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The discussion of information engineering innovative talent training mode

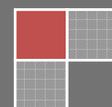
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ABSTRACT

This paper analyses and discusses the problem of the cultivation of college students' innovative thinking and the cultivating innovation ability of the students by building a scientific and reasonable practice teaching system , changing means of experimental teaching , designing and renewing the contents of the experimental etc. Introducing innovative concepts in university education and using new technologies and new means to the practice teaching based on experiment teaching reform and innovation, it is an effective way to develop creative spirit and innovative capabilities of senior professionals.

KEYWORDS

Innovative thinking; Practice teaching system; Experiment teaching reform; Practical ability; Creative ability.



INTRODUCTION

China's renowned scientist Qian Xuesen suggested to Wen Jiabao: "One of the important reason that China is underdeveloped is because no college or university can run a school in a mode that educate scientific innovative students. If the schools have no unique innovation, it is hard for outstanding talents to stand out. This is a big problem^[2]."

In the process of building an innovation-oriented country, we are badly in need of innovative talents. An innovative talent requires innovative awareness, innovative spirit and innovative ability. The formation of innovative talents is a comprehensive process affected by many external factors and internal changes. Higher education is the key link of this process. How to establish a high-level and high-quality innovative talents training mode has become the focus of China's higher education.

In order to train information engineering innovative talents, we should first train students' innovative consciousness, which requires students to carry out creative learning, actively participate in learning, seek underlying relationships between knowledge, eager to find problems, do the research and solve them. We should guide the students to construct their own knowledge system depending on their own demands. Secondly, we should change the old monotonous teaching method which is heavy on theory to a method that is focusing on broaden students' knowledge, and strengthen their practical ability. One of the objectives of the new practical teaching method is to improve college students' innovative ability, and to increase students' innovative spirit^[1].

ENCOURAGE CREATIVE THINKING

Innovation is the power of a country's development, and innovative training is one of the goals of universities. Innovative thinking is the foundation of innovation, thus we need to foster students innovative thinking first.

First, we should foster students' spirit of "be curious and pursue for truth". "Be curious and pursue" for truth is the power of innovative thinking, the source of innovative consciousness. Only curiosity can urge people to look, think and research initiatively. Einstein once said: "I never have some kind of special talent. I just like to get to the bottom of problems." That reveal the truth of innovation: the spirit of "be curious and pursue for truth" and never give up on dwelling is the base of the success for innovation. Thus, we should encourage students to jump out of the old formed knowledge system to pursue for the "real" knowledge, decrease the dependency on others and be a person unswervingly pursue for truth^[2].

Secondly, we should foster students' spirit of "question and critique". This means that a person should be able to raise their own opinion and have the faith to challenge the authority. Great scientist Li Siguang once said: "We shall never see the truth without doubt." Newton told us by his experience: "No bold guess, no great discovery." Question and critique is the source of innovation, which is not only an important thinking, but an important way to solve problems as well. It has unlimited influence on the growth of students' innovative thinking. Universities should foster students' spirit to be rationally critical. Students shall never have blind faith on authority, they should dare to question the authority and break the rules. Only that can lead to innovation.

Thirdly, we should encourage students' spirit of "explore and discover", which means that training students to absorb and digest existing knowledge and apply it to productive practice positively. Students shall explore unknown knowledge and future's life fearlessly, put forward their own idea, look for the method of solving problems, and achieve the goal of being innovative.

REFORMATION OF PRACTICAL TEACHING SYSTEM

Practical teaching is the key to ensure the quality of talents in universities and colleges. It also plays an irreplaceable role in shaping students' engineering quality, scientific quality, and innovation quality. Previous teaching methods are more focused on the theoretical part, and pay less attention to the practical part. The resources and contents for practical teaching are limited and lack varieties; hence, the result is unsatisfactory, and not beneficial to encourage students' practical ability and innovation ability. The old teaching method is unable to meet the needs of modern teaching and in needs of reform urgently.

Reformation of experimental teaching method, strengthen students' practical and creative thinking abilities

The purpose of experimental teaching is to train students' comprehensive ability, innovative spirit, and educating inter-disciplinary talents. Therefore, we start reconstructing, optimization, design and innovation of informational technology experiments from the fundamental level. Meanwhile, pay attention to students' technical skills training, pay attention to their aptitude, increase interesting aspects, practicability, and exploratory in learning. Also, we need to increase the proportion of comprehensive design and innovation development experiments. As a result, we can achieve the restructure of experimental teaching model.

As for experimental teaching system: the foundation is to develop its own ability; innovation is the goal; a system that is both scientifically logic and suitable for different professional fields. Through basic training strengthen the basic skills and basic theory; Through professional training and reality technology integration; By applying comprehensive experiment to technology; Through innovative design technology and the theory of sublimation. Through the practice of scientific research,

cultivate students' ability of observation, analysis, problem solving, formerly studied all kinds of knowledge to achieve mastery through a comprehensive study, and improve and breakthrough, so as to cultivate innovative talents.

Practical teaching method is using classical experiments as foundation, with particular emphasis on basic experiment and skills. It pays attention to modern technology development, captivate both domestic and foreign advanced experimental teaching models and the achievements. The new teaching model adopts diversified teaching models, as well as personalized training scheme, optimizing course contents. Enable to achieve the goals of experimental teaching, we need to continually improve our teaching techniques, resources and environments.

