, classroom teaching, and teacher investment. They proposed the ideas, goals, and construction plans for implementing the 2.0 version of outstanding talent cultivation, building a first-class experimental teaching demonstration center, promoting classroom teaching revolution, and building a first-class teaching team for the construction of first-class undergraduate programs. Comparing with the present study, They also

overlooked the important frontline of undergraduate class construction.

Huazhong University of Science and Technology had launched a practical exploration of strengthening undergraduate class construction in the new era (Wang, 2019). They had implemented the "Class Growth Project", aiming to explore an environment for students to learn and grow independently using the class as a carrier. They established a practical education system of "two constructions and two collaborations", and achieved good educational results. Their research formed a work system and long-term mechanism for class growth, which not only utilizes high-quality resources of the school to stimulate students' endogenous motivation for comprehensive development, but also fully leverages the self-education, self-management, and self-service roles of class students. This study is similar to the present study which focus on the undergraduate class construction, but the cultivation of chief engineer talents is not covered in the research, when for Northwestern Polytechnical University, this is an important talent cultivation requirement.

Summary

This study combines the undergraduate training requirements in the "127" target of Northwestern Polytechnical University, and strives to establish a more refined and targeted undergraduate class management service model through practical exploration. A class "brand" construction platform with the homeroom teacher as the main responsible person, college guidance, homeroom teacher coordination, class committee organization, and class participation is created. It forms a multi-dimensional collaborative team for student management services, education and teaching, and student independent participation. Further coordination of the resources of the college is made to support class construction. Adhering to the characteristics of cultivating "chief engineer type" talents, specific practical activities such as optimizing class management organization, condensing cultural themes are completed, which creating distinctive activities from three dimensions: system construction, activity implementation, and result condensation. This practical exploration has achieved the goal of coming from the class and going

to the class, as well as making class members truly beneficiaries. It makes a regular class become a class with good class spirit, excellent academic performance, and strong execution by the class committee.

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Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

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