Promoting the Cultivation of Undergraduate Talents of Environmental Engineering Specialty by the Construction of Disciplines

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Keywords: Discipline construction, talents cultivation, environmental engineering

Abstract. In the construction of colleges and universities, training is the center, discipline construction is a leader, both of which are interdependent and promote each other. Based on the analysis of the relationship between subject construction and undergraduate talents cultivation and combined with the development of environmental engineering discipline in our school, this paper discusses how to make use of the achievements of discipline construction to promote the cultivation of environmental engineering undergraduate talents.

The duty of the modern university is to integrate talents cultivation, scientific research and social service. Among them, the cultivation of talents is the primary task of colleges and universities, to improve the quality of education is the eternal theme of colleges and universities. However, as the scientific research and the graduate education promote the evolution of university disciplines constantly, disciplines have also focused on academic research for their own development, thus forming a tendency to dilute the function of talents training, especially the relationship with the undergraduate education gets alienated gradually. Therefore, how to ensure the quality of undergraduate education to cultivate high-quality environmental engineering undergraduate talents; and how to coordinate the relationship between undergraduate education and discipline construction to achieve the integration and interactive development between the discipline construction and the undergraduate education goals, are questions that must be answered positively.

The Relationship between Discipline Construction and Undergraduate Talents Cultivation

The Alienation of the Relationship between Discipline Construction and Undergraduate Talents Training

The disciplines of the university were originally created only for the purpose of talents' training. But in the early 19th century, after the scientific research came into the university, there were some new changes: the disciplines of the university took on two duties of teaching and scientific research at the same time; the university had developed graduate education on the basis of undergraduate education, the scientific research and postgraduate education had promoted the development of disciplines. In this process, the university's talents training function gradually faded, especially the relationship with undergraduate education became alienated gradually [1], and the higher the academic level of the university was, the more obvious this tendency of alienation became. This tendency was mainly due to the contradictions in the development of disciplines and the competition between universities. The core of discipline development is the innovation of knowledge, so it is mainly concerned about the forefront problems of the disciplines. To research and solve these problems, the university teachers need to invest a great deal of energy; and the hard labor is also needed in teaching work. Accordingly, there is a certain conflict between the discipline development and teaching work, it is usually
manifested in the contradiction between research and teaching in universities, which is exactly the phenomenon of preferring scientific research to teaching in the present universities. In the background of building the high-level until the first-class (teaching) research-oriented universities, its evaluation index are mainly academic achievements, including the number of key disciplines, the number of disciplines for doctoral degree granting, the number of the awards of the scientific research achievements, the number of high-level papers and so on, but the weighting of the undergraduates' training quality is not high. People are concerned about the development of disciplines, which relates to the academic reputation and development of schools and teachers, and what they have ignored is the educational function played by the disciplines [2]. As a result, the link between discipline development and the undergraduate education gets increasingly alienated.

Correctly Treating the Relationship between Discipline Construction and Undergraduate Talents Training

The duty of the universities is to integrate talents cultivation, scientific research and social service. The construction and development of the disciplines in the university, while paying attention to the development of the subjects, must further strengthen the function of the undergraduate talents cultivation. The training quality of undergraduate talents is guaranteed by the implementation of the goals of discipline construction. At the same time, the high-quality cultivation of undergraduates provides a powerful force for the development and innovation of disciplines. Therefore, the construction of disciplines and the high-quality training of undergraduate talents can promote each other. The construction of scientific research bases in the discipline construction can provide high-quality practice and innovation bases for cultivating high-quality undergraduate talents. There are a close connection and the technical cooperation between universities and enterprises by continuous research work, which provides a knowledge background and practice environment to train high-quality undergraduate talents. At the same time, a large number of scientific research projects undertaken in the discipline construction, whose research process attracts the undergraduates to participate in, will help to cultivate the creativity of undergraduate talents and guarantee the investment of personnel training funds. In the process of discipline construction, the relevant construction funds are mainly used for the construction of teaching and scientific research conditions, the talents introduction, the construction of books and materials, the construction of laboratories and so on, which can provide strong support for the undergraduates' cultivation[3].

Relying On Discipline Construction to Promote the Cultivation of Talents

In recent years, our school has made a major breakthrough in discipline construction. School of Resources and Environmental Engineering has currently two first-level disciplines for doctoral degree granting of Mining Engineering and Safety Science and Engineering. The second level discipline for doctoral degree granting of Mining and Metallurgical Engineering is set up independently under the first level discipline of Mining Engineering. Environmental engineering is an interdisciplinary subject, involving several research directions, so the achievements of discipline construction in the related subjects have also provided a good foundation for the training of environmental engineering undergraduate talents. And how to play the advantages of discipline construction to improve the quality of training of environmental engineering talents and further promote the construction and development of environmental engineering disciplines is worth considering.

