Study on the Ways of Training on Engineering Talent Vocational Ability for New-type Industrialization

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Abstract. For the new path of industrialization with Chinese characteristics, it is imperative to cultivate a large number of engineering talents which can adapt to and support Chinese industry development, in higher education of engineering. For new-type industrialization, inquiring the effective ways of training on engineering talent vocational ability, it is necessary for the reform of Chinese higher engineering education system which is based on the ability. In the paper, the goal of Chinese engineering talent training and the content of engineering talent vocational ability are expatiated. Some existing problems of training on engineering talent vocational ability in China are explored. Some countermeasures of establishing the system of engineering talents vocational ability training are put forward in universities in our country, such as perfecting the teaching system from the aspects of education idea, curriculum, teaching method, constantly perfecting the cooperative model about enterprises, universities and development, etc.

Introduction

After the implementations of the new path of industrialization with Chinese characteristics and building an innovative country, which have put forward impending requirements for the innovation and development of the higher engineering education in China. In order to keep up the new path of industrialization with Chinese characteristics, it is imperative to cultivate a large number of engineering talents which can adapt to and support Chinese industry development, in higher education of engineering. It should be strengthened a sense of meeting the needs of national strategies and market and enterprises. According to the education idea of morality-first, ability as the most important and full development, higher engineering education system of continuous reform and perfection should be set up to adapt to the development of society and economy. With general university students of engineering as objects in the paper, the problems of training engineering talent vocational ability in our university are put forward for new-type industrialization..

Some Relevant Theoretical Foundations

The Cultivating Objectives of Engineering Talents in Our University. Each university should set up cultivation objectives of education according orientation of running university. For example, our university is a provincial key university and co-sponsored by province and ministry. Following are the cultivating objectives of engineering talents in our university. The engineering talents cultivated by our university should have wide-range of theoretical knowledge and rich experience in practice, be familiar with discipline front tendency, the latest theory and the new methods of profession. The engineering talents cultivated by our university should have the technical innovation ability, be future brilliant engineers of our country and the enterprises in order to meet the needs of economic and social development.

Connotations of Vocational Ability. Vocational ability is the ability which can finish the fixed occupation missions, formed by knowledge, practices, skills and attitude integration and transfer by

generalization. International and domestic academics have studied the connotations and structure of professional ability. In 1999, “develop guidelines on the general framework of the teaching plan for vocational related courses” was passed by KMK in Germany, which divided vocational abilities into specialized abilities, method abilities and social abilities [1]. Through the further investigation of German vocational education, professor D.Y. Jiang points out that the professional abilities of German “Dual System” are made up of specialized abilities and key abilities, specialized abilities are fundamental indispensable abilities for practitioners to complete professional tasks and activities. Key abilities derive from and exceed specialized abilities, are vertical extension of specialized abilities [2]. Key abilities are made up of method abilities and social abilities. Specialized abilities and key abilities can make professional abilities continuously ascend as spiral. The connotations of professional ability are depicted on Fig. 1.

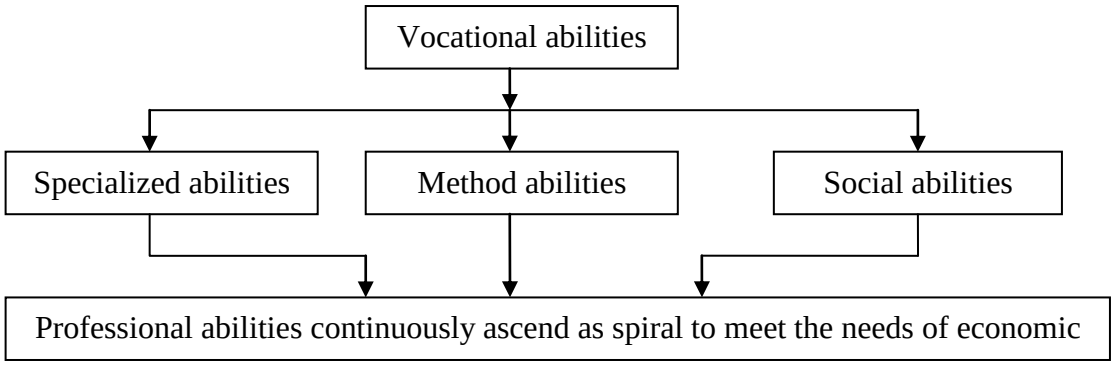

Figure 1. The connotations of vocational ability

(1) Specialized abilities. They are related necessary knowledge & skills for student employment and the fundamental manifestation of vocational abilities, emphasize capability concerning the professional technology aspects.

(2) Method abilities. They are related necessary working methods and learning methods. With the rapid development of science and technology, the abilities with continuously obtaining new information, new knowledge and skills and learning to learn have become the important part of vocational abilities.

(3) Social abilities. They are the kind of behavior standards, values and attitudes in life, including interpersonal skills, processing public relations skills, occupational ethics and innovation abilities, etc. In particular the abilities of innovation have become a decisive factor in competition for new-type industrialization [3].

Some Existing Problems of Training on Engineering Talent Vocational Ability

A Lack of Scientific Understanding of Vocational Abilities of Engineering Talent. About the training target of engineering talent, our universities often got vocational abilities and skills confused in the past, deemed training specialized abilities as training professional abilities. So, we should comprehensively understand the connotations of professional ability, train engineering talents nurtured in universities in universities with strong vocational abilities to adapt to the needs of the development of social economy.

