

## Teaching Reform and Practice of Polymer Material Course in Colleges and Universities

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**Abstract:** Polymer materials play a very important role in people's daily life. With the teaching reform of polymer materials in colleges and universities in China, there are some new situations and problems in the reform of teaching methods of polymer materials in colleges and universities. In order to improve the effectiveness of polymer material teaching course in colleges and universities, this paper simply combs the new problems that will appear and have appeared in the process of reform, in order to lay a theoretical foundation for further deepening the reform of polymer material teaching course in colleges and universities. Starting from the teaching practice, this paper explores the realization path of polymer material teaching reform, sorts out the new problems in the process of reform, and puts forward the corresponding teaching optimization strategies. This paper discusses the integration and optimization of the teaching content of the course "polymer material foundation" and discusses the practice of teaching reform with various teaching means and methods. The in-depth teaching reform of polymer material course in colleges and universities highlights the function of teaching and education in colleges and universities, which is conducive to the cultivation of professional talents.

### 1. The Necessity of Teaching Reform of Polymer Materials

Polymer materials, based on polymer compounds, are one of the fastest growing industries in the world, involving aerospace, automobile industry, building materials, packaging materials and other industries. For a long time, the teaching of polymer materials in colleges and universities has been highly valued and widely concerned by many leaders and educators, especially in practical teaching. The teaching reform of polymer materials should be based on the needs of the society. Polymer material is a required course for polymer material and engineering major, and it is a basic course for students to understand and master the professional knowledge of polymer material. It plays an important role in further learning polymer material and its structure, performance and application, and has a positive impact on their future professional work. At present, the course is mainly taught by teachers. It is difficult for the conventional teaching method to cultivate students into the practical talents needed by the society. Many reform methods are still limited in the classroom, and do not get rid of the conventional teaching method of teaching. Some schools think that the course is practical, and propose to carry out in class experiments and extracurricular practice teaching methods, but this will conflict with the experimental courses carried out according to the plan, and involve many teachers, also need to coordinate the arrangement of other courses in time to avoid conflicts, there are some difficulties in the implementation. As far as the literature is concerned, there are few related researches, and most of them are for reform. In addition, it did not combine the improvement of students' practical ability with the adaptability of the future positions and actual positions, and did not guide students to establish a sense of subject, so as to make efforts to improve the core competitiveness of employment. This is not conducive to improving the practical ability of students, but also divorced from the social demand for application-oriented talents, especially can not meet the current requirements of application-oriented undergraduate education. On the basis of

the reform of teaching materials, the innovation of teaching methods should be carried out to form an effective teaching practice system. In order to meet the needs of the society for the talents of polymer materials, the training of students should be based on their innovative spirit and ability, and on their comprehensive quality. The change of educational environment in different times should ensure that the teaching reform is in a dynamic state of development. Therefore, in the teaching of polymer materials, we should adhere to the teaching tenet of "creating opportunities and conditions for college students, giving full play to their potential, gradually cultivating their independent, cooperative and inquiry learning habits, as well as their innovative consciousness, innovative ability and scientific spirit", and actively explore the reform of teaching content, teaching methods and teaching methods.<sup>[1,2]</sup>

## 2. Current Teaching Situation Of Polymer Materials

In the new round of teaching reform of polymer materials in colleges and universities, teachers of polymer materials in colleges and universities have carried out a series of reforms and innovations on the original teaching content, methods, means and methods in accordance with the characteristics of the new era and the theoretical basis and learning objectives of college students, which to a certain extent has significantly improved the effect of classroom teaching. But at the same time, we also found that in the process of reform, some teachers still have a bad mentality, such as ignoring the actual feelings of students in the teaching process, and they are eager for success, there is a tendency of over skilled. From the perspective of form, all kinds of new teaching methods have been innovated with continuous achievements, but some teachers are still opportunistic, and the phenomenon of flashiness still exists in the teaching process of polymer materials, which has seriously affected the teaching quality of polymer materials in colleges and universities.

