



Exploration of The Path of Integrating Ideological and Political Education into Competency-oriented Undergraduate Graduation Design Course

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Abstract. In the current undergraduate graduation design, there are problems such as weak connection between topic selection and actual engineering, low student participation enthusiasm, single assessment mode, and incomplete guidance throughout the process. In order to achieve efficient construction of the teacher team, enhance students' comprehensive application of subject knowledge and ability to solve practical problems, this paper explores, researches and practices from the aspects of three-dimensional design topic selection, diversified guidance methods, diversified assessment throughout the process, hierarchical satisfaction of student needs, and full process ideological and political education, in order to build a Graduation Design Course teaching mode that meets the requirements of modern engineering education and is ability oriented.

Keywords: Ideological and political education, Graduation Design Course, Competency-oriented

1 Introduction

The government has issued a series of important instructions to promote the spirit of craftsmanship and carry out ideological and political work in universities. Emerging Engineering Education regards the cultivation of innovative talents with both moral integrity and talent as the central link, and integrates ideological and political work throughout the entire process of education and teaching, achieving full process and all-round education. The main approach is to inherit and innovate, intersect and integrate, cooperate and win, cultivate future diversified and innovative engineering talents, promote the construction of the Emerging Engineering Education to go deeper and more practical, and comprehensively improve the ability and quality of cultivating outstanding talents in the future. This is an important measure to deepen the construction of the Emerging Engineering Education, implement the spirit of the National Education Conference and the National Conference on Undergraduate Education in the New Era (Ma Li, 2021)[1].

Alongside the question of the persistent lack of diversity of students in engineering education, there is also evidence that there is increasing disengagement of students

throughout their degree programs (Ohland, 2008)[2], which may be related to pedagogical practices and class-room experiences that are misaligned with professional practice (Adams, 2011)[3]. From the employment and related research of students in recent years, it has been found that many graduates from universities have relatively weak mastery of new technologies and knowledge, and their hands-on abilities are not strong enough to be competent for their positions upon entry. This directly leads to the unclear characteristics of these engineering majors. Graduation Design Course, as the last practical teaching link of the undergraduate training plan, is an important step in talent cultivation. It is also an important training stage for students to comprehensively apply theoretical knowledge, comprehensively test their engineering practical abilities, and comprehensively cultivate their ability to solve complex engineering problems. The analysis and extraction of problems in the Graduation Design Course, research and exploration of quality improvement paths, and continuous improvement are of great significance for comprehensively improving the quality of school teaching and professional talent cultivation (Yu Guolong, 2021)[5]. In contemporary engineering education, there is an emerging focus on changing engineering cultures to attract new students, and to adequately equip engineering students for workplace settings (Allison J, 2019)[4].

This article is based on the OBE concept, guided by the requirements of new engineering disciplines and the development of students' comprehensive abilities. Starting from the factors of both students and teachers, this study aims to extract the factors that affect the quality of graduation design, and deeply analyze the urgent problems that need to be solved in the current graduation design of general local universities. The study focuses on six aspects: strengthening technical communication between teachers and students, exploring scientific guidance mode reform, exploring the establishment of diversified assessment mechanisms, further deepening collective sense of honor and teamwork spirit, optimizing and simplifying guidance links, and constructing diversified stage assessment methods throughout the entire process.

2 The Path of Integrating Ideological and Political Education into Graduation Design Course

Fully consider the differences and correlations among various professional courses, clarify the key points of different courses in shaping students' knowledge, abilities, and values, and through the joint efforts of all courses, ultimately form a complete new engineering professional talent training path that integrates ideological and political education into the curriculum. The graduation project is a practical stage that comprehensively applies various courses in the major, and it is also a key path to organically integrate the ideological and political construction of various professional courses. The top-level design plan for ideological and political education in professional courses, with the completion path of graduation project works as the main line, is shown in Figure 1.

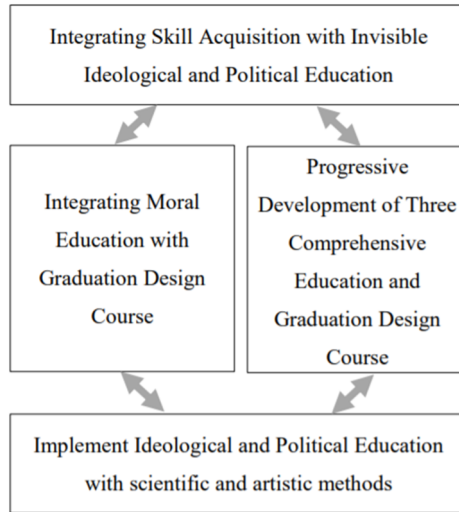


Fig. 1. Integrating ideological and political education into the design of graduation design courses

In the topic selection stage, cultivate students' basic theoretical knowledge, basic skills, and professional thinking. Through employment guidance and career planning, cultivate students' ability to research market demand in specific application fields. Students can form graduation project topics based on their own interests and research results. Form clear learning and job objectives during the topic selection stage, and enhance students' enthusiasm for professional learning and sense of job responsibility.

