

An Exploration of the Ways to Foster Innovative Talents of Science and Technology on Higher Engineering Education

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Abstract:

The 21st century is the century of innovation and the competition of talents.

The innovation of science and technology is the key for a nation to be strong in the world; it is also crucial for an enterprise and a research unit.

Taking a view of the reforms of higher education in the world, we can see there is a common feature that to foster the talents who have the innovative ability and high quality has been put in the first place. Therefore, implementing the scientific and technological reforms profoundly is seriously required to meet the needs for the construction of national economy and the social development.

This article discourses on how the higher engineering education fosters innovative talents and it includes the following main points: form the people-oriented concepts of scientific and technological development; pay attention to developing the innovative abilities; the ways to foster high quality innovative talents.

I. Form the people-oriented concepts of scientific and technological development

In order to further develop science and technology, the strategy of invigorating the country through science and education, and the strategy of sustainable development are the key to materialize these policies successfully, which lies in whether we can improve our national innovation ability and foster or bring up high quality innovative talents or not.

The main purpose of higher educational institution restructuring is setting up the people-oriented scientific and technological development.

1. Macroscopically speaking, according to the basic theme of Marxism

The core of social development is the development of people. People are not only the social development motive power and social value, but also the fundamental aim of social manufactory and cultural development. In addition, people are the basic measure of social progress. Moreover, social development and progress are mainly reflected in many aspects, such as people's development, their satisfaction of subsistence and development demand, and their quality improvement. Without shifting the economic social development to people's all-round free development, the development itself must lose its way and direction to move on.

2. Related to the challenge and competition of scientific and technological development

Competitive education and innovative talents are still playing a crucial role in this field. That is to say, successful crux depends on high quality talents. He, who has such talents, gets the advantage of development. Many facts show us a truth that colleges must give priority to fostering outstanding talents and bringing up distinguished scientific research team. In that case, such colleges and team must bring an inestimable contribution to the innovation and development of social technology. Otherwise, if we disregard talent training and lack a high quality scientific team, the college, the state, and even the whole nation will lose the smooth progress and a prosperous future.

3. From the perspective of people's material and mental requirements

Self-realization belongs to the highest rank. In order to encourage employees' strong innovative desire and cohesion sense, a successful enterprise or scientific research institute always create a work atmosphere to make them believe they can realize their own value. That is why some institutes that have no good condition and high salary still attract many talents for they believe they will be valued and they can give a full play to their important roles. In a word, they will meet their requirement of self-realization.

Therefore, talent fostering oriented by people is not only the strategic measure to raise science and technology, but also the target of strategic higher engineering education in the new century. All the leaders must pay enough attention to people-centered management, and understand, trust, and take care of the talents. In addition, they should create a sound atmosphere for them to turn eminent. The first step must be the talent fostering and the establishment of the competitive system, then we can make full use of employees' or talents' activeness and creativity.

II. Pay attention to develop people's innovative ability

Among all intact factors, innovative ability is the core and the most active one. Thus, the key to fostering high-quality talents lies in the development of innovative thinking. Then, how to raise and develop it?

1. Expectation brings innovation

Everyone has innovative ability, which does not only belong to genius. With that consciousness, you will get sensitive to novelty, creative courage and strong willpower. Generally speaking, activeness changes quantity, while creativity brings change to quality. Whatever a new achievement finite on research, on system building, on policy restructuring or even a good idea or daily suggestion, they are all innovations in different levels. We should overcome our habitual thought, and never be a striker of it. We must positively discover the problems and solve them creatively by the use of knowledge. If we can think in a different way boldly, we will find innovation everywhere.

2. Talent transfer makes innovation

The scientific research of higher education is a great innovation task. Only through the member restructuring, and subject overlapping will the innovative thoughts and views come out. Rather, there are some drawbacks in many higher educational systems. On one hand, it is caused by their misunderstanding on talent exchanging. Some leaders believe stability of people's posts is very helpful for work and they do not like their technology pillars to be exchanged. On the other hand, we have no good talent opening exchange system with competitive and cooperative principles. Some talents work in the same position for years and never change from graduation to retirement, which restricts people's knowledge extension and in-depth development, and innovation playing. Therefore a normal exchange of people can effectively avoid academic inbreed, and enhance people's stability by the self-coordinate function in groups.

3. Combination of arts and science arouses innovation

A famous motto about innovation says that: "Innovation is a new combination of old contents." Assembled plans of old elements and contents come from a wide range of knowledge. Fresh eyes and mind often find new thinking ways and reasons to solve old problems. Otherwise, narrow knowledge coverage has limited space for innovative thoughts.

The innovation development is related to image thought closely, however many talents majoring in science and technology educated in higher engineering education are good at all rigorous abstract thought and logical deduction, but poor in image thought which is full of imagination. For there are more and more overlaps, comprehensive parts in subjects and technology fields, the relevant parts of technology become wider and wider. In order to solve complex problems smoothly, we need to learn in different aspects, even including politic, economic and military affairs. Thus we should encourage students to read widely, esp. the books about social science. Knowledge is like a net, and subjects are the meshes between

mutual-relations. The wider and deeper we learn, the better understanding on subject combination we can get. In that case, we can strengthen our imaginative powers and improve our innovative abilities.

