



Shallow Discussion on the Construction Experience of Experimental Course Teaching and Research Section Focusing on the Construction of Ideological and Political Education in Courses

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Abstract: Taking the construction of the comprehensive experimental course teaching and research section in the field of materials science and engineering as an example, this paper explores the construction methods and strategies centered on the ideological and political education in the curriculum for engineering experimental courses. By improving the management system of the teaching and research section, optimizing the operation mechanism, improving teachers' teaching and scientific research ability, and strengthening curriculum construction and teaching reform, the teaching quality and educational effect of the course have been significantly improved, and it has played an important leading role in teacher development and student training. The systematic and scientific construction strategy of experimental course teaching and research section in this paper provides a useful reference for the construction of teaching and research section of related majors in colleges and universities.

Keywords: construction of course teaching and research section, professional experimental courses, ideological and political education in courses, talent training, engineering major

1. Introduction

With the continuous development of higher education, the importance of experimental teaching in cultivating students' practical ability and innovative spirit has become increasingly prominent [1]. As a practical subject, the quality of experimental courses is directly related to students' professional skills, professionalism and employment competitiveness [2, 3]. In recent years, with the rapid development of science and technology and the continuous upgrading of the industry, higher requirements have been put forward for engineering talents [4, 5]. As an important part of engineering education, experimental teaching bears the important task of cultivating students' professional skills and practical application ability [6].

As a grass-roots organization of teaching work, the teaching and research section plays a basic and key role in curriculum construction, teacher development and teaching reform [7, 8]. As one of the important majors in the field of

engineering, the construction of experimental courses is of great significance for cultivating high-quality professionals. This paper summarizes the effective construction strategies and experience by analyzing the construction practice centered on curriculum ideological and political education in the experimental course teaching and research section of material science and engineering. It provides reference for the construction of the experimental course teaching and research section of engineering.

2. The basic situation of the course teaching and research section

The teaching and research section of comprehensive experimental course is the key teaching and research section of material science and engineering specialty in our university. The construction carrier of the teaching and research section of this course is a series of comprehensive experimental courses of material preparation and testing. This series of courses focuses on the preparation, structural characterization, performance evaluation techniques and skills of typical materials in frontier or local industries. Since 2018, the series of courses have been taught for 12 semesters. The members of the teaching and research section of this course are composed of 10 teachers from the School of Materials Science and Engineering of our university, including 2 professors, 4 associate professors and 4 lecturers. Most of the members are highly educated scientific research backbones, with 8 doctoral degrees and 2 master's degrees; one third of them are young teachers, and the rest are young and middle-aged teachers.

3. Construction strategy

3.1 Improve the rules and regulations of the teaching and research section, optimize the operating mechanism

Clarify, refine and standardize the management system, assessment system, training system, incentive system and so on. According to the problems in the process of system implementation, continue to optimize the operation mechanism.

Clarify the division of responsibilities of the members of the teaching and research section to ensure the orderly advancement of all work. The leader is responsible for the goal setting, task allocation, activity planning and curriculum design of the teaching and research section. The key members of the teaching and research section are responsible for the development of teaching and research activities, curriculum construction, mentoring and promotion, feedback and assessment, operation and fund management. Each semester, a detailed plan of the activities of the teaching and research section is formulated. The activities include seminars with clear objectives at the beginning of the semester, task allocation, curriculum and teaching preparation, etc. Course tracking monitoring and problem discussion during the semester; the final examination and examination work arrangement of the course at the end of the semester; work report and summary during the semester vacation. Establish a teacher's teaching and research assessment mechanism, regularly collect feedback from teachers and students, and adjust teaching content and methods in a timely manner. At the end of each semester, the operation of the teaching and research section is comprehensively evaluated, and the system is revised and improved according to the evaluation results. Formulate a reward incentive system to reward teachers who have outstanding performance in teaching reform and curriculum construction.