In skills learning stage, students autonomously learn technical content that is not covered in the course, thereby exercising their ability to learn independently, analyze and solve problems, and cultivating a learning attitude of striving for excellence.

In the innovation stage, complete comprehensive skill training for students. Through innovative training, the final graduation project is completed, cultivating valuable qualities of excellence and innovation in students.

3 Reform and Practice of Graduation Design COURSE Guidance Mode

Guided by ability, establish an effective management and guidance system for the entire process of undergraduate graduation design, and explore strategies and optimizations to improve the quality of graduation design.

3.1 Strengthen Communication Between Teachers and Students

The guidance teachers and students are the main body of the undergraduate graduation project, and the smoothness of communication between the two is crucial to the quality

of the graduation project. Establish a two-way trust mechanism, taking into account the achievement of professional talent training goals and the actual situation of students, and optimize the selection process. Encourage students to jointly determine topics with their supervisors based on their employment intentions or areas of interest, following the principles of integrating graduation internships, design, and employment, and teaching according to individual needs, while balancing the depth and difficulty of the topics with the enthusiasm of students. Maximize the strengths of students, while adhering to the principle of diversified types, try to reduce the similarity of questions and improve their independence. Explore a scientific topic selection and graduation project practice guidance model with macro as the main focus and micro as the auxiliary. The teacher determines the overall direction of the graduation project topic, reviews and monitors the performance indicators and assessment parameters of the design system, and guides students to draft specific implementation plans based on their own abilities and strengths by consulting relevant materials, including system framework, core technologies, and demonstration of system performance and functions. Students can adopt familiar techniques that not only enhance their initiative and confidence, but also improve design efficiency and output effectiveness. The dynamic adjustment between teacher guidance and student independent design, combined with openness and guidance, provides students with a certain degree of independent exploration space.

At the same time, optimize the teacher guidance process and mandatory assessments, reduce unnecessary trivial links, give teachers more energy and time to strengthen communication beyond the technical level between teachers and students, and alleviate the anxiety and unease that students may experience under certain pressures. Guided by the improvement of the comprehensive abilities of graduates, we continuously innovate new modes of communication and exchange between teachers and students, advocate the adoption of heuristic, exploratory, and discussion methods, and the integration of multiple methods. Starting from both subjective and objective factors, we focus on inspiring students with self-evaluation awareness, active participation awareness, and team cooperation awareness; Strive to optimize the guidance process for teachers, stimulate their enthusiasm, and enhance technical and cultural exchanges between teachers and students.

3.2 Building a Diversified Topic Selection Model

Diversify the topic setting and selection for graduation design. Characterized by the mutual infiltration and cross integration of multiple disciplines for common development, the emphasis is on cultivating students' ability to comprehensively apply basic theoretical knowledge to solve complex engineering problems; Make full use of the important interdisciplinary platform of graduation design, based on practical engineering problems and the needs of students and enterprises in topic selection and content design, break down disciplinary barriers, and establish a diversified and three-dimensional model for graduation design topic establishment and selection. Specifically, explore and reform from the following five aspects: (1) enrich the selection elements within each profession; (2) Vertical deep cooperation between departments to achieve graduation project topic selection; (3) Introduce enterprise needs as a consideration

factor for the graduation project proposal; (4) Implement follow-up survey feedback for graduates, output oriented, and continuous improvement; (5) Establish a graduation project question bank, closely integrate the questions with engineering practice, and strive to achieve real problem solving as much as possible. The questions and content are updated year by year, constantly iterating and progressing.

3.3 Diversified Guidance

In the face of the requirements of the "new engineering" system for cultivating innovative engineering talents, in order to form diversified and personalized talent training models, we explore two graduation design guidance models: joint guidance by teacher groups and collaborative guidance by mentors. Various forms of cooperation can also be adopted, such as school enterprise cooperation, strengthening the construction of a dual teacher and dual ability teacher team, formulating various incentive policies to encourage teachers to actively participate in engineering practice, etc., to supplement, enrich, and enhance the guidance of teacher engineering experience. On the one hand, it can enrich the guidance resources for students during their graduation design period, and on the other hand, it can achieve mutual promotion and learning among guidance teachers, deepen cooperation between schools and enterprises, and enhance competitiveness.

3.4 Exploring Diversified Assessment Mechanisms

Change the single result only assessment method and focus on conducting multi-dimensional and diversified assessments throughout the entire process of graduation design activities. For example, in terms of subjective consciousness, team collaboration, knowledge application, exploration and innovation, literature search, document writing, hands-on experience, language presentation, etc., we can reduce the phenomenon of only knowing how to do but not speaking, or saying well but not doing. The purpose is to exercise students' comprehensive abilities and humanistic qualities. During the implementation process, students are encouraged to organize their language in a reasonable manner, articulate their achievements in a systematic manner, identify remaining issues, and provide solutions for future problems. The key lies in training students' logical thinking ability, ability to analyze, find and solve problems, and language expression ability with clear priorities.