4. An innovative leadership brings innovation

A commonplace leader does not care about innovation, a worse one who is jealous of other's talents suppresses innovation, only a leader full of innovative ideas in his mind can bring and support innovation. An innovative leader could be his subordinates' example in action, create a perfect work atmosphere, and encourage people badly. By the use of this kind of managerial method, a good leader can strengthen people's inter-motive power, and make them innovate ideally. So the leader's innovative mind is the most important support of innovation.

III. An exploration on the ways of talent fostering on higher engineering education

Einstein once said: "imagination is more important than knowledge, because knowledge is limited, while imagination generalizes all. Imagination puts the world step forward; it is the source of knowledge progress as well." Fostering and training students with innovative thoughts is the central task of our higher engineering educational reform.

1. Enhance the fostering on students' innovative thoughts

In order to enhance the cultivation of students' creative thoughts, the first step is the fostering on students' practical abilities. Lack of practicability is a serious disadvantage of our former education, which is caused by two reasons: first one is related to teachers. Most of them usually teach from one college to another, short of practice, the other is about students, they often learn theories all the time, have no chance to practice either. Besides guiding students to take part in scientific activities through "producing-studying-researching" combination, we must arouse their innovative desire, give them opportunities to make full use of their specialties, let them think through practice and studying in innovation, thus fully developing their innovative thoughts constantly.

Youth is the most active period for students' innovation. Participating in scientific activities can offer a stage to show their imaginations, a chance or conditions to make the imagination come true.

2. Improve students' abilities to understand and master knowledge

In the age full of knowledge and economy, society asks for talents with higher adaptabilities and flexibilities. In that case, he who knows narrowly, just the major things, but little about economy, management, arts, environments and ecology, will be hard to meet the social requirement. Thus, higher engineering education needs to foster and train students how to

analyze and address problems with their knowledge. The all-around talents who are good at both engineering technology and the background knowledge are needed. Students believe that only by taking part in scientific activities can they understand the importance of basic knowledge. Furthermore, the activities shift the students' former passive learning way to an active one, and teach students "how to innovate in studying, and study in innovation."

3. Strengthen students' operational abilities

Being short of operational abilities is a frailty of college students. A professional teacher who works in laboratory said, when students take experiments, the oscillographs always break down by their random operations. Li siguang, the famous scientist has said "no inspections and experiments, no theory abstractions. In that case any theory and inference is devoid, is just flip in the air." Engineers who have no operational abilities can gain nothing. Scientific activities provide us with a good opportunity to engage in engineering research. When students are short of money during their researching, they will solve the problem by any means. For instance, they make substitutes instead of buying a piece of expansive equipment. If they have to buy one, they will consider repeatedly, and then choose the best plan. Meanwhile, they get such virtues as hard work and thrift in the progress.

4. Enhance students' social responsibilities, and improve their communication and cooperation abilities

Nowadays, science and technology develop rapidly. No one can gain achievement without communication and cooperation. So we guide students to engage in scientific activities as early as possible. That asks for teamwork, thus everyone has different work: someone asks tutors for technical help, and someone solicits support for equipment. Obviously it is an effective practice on communication and cooperation. Dealing with scientific research, we must maintain an earnest and serious attitude. All the experiment data and project achievements speak for themselves. The attitude is very helpful to enhance responsibility.

5. Advocate students to engage in scientific research as early as possible, and foster their vigorous initiative and fearlessness of difficulties

The modern college students have many interests and colorful lives, but there are also some negative ones. Some people wallow in computer net games, some people have no motive power in studying, dancing and dating all the time. However, the scientific activities that are full of contents and interests attract many students to take part, vitalize them and make them vigorous initiative gradually. But there are some difficulties for students, such as the limited conditions and the deficient theoretical fundamental. In order to tackle the key problems, some students even study for days without sleep. Joy is the fruit of sorrow. So when we see every new innovative research achievement, we do know that is full of students' hard work.

In the recent years, our university gains a lot of achievements and experiences from developing students scientific activities and research. We conclude in 3 points as follows:

1) As a university of technology, science and engineering culture is the main trend, which asks for a sound atmosphere. We need to invite relevant experts to give lectures about academic studying and science popularization in “Sunday Lecture” weekly. As to scientific and technological teaching, on the other hand, we should advocate students to like it, stress it, and make full use of it, in which way to enlarge the number of students who take part in scientific activities and research

2) Scientific activities and research change the passive situation where teachers usually look for their students. Now, in the researching process, when students face difficulties, they ask tutors for help actively. That strengthens their learning and research enthusiasm.

3) Students’ scientific activities and research are the innovations by their own mastery, however, microscopically speaking, that are also under the organization and plans guided by college leaders. Therefore the universities and colleges need to supply the necessary soft and hard safeguards to ensure the progress of scientific activities and research.

References:

1. Zhang XiMei, On the Cultivation of Innovative Talents in China Higher Education in the New Century, Asian Education, 2003.8
2. Zhu Gaofeng, Shen ShiTuan, The Engineering Education in the 21st Century, Higher Education Press, 2001.12
3. Zhu JiuSi, Competition and Transformation, Huazhong University of Science and Technology Press, 2001.3