3.2 Improve teachers' teaching and scientific research ability, optimize the personnel structure

Carry out 'one-on-one' mentoring activities. Organize experienced teachers to pair with young teachers, and help young teachers grow rapidly by guiding teaching design and classroom observation. Regularly conduct teaching seminars to share teaching experiences and methods, with a focus on exploring the in-depth exploration, integration pathways, and teaching strategies of ideological and political education in the curriculum. Invite off-campus experts to give lectures to broaden teachers' horizons and knowledge. Through the organization of teachers to the training base, related enterprises and institutions to learn and exercise, improve the quality of 'double teachers'. Optimize the personnel structure and

attract more young teachers to join the teaching and research section. Support young teachers in participating in training activities aimed at improvement, especially those related to ideological and political education in courses, to enhance their ideological and political awareness. Teachers are encouraged to participate in academic conferences, teaching training and scientific research projects at home and abroad to improve their teaching and scientific research ability.

3.3 Strengthening curriculum construction and teaching reform

The work of the teaching and research section focuses on curriculum construction and teaching reform. Accelerate the development of course resources such as online courses, and create exemplary resources for ideological and political education in courses, such as ideological and political education paradigms and demonstration classrooms. With the enhancement of the ideological and political education function of courses as the guiding direction, encourage teachers to actively engage in teaching research, teaching reform, and practice. Continue to promote and expand the application of course learning results in students' innovation and entrepreneurship projects, academic competitions, graduation thesis, etc., and enhance the training effect of the course on students' comprehensive application and innovation ability.

Promote the construction of curriculum resources. Accelerate the construction of online courses, develop digital teaching resources, and provide students with rich learning materials. Integrate high-quality teaching resources inside and outside the school, establish a curriculum resource library, and facilitate the use of teachers and students. The resource library includes various forms of teaching resources such as science and innovation project cases, academic paper writing and so on.

Carry out teaching reform and practice. Encourage teachers to carry out teaching method reform, such as project-based teaching, case teaching, etc., to improve the teaching effect. Promote the reform of curriculum assessment methods, pay attention to process evaluation and comprehensive ability assessment.

Carry out teaching exchange activities. To carry out teaching observation activities, show the teaching style of excellent teachers, and promote mutual learning and reference among teachers. Teaching seminars and teaching salons are held regularly, and experts and peers inside and outside the school are invited to share teaching experience and research results. Hold a symposium on the construction of ideological and political education in courses, explore methods and strategies for its implementation, and fully leverage the role of courses in ideological and political education.

3.4 Strengthen publicity and promotion

Through lectures, seminars, teaching salons, observation, news and other communication and publicity activities, the mechanism model and results of the teaching and research section are publicized. Improve the school teachers' understanding and recognition of the teaching and research section, and strengthen the radiation and driving role of the teaching and research section. Encourage the members of the teaching and research section to participate in various teaching reform project selection and display activities to enhance the popularity and influence of the teaching and research section.

4. Construction results and experience

4.1 Construction achievements

Through the continuous implementation of the above teaching and research section management system and construction strategy, the members of the teaching and research section have achieved remarkable teaching results. Since 2018, the members of the curriculum teaching and research section have obtained more than 20 projects of teaching reform and curriculum reform, and edited and published the supporting textbooks for the curriculum. In 2023, one of the courses in this series was recognized as a first-class undergraduate course at the provincial level.

The overall teaching and research level and scientific research level of the teachers in the teaching and research section have been significantly improved. In the past five years, they have presided over 15 national and provincial-level teaching and research projects, published more than 30 papers in the second SCI area and above in international

authoritative academic journals, and obtained 6 authorized national invention patents.

The student training effect of this series of courses is outstanding. Relying on the comprehensive experimental projects in this series of courses, it has achieved fruitful results in connection with students' innovation and entrepreneurship projects and academic competitions. A total of more than 80 student projects, awards, and papers were published. The effect of student training has been recognized by the industry and employers.