At present, the teaching reform of polymer material specialty in colleges and universities is in the stage of theory to practice. Classroom teaching plays an important role in the classroom reform. Under the modern teaching standard, colleges and universities begin to focus on teaching materials as the leading role, break the limitations of traditional teaching methods, and stay away from the infusion teaching. However, the current curriculum reform is still in the stage of theoretical research, with many related academic achievements, but not enough performance in specific teaching. There are many problems in the traditional teaching methods of polymer materials in colleges and universities, such as inflexibility, single means, insufficient connection with reality, and weak attraction. The attraction to students is not strong, and the teaching effect is not obvious. In addition, the innovation of teaching methods is insufficient, resulting in the poor effect of curriculum reform. The teaching of polymer material specialty is still relatively rigid. It follows the previous teaching mode. The teaching method does not meet the requirements of modern teaching, the interaction between teachers and students is insufficient in classroom teaching, and the utilization rate of multimedia courseware is low, which is easy to cause the waste of teaching resources.<sup>[3-5]</sup>

## 3. Integration and Optimization of Teaching Content

The main contents of the textbook are as follows: introduction to materials science, preparation and reaction of polymer materials, structure and performance of polymer materials, general polymer materials, functional polymer materials, polymer blends and polymer matrix composites. It is impossible to achieve the training goal of polymer material professionals. This requires us to change the traditional education thought as soon as possible, proceed from the reality of social development, optimize the design of teaching, and improve the teaching effect. The dynamic teaching reform mode can use information technology, Internet technology and data analysis technology to provide technical support for the in-depth curriculum reform, so as to play the role of polymer material teaching in training modern talents. In view of the characteristics of the new era and the theoretical basis and learning objectives of college students, the teachers of polymer

material teaching course in colleges and universities have carried out a series of large and small reforms and innovations on the original teaching content, methods, means and methods, which to a certain extent has significantly improved the classroom teaching effect.<sup>[6]</sup>

#### **4. Reform and Practice of Teaching Mode**

In order to improve the quality of teaching, in the teaching methods and means, we also actively carried out some reform and exploration. The reform of teaching methods. Multimedia teaching is used to increase the information content of the course. There are still a lot of polymer materials in the teaching process, which has seriously affected the teaching quality of polymer materials in colleges and universities. Although the modern teaching mode has become rich and colorful, most teachers begin to use multimedia and network technology for teaching exploration, but considering the practical, engineering and experiential problems of polymer materials, adding teaching videos in the courseware can not meet the teaching needs. How to cultivate the ability to adapt to the market, practice and have theoretical knowledge of polymer materials Knowledge of mold talents is an urgent problem to be solved. Materials are one of the important pillars of the national economy. In the first class, teachers should explain the importance of materials and introduce students' ideas into the field of materials. After class, we will arrange the topics to be discussed in the next class, and guide students to attach importance to the subject of materials. Classroom discussion is centered on the relationship between the development of materials and the development of national science and technology, as well as the relationship between the development of materials and the development of human society. Students are required to take examples to illustrate the relationship between them.

The major of polymer materials and engineering is mainly to train talents in research, development, sales and management of polymer materials for relevant local enterprises. Therefore, it is of great significance for students to understand the situation of local enterprises in the future. Therefore, in the classroom, we specially invite enterprise research and development personnel and relevant personnel of the industry association to enter the classroom, introduce the situation and demand of the enterprise, the research and development situation of the enterprise, the difference between the actual situation of the enterprise and the classroom of the school, the local industrial distribution, and the introduction of the backbone enterprises, before leaving the school, students can have a deeper understanding of the local enterprises and their situation, which is conducive to the next step of employment and application. Inviting enterprise research and development personnel to face the research and development situation in the enterprise is more direct, in-depth close to the reality and more lively than teachers' classes. This kind of diversified teaching method arouses the students' interest in learning and improves the teaching effect. In view of the above-mentioned reform of teaching methods, the assessment method of this course has also made corresponding improvement, from the original mid-term, final examination and normal assignments as indicators of the assessment method adjusted to the assessment method combined with practical elements and appropriately increased the proportion. Specifically, we should give up the old practice that one final paper decides the fate, and divide the course results into three parts: material importance discussion, polymer material product homework and peacetime performance.<sup>[7-9]</sup>

