

A Study on Interdisciplinary Knowledge Development of Engineering Postgraduate

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Abstract: In latest trends, in order to meet the social development requirements of complex high-level talents, the universities have positively taken measures in interdisciplinary postgraduate cultivation. However, the interdisciplinary cultivation still has remained in the stage of emphasizing on more the theory than the practice. As a result, it is difficult to form a complete knowledge system of application and innovation. This paper explores the interdisciplinary postgraduate cultivation mode, which includes the education means, the interdisciplinary lectures, the academic exchanges and the teaching experiments. It is shown that the reformed interdisciplinary cultivation pattern can not only promote the virtuous cycle of teaching and learning, but also strengthen the postgraduates' practice and innovation abilities.

Keyword: Engineering postgraduate; Interdiscipline; Knowledge development

1. Introduction

With the rapid development of science and technology and highly integrated and complex nature of social problems, Interdisciplinary postgraduate education has become an important trend in the development of higher education in all over the world^[1-3]. The engineering postgraduate education, as the highest level of higher education, must adapt to the academic and social development^[4].

The interdisciplinary postgraduate training has very important theoretical value and practical significance to cultivate the innovative talents, promote the construction of teaching staff and accelerate the interdisciplinary development^[5-6]. At current, the interdisciplinary research has greatly made progresses in the fields of technology, economy and social life.

The core of this paper is to discuss how to break the barriers between different disciplines and establish a scientific mechanism for the interdisciplinary engineering postgraduate training. So, the remainders of this paper are organized as follows: in section 2, we analyze the current situation of domestic and foreign interdisciplinary engineering postgraduate cultivation. The suggestions on the

postgraduate education are described in section 3, and the section 4 gives a summary of the interdisciplinary education.

2. Situation analysis of the domestic and foreign related interdisciplinary engineering postgraduate education

In recent years, in order to meet the requirements of the social development of the compound high-level talents, the world first-class universities have carried out the research on the interdisciplinary engineering postgraduate cultivation^[7-9]. Taking the postgraduate education in the United States as an example, a number of universities have established the course system, teaching-practice platform and teaching staff to promote the postgraduate cultivation^[10-11]. For example, Massachusetts Institute of Technology has established a special “science, technology and social planning” school, which is organized and planned the interdisciplinary education of postgraduate in the mutual cross domain of nature science, technology science, humanities and social science.

Compared with the training scheme of foreign first-class universities, a number of colleges or universities in China have gradually carried out interdisciplinary training for postgraduates^[12-13]. For instance, Peking University has formed the interdisciplinary biomedical research center, which involves the biomedical science, nature science and applied science and social science, to implement the postgraduate training. Institute of plasma physics, Chinese Academy of Sciences has also cultivated the postgraduate of interdisciplinary domain in physics, chemistry and biology.

In spite of some achievements on the interdisciplinary postgraduate education in china, on the whole, there is still key problem, which emphasizes on more the theory than the practice. As a result, it is difficult to form a complete knowledge system of application and innovation^[14].

3. Suggestions on the interdisciplinary engineering post- graduate education

The current interdisciplinary engineering postgraduate education lies in the problems as follows: Firstly, the concept of interdisciplinary education must be further strengthened because people from all walks of life would rather hope that the postgraduate should skillfully grasp single discipline knowledge. Secondly, the postgraduate’s knowledge reserve is relatively lack since the current postgraduate education is more emphasized on the professional courses and less paid attention to the general education courses. Thirdly, the interdisciplinary exchange is not enough as the academic

exchange of interdisciplinary is required to possess more different disciplinary knowledge and skill. Fourthly, the resource sharing mechanism has not been perfectly established for the interdisciplinary postgraduate cultivation is bound to involve the problem of resource utilization and allocation among different discipline domains.

According to the above mentioned problem of interdisciplinary education of engineering postgraduate, as shown in Figure 1, the suggestions are presented from the following measures.