Imperfect Teaching System of Vocational Abilities Training. (1) At first, the core curriculums deviate from the construction of professional abilities. Course arrangements should reflect the basic requirement of professional abilities. But in fact, the course arrangements of some universities have not fully functioned for specialized abilities and key abilities training of engineering talent. (2) Practice

teaching can not embody requirements of vocational ability training. Although practice teaching have be pay more and more attention, the attentions remains surface such as fund into laboratory construction and so on, which cause separation of practice teaching and theory teaching. All of the above can not make students achieve the practical teaching goal at last. Secondly, the teaching methods are simplex, which is expressed in the traditional-style teaching methods, less of the teacher-student interaction, etc. From lack of practice, students cannot have a fully rounded understanding of the subject. Even now, some universities adopt some practice teaching means such as sandbox exercises, many of the cases and examples discussed, simulated negotiation have certain loopholes. (3) Teaching methods and examine manners lag behind. Teaching methods always concentrate on teachers, the subject status of the student was often ignored. The teachers habitually focus on grade of students and ignore vocational abilities training. Especially the innovative awareness, dialectical thinking and the independent learning ability of engineering students have always been ignored. All of the above cannot help students develop independent thinking and enthusiasm of the innovative. It is disadvantage for our universities to train engineering talent vocational ability for new-type industrialization.

The Lack of Support from the Government. (1) Our governments don't have a comprehensive understanding of the function of cultivating engineering talents at university. Some local governments are not fully aware of training vocational abilities of engineering students for the benefits of local economic development. Because of a lack of awareness, some local governments cannot properly guide for training professional abilities of engineering students, haven’t developed corresponding guide policies and incentive measures, haven’t provide financial support. (2) The government's services are vacancy. Our governments should provide a platform for school-enterprise cooperation, establish and improve service system of school-enterprise cooperation. There are differences in values and goals between enterprises and universities, so there are many practical problems which are needed to be solved. For example, How enterprises and universities share the cost? How to determine the rights and obligations? How to coordinate and communicate? Our governments should provide effective services to solve these practical difficulties [4].

The Construction of Training System of Engineering Talent Vocational Abilities

Building up Scientific Teaching Ideas of Engineering Talent Training. Building up scientific teaching ideas is directly related to teaching effectiveness and the quality of talent cultivation. Traditional teaching ideas lead to the emphasis of imparting knowledge and neglecting the students' application ability, which does not reach new training aims of engineering talent. So scientific teaching ideas of engineering talent should be build up, the old, traditional teaching methods and means should be changed.

Improving and Perfecting Teaching System of Engineering Talent Vocational Abilities Training. (1) The certificate qualification test in our country should be as teaching guidance, engineering specialty in our university should set up course structure according our own university-running characteristics. For integrating with the international practice, China implements the certified qualification system for engineers. Our universities engineering teaching can set up related course according to national professional qualification examination for the teaching orientation. For example, there are professional qualification examinations for national registered engineers in consultation, supervision, construction, cost and bidding experts, etc, in our construction industry[5]. Their testing knowledge systems have a lot of similarities, are closely related to the curriculums of project management specialty and building cost of projects specialty. When setting up the curriculums of engineering specialty in our university, the subjects of certificate qualification text should cover most courses offered by the cultivating plan, increasing the share of related knowledge, which can lay a foundation for students to participate the examination of qualification certificate after graduation. On the other hand, the course structure should be set up according to our own university-running

characteristics. For basing upon the road of distinctiveness, the course structure of engineering specialty in our university should stand out our university own unique superiorities [6]. (2) Reform the educational model constantly. Teachers should change traditional cramming method of teaching, adopt some new methods such as heuristic teaching, discussion teaching, case teaching and so on, for fully inspiring students abilities to gain knowledge actively, enhance the self-development, create fresh innovations, Teachers should guide students to solve problems with their knowledge.

Constantly Perfecting the Cooperative Model About Enterprises, Universities and Development. (1) Establish long-term off-campus bases for interning and training. Long-term off-campus bases have provided students with opportunities to learn and train their skills in real environment, to improve their own basic vocational abilities. Through such cooperation, universities can fully understand the enterprises demand to employees, so that universities can constantly adjust the major setting and course system, to meet the needs of improving their own basic vocational abilities [7]. (2) Our government should formulate relevant support policy. Investment in education should be enlarged, in order to improve vocational abilities of engineering students for abundant resources and training education practice. Our government should actively explore to establish a system to share the cooperative mode expenses, encourage enterprises and universities to enlarge the investment in education and share the benefits of cooperative mode. Our government should provide incentives, funded assistance and favorable policies for the cooperative mode[8]. (3) Industry associations or professional groups should establish the vocational abilities standards according to the characteristics of industry, provide vocational training, simulation training. With certifications, employers can get reliable references to know the vocational abilities of engineering talent in universities.

Summary

The connotations of training on Chinese universities engineering students vocational ability for new-type industrialization should take specialized abilities as the fundamental contents, improve students' moral, scientific and cultural qualities, focus on training on students' learning, practical and creative abilities. And Chinese universities should take into full account their own university-running characteristics and the needs of economic development for training on engineering students vocational abilities. In addition, the government and the society should increase efforts in support for constantly perfecting the cooperative model about enterprises, universities and development.

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