Classroom Teaching and Cultivation of Scientific Thinking Capabilities for Graduate Students

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Abstract. The classroom teaching is a bridge between the course study and scientific research for graduate students. And it presents the base and foundation for improving students’ academic abilities. In order to establish the relations between professional courses of graduate students and their scientific thinking capabilities, the situation and common problems about classroom teaching at universities of China were analyzed in this paper. Some proposes on improving classroom teaching were presented so as to exert the influence of professional courses, and gradually cultivate students’ thinking capabilities of scientific research while the students master extensive and massive theoretical knowledge. It will provide good conditions for cultivating students’ innovative abilities.

Introduction

Classroom teaching is an important part of a teaching chain. And it is the major channel for students to obtain information, develop capabilities and to cultivate good scientific manner. One important difference of higher education from basic education is academic. It demands college teachers should have abundant theoretical knowledge and always concern with the developing frontiers and new research fruits of their discipline. College teachers should also do relevant scientific research and combine the research fruits with textbook, and then convey these scientific research methods to their students in the classroom. It will supply classroom attraction and scientific magnetism.

The classroom of higher education should be the place of spreading knowledge and enlighten students to learn how to think. After analyzing the situation and common problems about classroom teaching at universities of China, some proposals, such as cultivating students’ thinking capabilities of scientific research and creative spirits in classroom teaching, are presented in this paper.

Situation Analysis of Graduate Classroom Teaching

Some scholars consider that thinking method is more important than knowledge itself. But the higher education in China, including the teaching method in graduate student classroom, regards the transfer of knowledge highly and neglects the cultivation of students’ scientific thinking capabilities. Nowadays, the primary existing problem of graduate education in China is that cultivation goal is much simple. Therefore, adaptability of cultivated students is weak, and they cannot satisfy the need of economic development of the real society. The lack of abilities of scientific research and innovation is the evidence. It strongly affected the sustainable development of Chinese graduate education [1].

During graduate period, it shouldn’t be criticized that graduate students should gradually learn how to do scientific research. But it need time to do it well, and to learn professional basic courses is also an important and nonnegligible thing. Teaching and scientific research are two missions for college teachers. The teaching contents should reflect relevant features of its advanced development. But under the scientific research environment of being impulsive and interested in a quick profit, some
supervisors of graduate students want their students to do research works for them immediately, and they consider lesson in class is not important. They pay a little attention to the graduate teaching because of the pressure of heavy scientific research tasks. So they don’t want to take much time to think about graduate classroom teaching reform. And scientific research becomes first one for them. The result is that the graduate classroom teaching becomes a mere formality, or it just continues undergraduate curriculum. And it will be no enlightenment for training a student’s ability of scientific thinking and innovational spirits. The existence of these problems is obviously a disadvantage to graduate classroom teaching.

Succession of Classic Theories

Scientific development is established on the basis of previous studies. The new findings may be the improvement of old works which appeared in literatures. So the professional researchers should know the classic literatures in their study field, such as textbooks, monographs and summarized literatures. By deep and comprehensive reading, they can try to know all aspects of their study field and to absorb relevant knowledge systematically.

Knowledge need to be transferred from generation to generation. It’s necessary that graduate students understand and master elementary knowledge and basic principles of their subject, so that they could establish extensive and solid theoretical bases. For example, through learning advanced heat transfer course, the graduate students knew that the theory of classic advanced heat transfer is research production to physical phenomena. They should learn and utilize these research methods which were summarized by predecessors [2]. It is said that the journey of a thousand miles starts with one step. The creator must have extensive and solid foundation. He should know as many previous experiences and thoughts about the similar problems as possible. He should deeply analyze the problems basing on previous success and defeat, and avoid doing repetitive work with new starting line. Moreover, the students should learn knowledge of relevant disciplines except of their own major. And they should continuously stride forward by drawing lessons from interdiscipline and inheriting the results of previous efforts.

The Formation of Scientific Thinking

Scientific research needs scientific thinking. And scientific thinking could help us master scientific innovating methods and develop innovating activities of science and technology. Therefore, learning and exercising scientific thinking methods are of great benefit to scientific research success by cultivating scientific thinking habit. And it will impel the progress of science and technology [3]. The graduate students should train their scientific thinking and innovating thinking gradually.

Scientific research relies on conscious thinking. And this conscious thinking activity should be trained for a graduate student during school [4]. Not only should the students learn enough scientific knowledge, but they also should be trained scientific thinking and cultivated logical thinking. They should think with scientific method and study with critical attitude since classic theories are not always right and so-called knowledge written in textbooks may be wrong. We should not blindly believe in the words of predecessors and must dare to question it, as doubt is sometimes the reason to tempt us to study. Something reasonable should be insisted. It is not self-opinionated but the result of scientific deduction based on logical thinking.

College teachers can gradually train graduate student’s scientific thinking combined with teaching the establishment of classic theories. It will promote the formation of student’s consciousness of independent thinking, and enhance student’s abilities of discovering problems and solving problems. College teachers should lead students to combine course learning with scientific research organically, and cultivate their scientific research abilities and comprehensive qualities widely. If the habit of scientific thinking were formed, it will benefit to one’s whole life. It is the embodiment of the students training model and the necessary need of the development of society.
Cultivation of Creative Spirits

Scientific research is an activity that exploring unknown problems. And its life is creativity. The essence of scientific research is to explore new knowledge, and it must be innovative basing on previous work. The golden period of scientific creation is during middle and young ages. It was the conclusion from experts of scientific methodology and scholars of creation psychology [5]. Therefore, cultivating the graduate students’ creative spirits is very important. It needs teachers to carry out on classroom teaching. Teachers should consider about what they prepare to talk in the class. Are there any theoretical creative points or innovation of science and technology? How is the innovation obtained? Such questions will help students learn creative thinking. Leading students to inquire and try the perspective-taking will inspire students’ creative spirits, and improve their innovative consciousness and abilities.

Classroom teaching is the entry point and key part of cultivating graduate students’ creative abilities. In class, students may capture inspiration and explore innovative fountain by learning the producing process of classic theories. Teachers should continuously inspire students’ interests in exploring unknown world, lead students to find problems, and encourage students to question. Graduate students must suffer strict academic training and learn scientific thinking. Only continuously improving their scientific exploring abilities can graduate students become uncommon creative and talented persons. Excellent students must have innovative abilities. Merely reciting facts and receiving high marks in examination are not good students. Graduate students should think independently and study academic frontier problems. Following others blindly is not the behavior of science spirit. The most important science spirit is creation or innovation.

Summary

Classroom teaching played nonnegligible and irreplaceable function during quality-oriented education and personal training. Knowledge need to be transferred from generation to generation. Academic subjects should train the students on logical deduction and critical thinking.

Some common problems about classroom teaching at universities of China are analyzed in this paper. And the relation between classroom teaching and students’ training which includes scientific thinking and creative spirits is also illustrated. The combination of classroom teaching and the training for students’ scientific thinking and creative spirits is an effective method.

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References