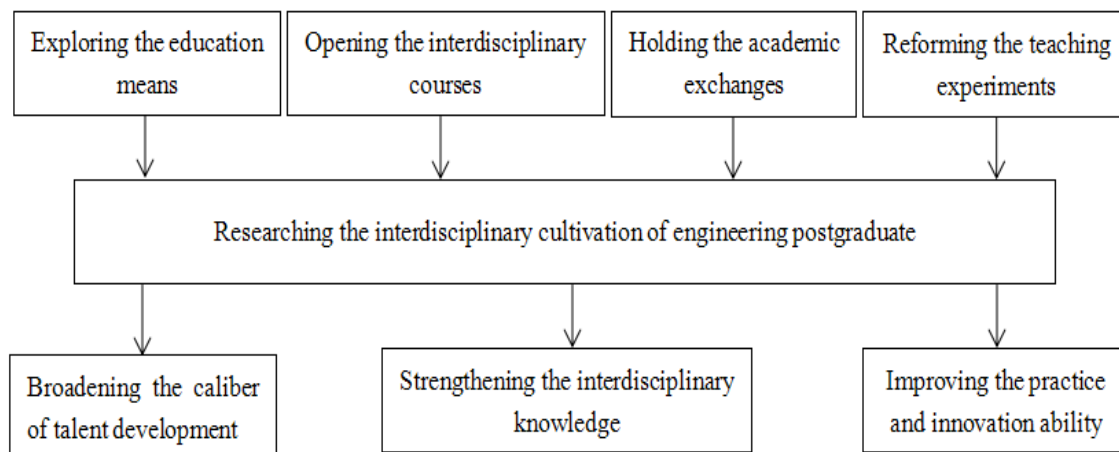


Figure 1. The flowchart of interdisciplinary engineering postgraduate's cultivation

3.1 Exploring the education means of interdisciplinary engineering postgraduate

Since the long-term professional education has made the engineering postgraduate narrow knowledge, the interdisciplinary postgraduate education is highly concerned, which breaks the professional boundary and guides the postgraduate to develop the general education.

If we excessively emphasize the stability of teaching plan and cultivation system in education, which is difficult to form the characteristic or distinctive discipline, it is not conducive to the cultivation of high level talents. Therefore, how to change the education methods? The multidisciplinary teaching staff is organized to guide every postgraduate's learning and practice and the engineering postgraduates should study the general knowledge by the interdisciplinary education.

In conclusion, the disciplinary intersection and integration is not only the source of innovation of science and technology, but also the indispensable way to improve the postgraduates' practice and innovation abilities, even cultivate high-level innovative talents of science and technology.

3.2 Opening the interdisciplinary courses and lectures

There is a great barrier in the current interdisciplinary postgraduate education in china, which is lack of disciplinary intersection and integration, to hinder the postgraduate development. So, the

construction of interdisciplinary course must be strengthened, to a certain extent, which enriches the engineering postgraduate's general knowledge.

In addition, the teachers in different disciplines regularly hold lectures on the hot or frontier discipline topics. Facing the engineering postgraduate education, the teachers should use the advanced, frontier, practical and systematic discipline knowledge to develop the compound high-level talents of interdisciplinary. In order to better direct the postgraduate's practice and innovation, the universities or researching institutes in china strive to construct the compound-type tutor team to cultivate the postgraduates' multidimension knowledge.

3.3 Holding the academic exchange activities

It is widely accepted that the academic exchange in essence has four distinct characteristics. Firstly, the involved theme is extensive. Secondly, the participants are not limited. Thirdly, the discussed form is flexible. Fourthly, the communication atmosphere is active. Through holding the interdisciplinary academic exchange of arrangement, organization and hierarchy, the engineering postgraduate's perspective will be broaden and the postgraduate's creative thinking can be inspired. Therefore, the academic exchange activities of multiple forms should be regularly held.

First of all, the academic exchange is helpful to construct the free and easy academic environment and atmosphere. It is the freedom of thought and speech that is one of the essential characteristics of academic exchange. In the academic exchange activities, all participants, who are equal, can freely discuss. So, this free and relaxed academic environment will contribute to the new thinking generation.

Secondly, the academic exchange helps the postgraduates complement and improve the their disciplinary knowledge. Academic exchanges activity does not restrict the participants' identity, regardless of age, sex, nationality, race and academic background. Therefore, the involved postgraduates easily form a "brainstorming", which is conducive to developing the postgraduate's creative thinking and academic quality.

Finally, the academic exchange is helpful to the formation of critical consciousness and methodology. Because criticism breeds innovation and methodology makes progress in science and technology, the organic combination of both sides urge the postgraduates' practices and innovations.

3.4 Reforming the teaching experiments

It is widely accepted that the perfect teaching experiments not only help the postgraduates' content comprehensions but also complement their interdisciplinary knowledge. Therefore, the tutor should prepare the related teaching experiments on hot or frontier interdisciplinary contents to give

the postgraduates lectures. At the same time, a number of designing and innovative experiments should be opened to make every postgraduate thinking and practice.

Relying on the teaching experiments, the teachers can turn the boring theory into the practical application, enrich the postgraduates' practical skills and conduct their innovations.

4. Conclusion

The engineering postgraduate education is the highest level in higher education, which is an important symbol of the school-running level. We should pay close attention to the hot issues of engineering postgraduate education, continuously strengthen the postgraduate's management level and positively improve the postgraduate's development mechanism.

In accordance with the requirements of engineering postgraduate education, this paper has presented the following suggestions. First of all, exploring the interdisciplinary education means. Secondly, opening the interdisciplinary courses and lectures. Again, holding the academic exchange activities. Finally, reforming the teaching experiments. Therefore, it is shown that the the aforementioned measures can not only broaden the caliber of talent cultivation, but also improve the engineering postgraduate's interdisciplinary knowledge and innovation ability.

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