Establishing the Key Position of Undergraduates Training In Discipline Construction

Undergraduate education is the basis of running the university, determining the quality of postgraduate training, discipline development and the level of scientific research. A high-quality undergraduate education often determines a university's reputation. The undergraduate stage is also the key period of the growth of talents, whose knowledge structure, way of thinking, practical ability and academic vision play an important role in future development. Discipline construction should be carried out to the personnel training, and the quality of personnel training is one of the important signs of discipline construction. Henry Rosovsky, the dean of the Harvard Faculty of Arts and Sciences
for 11 years, once said that in the eyes of the traditional Harvard, Harvard's real children can only be undergraduate graduates, a graduate degree can only be granted to a status of collateral relatives [4]. Only by establishing the important position of undergraduate talents cultivation in discipline construction, can we mobilize the achievements of discipline construction and provide academic support and development platform for the cultivation of undergraduate talents.

**Optimizing the Curriculum to Deepen the Reform of Teaching Plan**

To further optimize the curriculum and to deepen the reform of the teaching plan and teaching content cannot be ignored. At present, the speed of knowledge innovation is increasing day by day. Due to the rapid development of the social economy, its demand for talents is also changing constantly. Undergraduate talents training is the first stage of senior personnel training, and is responsible for transporting talents to the society, providing source of students for higher education. If there has been no change in the teaching plan and teaching content for a long time, it cannot meet the above requirements. Studies have shown that the long-term single classroom-teaching model drives students to develop a habit of only looking at the books and only listening to the teachers. Students regard the knowledge in books as absolutely correct, satisfied with the memory of knowledge, do not form a thinking habit on the professional problems, and are not interested in research issues [5]. Therefore, it is necessary to reform the curriculum and teaching plan.

In 2012, combined with the school's reform of the credit system teaching, the environmental engineering discipline developed a new training program and began to implement. The new training program is carrying out a principle, which supposes us to consolidate the basis, broaden the professional caliber, enhance the abilities and improve our quality. And the structure of the curriculum has been carefully designed and scientifically optimized to maintain the original professional advantages, highlighting the characteristics in the field of mining and metallurgy. As the undergraduates majored in environmental engineering live in Huangjiahu campus for the first and second grade and live in Qing Shan campus for the third and fourth grade, there is a lack of communication between low-grade students and specialized teachers and senior students. We have added 16 hours of "Introduction to Environmental Engineering" course in the first grade, which is conducive to the cultivation of professional awareness and interests in learning. In the third and fourth grade, we have added elective courses such as "Extraction of Mineral Chemistry", "Energy Saving Technology and Assessment", "Theory and Technology of Dust Removal", "Operation and Management of Environmental Protection Facilities" and so on, which have highlighted the current social needs for talents in environmental engineering field and combined with our advantages of our school's discipline construction in Mining Engineering, Safety Science and Engineering.

**Promoting the Teaching with Scientific Research to Form the Positive Interaction between Scientific Research and Teaching**

Scientific research is the core of the discipline construction, a high-level scientific research can improve the level of discipline construction and the academic status at home and abroad, enrich the existing academic content, and bring up high-level academic leaders. In the past three years, the environmental engineering discipline of our school has made considerable progress in scientific research, which has won 8 national projects such as the National 863 Program, the National Science and Technology Support Project of the 12th Five-Year Plan, the National Natural Science Foundation of China, etc. It won a second prize of Hubei Provincial Science and Technology Progress Award in 2012 and a first prize of Hubei Provincial Science and Technology Progress Award in 2016. The number of papers indexed by SCI has increased year by year, effectively promoting the development of environmental engineering discipline. At the same time, we pay more attention to the positive interaction and integration between teaching and research, and try to turn scientific research resources into teaching resources and turn research strengths of disciplines and the teachers' scientific research achievements into teaching contents, teachers are encouraged to combine scientific research with teaching organically, the scientific research achievements are brought into the classrooms, students are taught with the latest knowledge and information, all of which have enriched the teaching contents, promoted the improvement of teaching methods and means and improved the quality of teaching.
The research promotes the cultivation of students' innovative spirit and practical ability. The institute encourages students to actively participate in research projects undertaken by teachers, supports students' scientific and technological innovation activities, and provides students with a platform for self-innovation and self-display, which allows students to pay more attention to the analysis of the scientific and technological innovation in a good atmosphere of scientific research. In the school's active advocacy and the strong support of School League Committee and Department of School Work, "the Extracurricular Scientific and Technological Activities (Natural Sciences) Innovation Base for Undergraduates" was established in our institute in July 2006. More than 80% of environmental engineering undergraduates have participated in scientific and technological innovation activities. The backbone teachers of the research are encouraged to guide students in scientific and technological activities. By participating in instructors' scientific research projects, students develop their own experimental program, select the experimental apparatus and complete the experimental project independently, which has stimulated the students' sense of innovation and improved the ability of independent learning and innovation. The skeleton stuff with abundant scientific research experiences and strong scientific research ability are served as advisers, which can stimulate students' interest in scientific research and improve the quality of scientific and technological activities. Through the learning and research of the extracurricular scientific and technological activities, our students have made obvious improvement in the practical ability, innovation, and comprehensive quality and so on, and have made outstanding achievements in various competitions. They have received more than 5 provincial and ministerial level awards, more than 20 patents, and have published more than 40 papers. Among them, in the 13th session of undergraduate students, Wulong Ding et al.'s entrepreneurial plan of Ling Yang Technology Limited Liability Company, won the bronze award in the Hubei Province University Students "Challenge Cup" Outside Business Plan Competition. In the 16th session of undergraduates, Zhihong Gao et al. designed and created a multi-functional electrostatic dust screen window and got the national patent licensing of "a plug-in electrostatic screen window for air purification", and the CLEAR Environmental Technology Limited Company established by them won the bronze award in the Hubei Province's "Chuang Qingchun" College Students' Entrepreneurship Competition in 2016. In addition, the backbone teachers of scientific research guide students to do the graduation thesis with "real swords and spears", which is another embodiment of turning the discipline construction resources into educational resources. The title of undergraduates' graduation thesis is directly from scientific research tasks, which is helpful to cultivate students' scientific thinking ability and to improve the quality of graduation thesis. And in the past five years, the ratio of that the title of undergraduates' graduation thesis (except graduation design) is directly from scientific research tasks was always 100%.