3.5 Invisible Integration of Ideological and Political Content

Explore and study how to integrate ideological and political elements into the curriculum during the graduation design process, cleverly establish the natural integration of various ideological and political elements with key nodes in the graduation design process, and do a good job in designing teaching plans to solidly promote classroom ideological and political education. Firstly, it is emphasized that the entire process of graduation design should reflect elements such as professional standards, legal awareness, teamwork, craftsmanship spirit, social responsibility, and ethical norms. Secondly, in

specific implementation, emphasis should be placed on cultivating and deepening the sense of collective honor and teamwork spirit. Multi stage technical exchange meetings create an academic atmosphere, expand student knowledge, enhance relationships between students, and find solutions to technical bottlenecks.

Adhere to the connotative development path with quality improvement as the core, student-centered, and teachers mainly play the guiding role of "guides". The fundamental purpose of teacher guidance is to effectively improve students' ability to comprehensively apply the knowledge they have learned to solve complex engineering problems throughout the entire process of graduation design, train their logical thinking ability, cultivate their tenacious spirit of not giving up and not afraid of setbacks, and incorporate ideological and political factors throughout the entire process of graduation design practice.

4 Innovation

4.1 Considering the Influence of Psychological Factors of Student Subjects on the Quality of Graduation Design

The cultivation of positive psychological qualities in students is an effective way to solve the difficulties in graduation design and improve the quality of graduation design. Fully realizing the promoting effect of positive psychological qualities on graduation design, setting reasonable stage training goals, and teachers always play the role of "guides". Firstly, with the principle of "student-centered", we moderately consider the future needs of students for further education or employment, and introduce them into the problem-solving process. The problem-solving process is closely integrated with the student's research direction, while teachers focus on the formulation of specific assessment indicators for the project, allowing students to deeply understand what the graduation project is for themselves, what they want to do, and why they do it, eliminating their inner resistance. Secondly, it is advocated that every student participate in the phased assessment activities of other students, and that all members participate in the phased assessment. Encourage each student to express their opinions or provide suggestions, create a good team collaboration atmosphere, enhance student confidence, and cultivate a rigorous and responsible research attitude. This can allow students to unleash their strengths more broadly, while discovering errors in the structure and standardization of their papers during the process of technology document mutual inspection. They can learn from each other's writing skills and gradually mature. As a result, student subjectivity gradually becomes apparent, and the management role of teachers gradually weakens, deepening the teaching objectives of graduation design.

4.2 Building a Three-Dimensional, Diversified, Diversified, and Multi-Level Full Process Guidance Model

Construct a comprehensive guidance model for the entire process of undergraduate graduation design from the dimensions of three-dimensional problem formulation, diversified forms, diversified assessments, and multi-level training (Jin Yan, 2021)[6].

(1) Breaking through disciplinary barriers and broadening the knowledge system of engineering talents, breaking through professional barriers and establishing a grand engineering perspective for engineering talents, breaking through the barriers between undergraduate and graduate studies and improving the efficiency of engineering talent cultivation, breaking through the barriers between schools and enterprises and promoting market matching of engineering talents, breaking through the indifferent relationship between teachers and students, and establishing a good atmosphere for engineering talent cultivation, with the deep cross integration of project content, combined with disciplinary needs, technological development, and enterprise needs The three-dimensional design of graduation project questions based on student interests (Huang Faguo, 2020)[7]. (2) The traditional mode of one-to-many single guidance by a mentor with a fixed number of students throughout the implementation of the graduation project narrows the communication between students, teachers and students, and teachers and teachers throughout the entire graduation project period. By collaborating with a team of guiding teachers and school enterprise mentors, diverse guidance methods are constructed to achieve a "1+1>2" effect, achieving the optimal allocation and efficiency of teachers and teaching resources, and adapting to the requirements of personalized talent cultivation (Yu Guolong, 2021)[5]. (3) Pay attention to the diversification of graduation project topic selection and the diversification of design process assessment. The selected topic takes into account the diverse needs of talent cultivation, enterprise and student future development, while the assessment covers multiple factors such as logical thinking, language expression, system design, team collaboration, and humanistic qualities. (4) Adhering to the principle of "student-centered", we plan the difficulty level and specific guidance form of the questions reasonably based on the multi-level needs of students; The multi-level composition of the guidance teacher team and the multi-level supervision of teachers in schools and departments also provide guarantees for improving the quality of graduation design.

5 Concluding Remarks

Based on the OBE concept and guided by the training of graduates' comprehensive abilities, this paper reflects on and analyzes the entire process of teaching practice for graduation design in local universities. It highly condenses the urgent problems that need to be solved, such as single topic selection type, lack of close connection with actual engineering, detachment from student needs, and weak participation of the implementation subject. From the diversification of design topic selection, guidance methods, details of organization and implementation methods, comprehensiveness of score evaluation system and process monitoring, engineering of guidance teacher team, and full process of Ideological and Political Education, the teaching mode of graduation design education is explored, researched, and practiced. The PDCA [Plan, Do, Check, and Action] mode is adopted to effectively ensure the full process of Ideological and Political Education. By continuously improving the quality of all aspects of the graduation project, it not only stimulates students to actively learn, but also enhances their

ability to comprehensively apply interdisciplinary knowledge to solve practical complex engineering problems.

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