

Improvement of Talent Training Quality in the Specialty of Functional Materials through the Scientific Research-Promoted Teaching Mode

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ABSTRACT. *Scientific research is an important method and path to elevate teaching levels of colleges and universities. Scientific research is needed by engineering specialties as the backup force to improve teaching quality. Scientific research can promote teaching so as to improve talent training quality. The emphasis in this paper is laid on discussing about the basic idea and measures taken by the specialty of functional materials to promote teaching by scientific research. Talent training results are simply expounded.*

Keywords: *Scientific Research-Promoted Teaching; Talent Training Quality; Innovation and Entrepreneurship*

0. Introduction

Specialty of functional materials, a specially established national specialty, is an interdisciplinary specialty coming into being under national structural adjustment of emerging industries. As one among the first batch of institutions of higher teaching which are nationally approved to establish specialty of functional materials, Suzhou University of Science and Technology formally enrolled students in 2011. Since the foundation, specialty of functional materials has adhered to the teaching guiding thought “integrate scientific research in teaching and promote teaching through scientific research“. Teaching and scientific research supplement each other. As a whole, teaching and scientific research commonly built the talent training environment for institutions of higher learning[1]. Teachers can realize organic combination of impartment of basic knowledge and improvement of basic skills in the teaching process only by integrating teaching and scientific research[2].

As for concrete measures of teaching research and reform, specialty of functional materials attaches importance to extension of scientific research resources to teaching[3]. Teachers should continuously update contents of specialized courses by combining their own research directions, introduce new dynamics and new trends and set up special reports to improve students' interests in materials science. Scientific research facilities established through projects should be open to students by combining course experiments^[4]. We may try the working and learning mechanism integrating tutors, postgraduate students and undergraduates. Scientific manpower class is set up in the latter half of each year to attract a batch of undergraduate students specialized in functional materials to participate in research groups led by teachers. Students' abilities in comprehending learned professional knowledge through literature review, reading reports and cooperative experiments. By attracting a batch of undergraduate students in research groups for extracurricular researches, postgraduate students and undergraduate students can work and exchange ideas in the same research group. On the one hand, this will be conducive to improvement of working quality of undergraduate students. On the other hand, it can improve team leadership of postgraduate students.

1. Exploration into scientific research-promoted teaching

1.1 Scientific research promotes teaching reform

We must depend on scientific research in order to establish a comprehensive curriculum system rich in characteristics. Teachers can improve their own academic quality and academic level by carrying out scientific researches, which is the guarantee for success of curriculum reform. Teachers can review the teaching system and teaching contents, grasp key points and make choices at a higher academic height only if they have high academic levels. As teachers accumulate rich basic theories and professional knowledge in the scientific research work and understand leading-edge academic fields and development trends of the discipline, they can impact latest knowledge about disciplinary development for supplementation in proper chapters and push students to a dynamic process of scientific development.

1.2 Scientific research promotes classroom teaching

Classroom teaching is the main battlefield for university teachers to cultivate students. They can explore into new knowledge, update their knowledge, establish new ideas and viewpoints and improve teaching level at leading edge of the discipline only through scientific research, and only in this way can they avoid inflexible teaching and motivate students' learning interests. They can quote and prove fully in the teaching process and make classroom teaching lively and vivid only by virtue of profound essentials of scientific research so that students can gain deep knowledge, open imagination and creative thinking.

1.3 Scientific research improves undergraduate thesis quality

Graduation thesis is an important link in the undergraduate training program. Teachers should cultivate students' abilities in utilizing learned knowledge in their graduation theses. Students can improve their abilities in analyzing and solving actual problems through the practice in the graduation thesis phase. Teachers should cultivate students' consciousness of innovation and exploratory spirit so that their operational capacity, abilities in independent thinking about and analyzing problems and writing skills can be comprehensively trained and improved. Scientific research basis plays a significant role in cultivating undergraduates' innovation abilities. Letting undergraduates directly participate in research projects will contribute to improvement of their innovation abilities. The effect of scientific research on promoting teaching can be realized through joint efforts made by teachers and students.

1.4 Scientific research helps to improve students' comprehensive abilities

Scientific research activities of teachers can exert significant promoting effects on undergraduate teaching quality. Modern talent training is mainly cultivation of innovation ability. Students' direct participation in scientific research work of teachers is an effective path to cultivate their innovation abilities. These activities not only cultivate students' innovation abilities and operational abilities but also cultivate their organizing abilities, interpersonal skills and communicating abilities. Scientific research not only improves teaching quality but also elevates student's comprehensive qualities.

1.5 Scientific research promotes reform of practical teaching link

16-week course "scientific & technological innovation and practice of functional materials" is set in the practical link of training program of specialty of functional

materials. Experimental contents are mainly combined with scientific research projects undertaken by team members while related teachers undertaking the research projects give practical guidance. The training provided in this practical link can not only improve students' comprehensive practical abilities but also can exert an important guiding effect on the follow-up graduation thesis.

2. Achievements of scientific research-promoted teaching

Since the foundation in 2012, specialty of functional materials has formed a complete and characteristic innovative & entrepreneurial practice system for college students through mutual promotion of teaching and the specialty. Outstanding students with innovation potentials are elected out through two-way selection between teachers and students. Scientific research tutors propose scientific research subjects according to their own scientific research characteristics and research practices while students select subjects based on their own interests and strong points. These practices help to cultivate high-level talents specialized in materials science. From practical results, scientific research activities of teachers indeed exert a significant promoting effect of undergraduate training quality. Over 70% of students in specialty of functional materials participate in scientific research practices led by teachers and have formed their own interests and hobbies in practice. Over 30% of students are approved to participate in undergraduate scientific and technological innovation and entrepreneurship projects and have carried out profound studies towards on scientific research direction as funded by the projects.

Under the guidance of teachers, students' innovation abilities as well as organizing abilities, interpersonal skills and communicating abilities are cultivated by participating in various innovation & entrepreneurship contests for college students. In recent years, we have obtained abundant achievements with 8 undergraduate scientific and technological innovation projects above provincial level and won silver award in 2014 China College Students' Entrepreneurship Competition "Creating youth", bronze award in 2016 China College Students' Entrepreneurship Competition "Creating youth", gold awards in 2014 and 2016 Jiangsu College Students' Entrepreneurship Competition "Creating Youth", second prize and third prize in 2017 Challenge Cup Jiangsu College Students' Extracurricular Academic Technological Work Competition as well as first prizes in international and national innovation & entrepreneurship competitions like "Zhenghe Cup" and "Xiexin Cup".

In the aspect of teaching, the specialty has formed a good students' scientific research learning pattern. After obtaining experimental results through scientific research activities, students complete their scientific research theses with the help of their tutors, based on which they apply for school-level and provincial-level outstanding undergraduate theses. More than 20 SCI scientific research theses with students being authors are published, where 6 students win school-level outstanding undergraduate theses and 4 ones have the honor to win Jiangsu outstanding undergraduate theses, thus improving the reputation of the specialty and promoting undergraduate enrollment work.

3. Conclusion

Talent training is the fundamental task for institutions of higher learning and scientific research is their important function. Modern talent training is mainly cultivation of innovation ability. Scientific research work not only cultivates students' innovation and operational abilities but also cultivates their organizing abilities, interpersonal skills and communicating abilities. Higher education must be based on teaching. Teaching status of a university can be embodied only through the scientific research-promoted teaching mode. Mechanism and system reform can be continuously reinforced through feedbacks from the practice so as to guarantee healthy development of the scientific research-promoted teaching work in the specialty of functional materials.

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