#### **5. Reform Measures of Polymer Materials**

In today's fast-growing industry in the world, high polymer materials see the employment competitiveness of students. This kind of curriculum reform can not effectively occupy a very important position. It has been in the field of science and technology information, aerospace, vehicle to improve students' professional practice ability, and make students out of touch with society. The rapid development of vehicle engineering, biochemistry, construction engineering and other fields can not meet the application requirements of society for this major, but also can not meet the exhibition. On the basis of preliminary visit and investigation, combined with information such as business communication, Internet search, product advertisement, etc., each student selects a polymer material product, and then first makes speech materials of relevant contents according to

the operation requirements, introduces the raw materials of the product, the synthesis method, performance and processing performance of the material, as well as the preparation process of the product in class , performance, application, etc.

32 class hours are divided into 24 theoretical courses and 8 computer operations. After enterprise investigation, computer-aided mold design is the main design method of mold nowadays, which greatly shortens the design cycle of mold, and is also the necessary skill of mold talents. Therefore, eight class hours are adjusted to carry out computer-based teaching combining practice and theory. We are going to add a classroom test in the course teaching in the future, covering the whole semester's teaching content and students' explanation content. The types of questions include filling in the blank, question answering, judgment, material design and preparation, etc., so as to urge students to learn other parts of the knowledge, so that each student can master the whole course content more comprehensively.<sup>[10, 11]</sup>

## Conclusion

At present, there are abundant theoretical researches on the teaching reform of polymer materials, but there are some deficiencies in the theoretical application. This paper studies the current situation of polymer material teaching in colleges and universities, makes clear the deficiencies in the current teaching practice, further determines the direction and key points of teaching reform, specifically analyzes the causes of these problems, and constantly improves in the process of teaching reform, so as to provide guarantee for the effective development of teaching. In view of the characteristics, current situation and existing problems of the teaching content of polymer materials in colleges and universities, the necessity and rationality of the curriculum reform are expounded. However, as the course involves many theoretical teaching contents and new concepts and theories constantly emerge and improve, the teaching reform and practice of the course must be a long-term process.

## References

- [1] Chan xie, Yunying Wang, Jiangyan Meng. (2019) Research on the teaching reform and practice of polymer materials in colleges and universities in the new era. *Technology and Industry Across the Straits*, 06, 147-148.
- [2] Zhimin Chen. (2019) on the teaching reform and practice of the course of modern research methods of materials for graduate students majoring in polymer materials and Engineering. *Technology Wind*, 16, 46+49.
- [3] Chuanli Ren, Ze Kan, Zhongcheng Li. (2018) On the teaching reform and practice of polymer material course in colleges and universities in the new era. *Education Modernization*, 42, 34-35.
- [4] Zongxia Guo, Wenbin Wang. (2017) Teaching reform and practice of polymer material course in the new situation. *Education Teaching Forum*, 37, 112-113.
- [5] Fengshou Liu, Ying Wang, Dongsheng Shen. (2011) Teaching reform and practice of polymer material course. *Guangdong Chemical Industry*, 01, 222-223.
- [6] Guolun Zhong, Yonghong Wang. (2016) Exploration on the reform of practical teaching mode of polymer materials course in applied colleges and universities. *Polymer Bulletin*, 11, 84-87.
- [7] Nanzhe Zhang. (2017) Teaching reform and practice of functional polymer materials in local colleges and universities. 23, 106-107.
- [8] Yu Lei, Guoping Yan, Fan Liu, Si Chen, Yunfei Zhang, Qiao Zhang, Qingzhong Guo, Xianghua Yu. (2017) The reform and practice of graduate course teaching of functional polymer materials. *Guangzhou Chemical Industry*, 10, 160-162+193.
- [9] Chao Ma. (2015) Teaching reform and practice of polymer material chemistry in Higher Vocational Education. *Polymer Bulletin*, 11, 93-96.

- [10] Huili Ding, Zhiping Cao, Xiongwei Zhai. (2007) Teaching reform and practice of "polymer material foundation". China University Teaching, 11, 43-44.
- [11] Gelu Liu, Yonghui Gao, Xiufang Ye, Jiajie Lin. (2008) Teaching reform and practice of polymer material processing course. Guangzhou Chemical Industry, 06, 89-91.