The introduction of virtual experiment teaching, replace or improve the traditional electronic design and experiment method to a great extent. Through EWB, Multisim, System View, CCS, Matlab, Protel and other software to supplement and perfect "circuit analysis", "digital electronic technology", "signal and system", "digital signal processing" and "communication principle" courses and experiment requirements, also could complete the design of the circuit schematic, printed circuit board (PCB), and etc. In order for the students to master the modern advanced technology, advance their practical ability and creative thinking ability, and resolving financial difficulties; the application of virtual technology in practical teaching is essential.

Improving experiment teaching methods, focusing on students' individual character

The teaching environment has been changed dramatically along with the introduction of modern educational technology. Teaching by experiment has taken the place of the traditional teaching mode which has always focused on the books, lessons and teachers. The roles of teachers and students have been changed a lot. Teachers' role has become to someone who "guide, sort out, organize" from someone who "tell, teach, answer". The concentration of teaching has moved to the students, while the mission of teachers is merely stimulating students' interest and increasing their curiosity. In this way, students' enthusiasm and creativity will be aroused and their ability to explore, analysis and solve problems will be fostered efficiently.

Concentrating on the research of experimental technology, the choosing of experiment project and the design of experiment program would be beneficial to inspire students' scientific thinking and innovative awareness. The improvement of teaching method would build an student-centered experimental teaching mode, thus form an independent, cooperative, research-based, explore-based teaching mode, turning the past verifying-experiments-based education to integrated designing-experiment-based education. Before the experiment, students shall preview the lesson, and teachers should pertinently explain the content and problems of the experiment in order to induce the students to finish the experiment successfully and inspire their initiative. Enough class hours and intact equipment guarantee considerable time for the students to finish the class and train their practical ability. After the class, the errors should be analyzed in order to foster students' rigorous scientific attitude. Reasonable and effective teaching method would ensure the improvement of teaching quality. Besides, we should launch seminar and experimental competition, open up the lab, carry out the second classroom and other students' extracurricular scientific and technological activities experimental teaching to increase their interest. Some experiment programs newly designed by practical productivity such as Welding technology of optical fiber are popular among students. Considering this situation, we increased the content of optional experiments, which has been widely studied by students.

We should focus on the improvement of teaching means, use several kinds of teaching method, apply modern teaching technique, increase the effect of experimental teaching. Using modern teaching aid such as video, multimedia technique in the experiment can guide the students to finish the experiment design independently and increase their practicing skills.

Update experiment content

Integration of the experimental teaching content

The whole experimental process will not only be the knowledge of one course, but a comprehensive process of multiple course knowledge. It also is a process to improve students' hands-on ability and creative thinking. The arrangement of experimental content should pay attention to students' independence and creativity. It also should offer a variety of experimental projects for students to choose, or let students to design their own experiment, hence to improve the students' interest in learning.

In curriculum design, we should further enhance the awareness of engineering practice, strengthen the whole process of "a small electronic product development", and let the students to design and work independently. Students are encouraged to research projects, have different plans for the projects, and integrate engineering theory with practice as much as possible.

Open laboratory

1. Open laboratory breaks the traditional fixed experimental teaching time, space, content, condition and other restrictions. It provides more laboratory study and practice opportunities for students, guide students to combine theory with practice. This is an important way for the development of creative talents. Each experiment course should provide a certain number of in-class projects and extracurricular projects for students to choose from. Students can use the laboratory at their convenient time, also provides more lab space for students who are interested in learning^[3].

2. Each specific subject could use training plan and course needs to select suitable projects from different experimental teaching module. Each experimental project has both basic requirements and advanced requirements for students to choose. Students can go to the open laboratory at any time to perform independent experiments.
3. For graduation thesis, we should encourage students to choose topics that is practical and hand-on, or topics from scientific research. All these thesis projects should require students' in-depth laboratory DIY skill in hardware circuit, and actual demonstration in the graduation defense can be affirmed in the performance assessment. We learned in practice this has greatly enhanced the students' practice ability and creative thinking ability.

To develop the second classroom activities

1. Upon completion of the program in experimental teaching tasks, we should increase the students' extracurricular experiment projects and activities of interest at the same time. According to the interests and hobbies of the students, we can set up various innovative teams, which are targeted to strength the students' practical ability through the actual operation. These projects not only let students assemble useful circuit on their own, design practical electronic products, it also expands the horizons of students, stimulate and develop the students' comprehensive application ability and innovation ability.

2. Each year different grade of students can participate in various forms of extracurricular science and technology activities, such as innovation achievements exhibition, electronic design contest and others to discover and cultivate excellent talents.

CONCLUSION

Throughout times of development, innovation has become the main melody of the world. The education of innovative talents has become the focus of the country and competition between countries, to train creative talents with high quality has become an important task of higher education. To carry out innovative education of college students in the new period, we need continuously to improve the education module, excavate the reform of practical teaching. Through teaching, we can convey knowledge, develop abilities, and improve the combination of theory and practice. The combination of theory and practice, in class and after class, teaching and scientific research can stimulate each other. In this way, we can ensure the quality of higher education by improving students' comprehensive quality, better preparation for science and engineering students' engineering practice ability, innovative ability and the entrepreneurial spirit. We prepare students to become the innovative talents who meet the requirements of the socialist modernization construction by having the innovation consciousness, encourage innovative thinking, and innovative spirit^[4].

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