

Reform of Polymer Modification Course in the View of New Engineering

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Abstract: This project stands in the perspective of new engineering, based on the teaching concept of Outcome Based Education, combined with the actual work of China's engineering education certification, the teaching team studies and implements teaching reform. The project has designed a teaching reform plan from the aspects of teaching content, teaching methods, teaching means, evaluation mechanism, etc., in an all-round and full process way, taking full account of the novelty and practicality of teaching content, the pertinence and effectiveness of teaching methods, the differences of teaching objects, the effectiveness of teaching methods, and the fairness of evaluation mechanism, which is conducive to fully stimulating students' learning enthusiasm and enriching their knowledge structure, Stimulate their innovation awareness, improve their engineering literacy, expression ability, team cooperation ability, and comprehensively improve the students' humanistic and scientific literacy.

Keywords: New engineering, Polymer modification, Reform.

1. Introduction

In 2017, the Ministry of Education of China put forward the concept of "new engineering". The three national strategies of "the Belt and Road", "Made in China 2025" and "Internet plus" have put forward new requirements for talent cultivation in colleges and universities. As a comprehensive course between polymer science and engineering science, Polymer Modification is a required course for polymer materials and engineering majors, and plays an important role in students' basic theoretical reserve, engineering ability development, etc. This course has many contents, involves a wide range of knowledge, is highly theoretical, and is difficult. It is easy for students to fear difficulties.

Due to the continuous emergence of new polymers and their modification methods, the existing textbooks can not include the latest polymer modification methods and theories, and the content is relatively lagging behind, and the traditional teaching methods can not fully adapt to the current situation. Therefore, the teaching of this course should break the shackles of textbooks, and break the traditional teaching mode from teaching content, methods and means, so as to fully stimulate students' learning interest and broaden their knowledge horizons, Enhance students' innovation and practical ability. In 2015, Wang Wei of Jiangnan University tried to reduce the theoretical teaching hours, increase the thematic discussion links, and stimulate the enthusiasm of students to actively acquire knowledge. In 2019, Zhang Mengmeng of East China University of Technology adopted the PBL teaching method (Problem Based Learning) to put students in a problem situation and improve their ability to solve practical problems and language expression through independent learning and independent thinking. In 2020, Lin Zhitao of Shandong University of Science and Technology improved the course assessment and evaluation, reduced the attendance score, and increased the process assessment contents such as experiment, question answering performance, online testing, and inquiry learning. The enthusiasm of students for learning and teaching quality have been improved. On the whole, the current teaching reform carried out by

researchers in terms of teaching content, teaching methods, teaching means, evaluation and assessment has achieved certain results. Although it is a beneficial transformation of the traditional teaching model, there are also some defects such as simple ideas, simple processes, and not systematic enough.

Standing in the perspective of new engineering, based on the teaching concept of Outcome Based Education, combined with the actual work of engineering education certification, the teaching team studies and implements teaching reform, adjusts the previous teaching mode, and plans to build a new and practical teaching system by systematically updating teaching content, designing teaching methods, adopting reasonable teaching methods, and adjusting the evaluation and assessment mechanism. The implementation of the project is of great significance to stimulate students' enthusiasm for active learning, enhance their innovation awareness, improve their ability to solve practical engineering problems, expand their language expression, teamwork, etc., and improve their scientific and humanistic literacy.

2. Curriculum Reform Practice

(1) Teaching content reform

a) Eliminate overlapping and crossed contents. In terms of teaching content, it is necessary to systematically check the contents of the prerequisite courses and eliminate overlapping parts.

b) The course content is inclined to application. The methods and means widely used in industry and scientific research are analyzed and disassembled with examples. The teaching content focuses on application.

c) Adjust the teaching content flexibly in combination with the frontier of scientific research and discipline development. On the one hand, combine the latest scientific research trends to attract and motivate students with "new" content; On the one hand, according to the composition of the teaching team, the teaching content has certain characteristics, highlighting the advantages of our polymer major in flame retardant modification, functional membrane modification, bio based

polymer modification, rubber and plastic blending modification, etc.

d) The engineer enters the classroom. Invite engineers into the classroom, or insert enterprise engineers' video explanations on the project site, introduce project content, guide students' understanding of "learning to apply", stimulate rationality with sensibility, and improve learning enthusiasm.

(2) Reform of teaching methods

a) Task cooperation self-learning method. Students are free to form a study group of about 5 people. The teacher presets questions before class, so that students can put themselves in the problem situation, solve problems through self-study, literature review and other ways, and entrust representatives to answer in class.

b) Task driven teaching method. In the form of flipped classroom, the teacher sets or the study group determines a production and research related topic, and performs the classroom performance according to the idea of raising, analyzing and solving problems.

c) Object teaching method. The students can directly feel the application direction of the knowledge they have learned by using the product objects, the products of scientific research work, etc. as the teaching carrier for visual demonstration.

d) Case teaching method. According to the requirements of teaching objectives and teaching tasks, typical teaching cases with scientific basis and reliable data are carefully selected for different chapters to make teaching activities concrete.

In the application process of the above teaching methods, attention should be paid to differentiated teaching, teaching students in accordance with their aptitude and individualized guidance.

(3) Reform of teaching dependence approach

a) Online and offline hybrid teaching: adapt to the teaching needs under the conditions of the COVID-19 epidemic, and adopt online and offline hybrid teaching in good time.

b) Multimedia teaching: use PPT, demonstration animation, micro classroom, MOOC video resources, etc. to carry out teaching, so as to make the teaching content more intuitive and understandable.

c) Use of mobile network resources: pay attention to the combination of Internet resources, mobile phone APP and other mobile network resources to carry out learning activities as a useful supplement to teaching methods

d) Practical teaching: fully explore the opportunities for teachers' laboratories, practice bases and other scenes to cultivate students' engineering ability.

(4) Reform of curriculum evaluation mechanism

Scientifically and rationally design the assessment content and assessment weight, and increase the proportion of process assessment.

3. Achievements of Teaching Reform

The project has designed a teaching reform plan from the aspects of teaching content, teaching methods, teaching means, evaluation mechanism, etc., in an all-round and full process way, taking full account of the novelty and practicality of teaching content, the pertinence and effectiveness of teaching methods, the differences of teaching objects, the effectiveness of teaching methods, and the fairness of evaluation mechanism, which is conducive to fully stimulating students' learning enthusiasm and enriching their knowledge structure, Stimulate their innovation awareness, improve their engineering literacy, expression ability, team cooperation ability, and comprehensively improve the students' humanistic and scientific literacy. The achievements of the project can not only be implemented in the polymer materials and engineering majors of the University, but also further promote the sister colleges and universities and colleges that have opened similar majors.

The project conforms to the requirements of the Ministry of Education of China to promote the construction and development of "new engineering". In view of the characteristics of the "Polymer Modification" course, it breaks the "three center" model of "teacher centered, textbook centered, and classroom centered", and organically combines the adjustment of teaching content, the reform of teaching methods, the application of new teaching methods, and the establishment of a process assessment mechanism, Enrich the curriculum system, change the focus of teaching, change the role of teachers, focus on improving the ability of college students to learn actively, highlight problem-based teaching, and implement differentiated teaching. It is not only the need of course teaching, but also the only way to improve the quality of talent training to conduct in-depth research and teaching reform on this course.

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