

Teaching Reform of Polymer Reaction Engineering based on the Background of New Engineering

Shujuan Xiao^{1,a}, Shouwu Yu¹, Hui Liu¹

¹College of Material Science and Engineering, North China University of Science and Technology, Hebei, Tanshan 063210, China.

^axiaosj@ncst.edu.cn

Abstract

In order to improve the scientific and innovative thinking of master degree students and adapt to the training concept of new engineering, the teaching methods and contents of polymer reaction engineering for materials engineering graduate students were discussed, and the corresponding teaching reform methods were proposed. Through the combination of theory and practice, the ability of students to analyze and solve problems was improved.

Keywords

Graduate Student; New Engineering; Polymer Reaction Engineering; Teaching Reform.

1. Introduction

At the beginning of 2017, the Ministry of education proposed the concept of "new engineering" in Colleges and universities, with the aim of deepening the reform of engineering education and cultivating cross disciplinary talents with strong adaptability.

Polymer reaction engineering as a professional degree course for master degree students majoring in polymer science and engineering. It mainly studies the design, operation and optimization of polymerization reactor based on polymerization kinetics and transfer theory. It is a bridge between theory and engineering technology. As a professional course for master degree students majoring in polymer materials at North China University of science and Technology, this course has some problems, such as less class hours, more contents and more difficulties. In order to improve the teaching quality, it is necessary to adopt various means to cultivate students' theoretical and practical abilities.

2. Problems in teaching

Polymer reaction engineering is a discipline that integrates polymer chemistry, chemical engineering and other disciplines. It was only in the mid-1960s that this direction was proposed in the world. However, this course was only established in China in the early 1980s.

As a professional degree course for Postgraduates of North China University of science and technology, this course focuses on industrial scale polymerization process, and studies chemical reaction engineering problems in polymer manufacturing based on polymerization reaction kinetics and polymer system transfer process. It includes not only the chemical phenomena of polymerization reaction, but also the physical phenomena such as chemical rheology, fluid flow and mixing, heat and mass transfer. It is a professional course with strong comprehensiveness, wide range of basic knowledge and high requirements for mathematics. Students generally feel abstract and difficult to understand, formula derivation and calculation cumbersome. Because of the double complexity of polymerization kinetics and polymer system transfer, and the different entrance requirements of students, there are many problems such as less class hours and more contents. If the teaching still follows the old routine, it will inevitably lead to the low quality of teaching. Therefore, in order to improve its teaching quality, it is necessary to change the traditional teaching methods, establish an all-round development education concept of knowledge imparting, ability training and quality

improvement, build a new practical teaching system through various ways and means, and fully mobilize students' learning enthusiasm and creativity.

3. Curriculum reform based on new engineering

In order to construct new engineering courses in the new era, it is urgent to transform and upgrade the traditional engineering majors, and to promote the construction of new engineering disciplines in terms of future development, cross integration, and engineer status. Based on these characteristics, the polymer reaction engineering course will be reformed from the curriculum content and implementation process.

(1) Accurately grasp the connotation of polymerization reaction engineering course, and construct the optimization mode of curriculum system and teaching methods based on master degree students. In the course teaching plan, there should be executable teaching documents such as teaching organization, teaching methods, teaching means and teaching environment that can directly guide teaching.

(2) In the project practice which takes the working process as the core, we should implement the stratification and ability division, and build the system into a system that can not only radiate most students, but also open up the development space of excellent students, and embody the teaching concept of student-oriented and teaching students in accordance with their aptitude.

(3) We should strengthen communication with the tutors of master degree students, enter the subject research faster and more accurately, and establish a long-term and win-win cooperation mechanism with more relevant enterprises, so as to make students' professional behavior ability develop in an all-round way.

4. Engineering thinking mode

(1) Through the complete task design, the graduate students can have a clear overview of the application direction and application situation of the learning content, and promote the learners' interest and enthusiasm to master professional knowledge and work skills.

(2) Through a complete system presentation from simple to complex, professional knowledge teaching from simple to deep, task project driven step by step, practical skills training and other activities, we can cultivate students' interest in polymer reaction engineering course, consolidate professional knowledge, exercise working skills, stimulate innovation consciousness, and motivate self driving of learners.

5. Conclusion

With the continuous progress of national science and technology ability, graduate education will become an important link in the improvement of academic qualifications and ability, so it is necessary to reform the teaching of graduate courses. For a long time, postgraduate teaching has mainly focused on teachers' lectures and students' listening carefully as the main teaching method. This will inevitably limit students' thinking and innovation ability, and cannot meet the requirements of the Ministry of education to vigorously cultivate "big country craftsmen" and high-level engineering innovative talents. Therefore, the author takes engineering students as the research object and reforms the polymer reaction engineering course. The teaching content is from the whole to the part and then the principle of returning to the whole. The task is gradually decomposed, and the teaching method is also introduced into the physical teaching method, and carries on the practical training to improve the practical ability; teaching methods are also more diverse and teach according to each person. It can greatly mobilize the initiative of students in learning and lay a good foundation for the scientific research projects they are facing, which plays an important role in promoting the postgraduate students to engage in teaching and scientific research in the future.

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