Promoting the Improvement of Experimental Condition by Discipline Construction

With the intensification of disciplinary construction, the increase of scientific research projects, the improvement of scientific research level, the increase of scientific research funds, and the gradual increase of the input of experimental equipment, the experimental teaching condition has been greatly improved. Environmental engineering laboratories currently have meteorological chromatograph, liquid chromatography, atomic absorption spectrophotometer, atomic fluorescence spectrometer, smoke comprehensive analyzer, total organic carbon analyzer and other large instruments, which can basically meet the teaching needs. The improvement of laboratory condition has greatly improved the quality of undergraduate experimental teaching. At the same time, by creating condition to open the laboratory and highlighting the comprehensive and designing experiments, students have obtained the cultivation of self-learning ability and the inspiration and guidance of innovative thinking on the basis of mastering experimental techniques and methods.

By using the advantages of discipline construction, the connection between the contents of experimental teaching and the achievements of scientific research has been strengthened, the contents of experiment have been enriched, and the level of experiment has been improved. The undergraduate students have been provided a high-quality experimental environment by making full use of the equipment in scientific research laboratory. On the one hand, the achievements of scientific research
and the experimental techniques are introduced into experimental teaching, which promote the continuous renewal and development of experimental projects. On the other hand, by opening the comprehensive, designing and innovative experiments, experimental teaching has been changed from the simple validation of theory in the past, which is to cultivate the students' comprehensive ability and innovation consciousness in the experimental design and analysis, the process of finding and solving problems and so on.

**Leading the Construction of Teaching Staff with Discipline Construction**

Disciplines are fertile ground for the development and activities of talents. Only by high-level disciplines, can high-level teachers be forged and can a group of high-level scholars be gathered. According to the needs of environmental engineering discipline construction, our school has tried to improve the construction of teaching staff constantly. The growth of the teaching staff and the improvement of the teaching level provide an intellectual support for the undergraduate talents cultivation. By using the approach of "pass, help, guide" and "bring in and send out", the teaching staff level has been continuously developed. In the past five years, the Environmental Engineering Department has introduced 5 doctors from the "985" key universities, three of whom were funded by the Youth Found of National Natural Science Foundation of China. And another one, as the first person to complete, won the second prize of scientific and technological progress in Hubei Province in 2012. In 2011, the Environmental Engineering Department introduced one professor of Chutian Scholars and one distinguished professor of Xiangtao Scholars. And currently, the Xiangtao professor has opened one course for the undergraduates and actively instructed undergraduates' graduation thesis (design). In 2009, the Environmental Engineering Department sent a selected teacher to Australia for a one-year cooperative research, who has published three SCI papers during the period. In addition, two young teachers were supported by China Scholarship Council Local Cooperation Program and went to study in the United States for one year. Through these methods, a powerful, innovative and collaborative echelon of disciplines has been developed gradually, which has reasonable structure of age and learning, promoting the cultivation of undergraduate talents.

**Acknowledgement**

This work was financially supported by a research Grant from the Provincial Teaching Research Program of Colleges and Universities of HuBei (2016237); Provincial Teaching Research Program of Colleges and Universities of HuBei (2013231); Teaching Research Program of Wuhan University of Science and Technology (2012Z93).

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