4.2 Construction experience

The construction of curriculum teaching and research section must adhere to the curriculum construction as the core. The course is the carrier and foundation of the course teaching and research section. Always put the curriculum construction in the first place, through continuous teaching reform and practice, improve the quality of curriculum teaching and the effectiveness of ideological and political education. The curriculum construction not only includes the renewal and optimization of teaching content, but also includes the reform of teaching methods and assessment methods to ensure the scientificity and effectiveness of curriculum teaching.

The development of curriculum teaching and research section should take teacher development as the key. Through mentoring activities, training and practical exercises, teachers' teaching and scientific research abilities are improved and the structure of teachers is optimized. The development of teachers not only helps to improve the level of teachers' own teaching and research, improve the quality of curriculum teaching, but also provides strong support for curriculum construction and forms a virtuous circle.

The construction of teaching and research section should aim at students' development. The ultimate goal of any education and teaching work is to improve the effect of education and promote the development of students. The construction of teaching and research section enhances the teaching level and educational function of the course through curriculum construction, teacher development, teaching reform and other ways. In particular, professional experimental courses can enhance the cultivation of students' comprehensive application and innovation ability by promoting and expanding the application of course learning results in students' innovation and entrepreneurship projects, academic competitions, graduation thesis and so on.

The construction of the teaching and research section of the course should be expanded by radiation. Through a variety of ways to promote the construction results of the teaching and research section, play the leading role of the teaching and research section, and enhance the influence of the teaching and research section. The radiation drive not only helps to enhance the visibility of the teaching and research section, but also promotes exchanges and cooperation within and outside the school, promotes the popularization and application of the experience and achievements of the teaching and research section, and promotes the extensive development and in-depth study of teaching reform.

Conclusion

The construction of the teaching and research section of engineering experimental courses is of great significance for improving the quality of experimental teaching, promoting teacher development and student training. By improving the management system, enhancing teachers' capabilities, strengthening curriculum development, and enhancing the radiation and driving effect, the overall level and influence of the teaching and research office can be effectively improved, thereby enhancing the teaching level of the course and the effectiveness of ideological and political education. The construction strategy and experience summarized in this paper can provide useful reference for the construction of the teaching and research section of engineering experimental courses in colleges and universities.

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References

[1] Yanling Dong , Zhaofu Yang. A preliminary study on improving the quality of experimental teaching in colleges and universities under the background of ' based on this ' [J].Education and teaching forum, 2022, (51) : 9-12.

[2] Xiaoyan Wang, Fangxia Ye, Gengrong Chang, etc. Exploration on the teaching reform of metallographic preparation and detection experiment course under the background of new engineering [J].Western quality education, 2025, 11 (04) : 169-172.

[3] Jue Wu, Xin Chen, Jinqiang Cheng, etc. Experimental teaching of micro-project new energy specialty under the background of new engineering-Lithium ion battery experimental case [J].Laboratory research and exploration, 2024,43 (04) : 121-124.

[4] Jiayi Dong , Research on the existing problems and countermeasures of new engineering talents training in local universities under the concept of OBE [D].Hebei University of Science and Technology, 2024.

[5] Xiwen Li, Shenghua Yin, Yang Liu. Research on the reform path of mass entrepreneurship and innovation education in colleges and universities for the demand of new engineering talents [J].Journal of Beijing University of Science and Technology (Social Science Edition), 2025,41 (03) : 44-50.

[6] Zhibin Zhu, Lei Chu, Feng Sun, et al. Construction of experimental teaching system for materials science and engineering [J]. Guangzhou Chemical Industry, 2023,51 (10) : 136-138 + 145.

[7] Zhihui Zang. Research on the reorganization and transformation of teaching and research sections in colleges and universities from the perspective of community [D].Heilongjiang University, 2021.

[8] Yangyang Bai. Research on the construction of teaching and research sections in colleges and universities from the perspective of system contingency theory [D].Xiamen University, 2017.