A Study of the Cultivation of Innovative Capability of Postgraduates Majoring in Science and Technology

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Abstract. This study attempts to explore some approaches to dealing with postgraduates’ ability in education. By a detailed analysis of flawed evaluation of postgraduates’ capability in a survey of science and technology majors, this paper concludes that graduate schools should give priority over soil-climatic conditions, strict requirements as well as assessment of tutors’ qualifications in fostering students’ innovation consciousness, and simultaneously academic integrity must be guaranteed.

Introduction
Throughout the human history, innovation has always been an important force not only facilitating the development of a country, but also promoting the progress of human society. Graduate education is the highest level of its formation in China. Innovative capacity of postgraduates’ directly affects the level of knowledge innovation at institutes of higher education as well as relates to an overall innovation capability in the future of a country. China is now arriving at a critical stage of accelerating the socialist modernization, to achieve The Two Centenary Goals (Jin-ping Xi, 2013) and to realize China’s Dream, China’s 18th Party Congress proposed the strategy of innovation-driven development. But how can colleges or universities undertake a constructive work on the premise of observing basic education laws to cultivate postgraduates? There are many concrete aspects worth pondering over and discussing, namely, the origin of an innovative mind, the surrounding of enhancing students’ innovative capacity, which is particularly indispensable for colleges and universities to carry out an effectively innovative education, so as to improve the students' innovative spirit and capacity.

Preliminarily Evaluating Students’ Innovative Sprits or Ability
Firstly, selecting a good seed is of great importance. American biochemist Paul Delos Boyer who was the Nobel Prize winner in Chemistry in 1997 said to Chinese young people: “You should explore a variety of approaches to identifying areas that you are interest in, and suitable for your condition and potential. Only a very few people can luckily experience an environment that he/she may earn a high reputation, most people must seek satisfaction from what they are undertaking, by doing so he/she is not for the special incentives. You are a happy man, provided that you have enhanced your ability in work to appreciate this wonderful world” (2003) which can be found that many of them had not thought about the future of being a great scientist, but growing up with exuberant curiosity and desire for the knowledge of nature. They were full of strong enthusiasms, even to an obsession degree, to explore the unknown phenomenon and unknown truth, even quite a number of people explored these which they had been interested in for a lifetime, willing to sacrifice for this purpose. Consequently, not expecting to be awarded, they just inexhaustibly concentrated on their researches in pursuing graduate education.

Now a lot of young people take up the entrance examination for postgraduates. With the establishment of the academic degree system in 1980, coupled with rapid growth of the demand for high-level personnel, it provides an opportunity for the development of graduate education, dramatically leading to a expansion of graduate programs. Compared with an enrollment of 92,225
students in 1999, by 2016, only the admission number of national postgraduates has reached 510.72 thousand, of which nearly 330 thousand of postgraduate students are academic learning oriented, 190 thousand of whom are professional learning oriented. But whether these students really want to study science, to pursue some unknown truth, even prefer to make a career in scientific research as well? Whether these people are suitable to be a postgraduate? This is no always the case. The motivation of pursuing a further study is variable, and most students are motivated solely out of the utilitarian mind. Many improve their academic qualifications in order to seek better jobs or be able to go abroad for a better personal development. More students study for the Master’s Degree just because they cannot find a satisfactory job or want to raise their social status in the future. Of course, these motivations are understandable. But holding these motives, how many have exuberant curiosity, strong interests and enthusiasm to explore the unknown areas? How many people realize that they will pay a cost, take risks and sacrifice for the path they have chosen? We feel the candidates doing it right are rather rare. Needless to say, this is not unrelated to the examination-oriented education of basic education in China. Therefore, the selection of a graduate student should not only take scores in the entrance examination into account, but also focus on the candidates’ presence of exuberant curiosity and strong interests to explore the unknown, or the patience, assiduously determination of practical scholarship, and dedication to the study field as well. They might as well not to join in for pleasure if they were impetuous, utilitarian, impatient and had no determination to be a competent scholar, because, to them, it would be a waste of time and effort.

Fostering Soil-climatic Conditions of Innovative Capacity

Secondly, the suitable climate of cultivating graduate students is essential, so to speak, a favorable environment and atmosphere contributes effectively to the cultivation of graduate students as well as others talents. Liking sapling, graduate students need superior climate and soil to grow up and become talents. Currently, respecting knowledge and talents is strongly advocated by society and governments. For economic compensation, the so-called Black and White (physical work is well paid, compared with mental work) phenomenon has been basically reversed, so the climate and soil which is conducive to the growth of talents is not a problem. However, whether it is advantageous to the talent’s growth actually need to consider carefully. First of all, the social climate, leaders at all levels eager to be talents and obtain achievement, have launched a variety of talents engineering, talents planning, intensify the selection, increasing investment. Media is busy predicting when China will have a Nobel Prize winner, while some colleges and universities take high bonuses to encourage publications in the Nature, Science, expecting where there's muck, there's brass. Because that there is a vital relationship between achieving these goals and the school grade. Some people entering an examination the graduate student is to enter a variety of "talent project". Because if you can't study in postgraduate and get PhD, means you losing a key personnel and training opportunities, losing the position of leadership positions in the future, which means losing high title, higher wages and scientific research funds. In such a campus environment, the students who mainly through credits and do their research project directed by the supervisor, and then, get a number of data, which is basic to achieve the requirement of the tutor and the desired results, can through the defense and get a degree. Can such climate and soil really cultivate talents?

The history of human science shows that the great scientific and technological innovation and the growth process of innovation talented person often is not this case. It is not by any arrangements in advance, planned program selected, nor under high reward, but produced naturally in so many people who love to explore the nature, to tirelessly pursue the truth. The so-called stand out is a very personal factor. In the field of basic research, including some application areas of science and technology, respect for science research inspired moments, the path of randomness, the characteristics of uncertainty, allow scientists to free imagination, bold hypothesis, careful verification. Jin-ping Xi has pointed out that In the field of basic research, including applications in science and technology, we should respect the scientific inspiration of the moment, the way the randomness, uncertainty of the path to allow scientists to freely imagine, bold hypothesis and
careful verification, but not to interfere scientists research on behalf of the outcome, also do not constrain scientists from research activities by rigid institutional. Many scientific studies should focus on the long term, not instant success, haste makes waste (2016) which Brilliant exposition of the cultivation of innovative talents, the most important condition is relaxed freedom, unrestrained, very strong academic atmosphere, and not specified by any non-academic arrangements. Graduate students, especially doctoral students, unlike the undergraduate, he (she) himself should take the initiative to study and explore a particular issue of interest. Although what is the most important issue, worthy of study, or the existing basis for the work that study a problem needs tutors’ guidance, but in general, the subject should come from students themselves, which determined from presented and counsel to mentor by the post-graduate students reading a lot of literature of interest, after thinking and self-assessment. During the study, students must have the environment and tools to get a lot of latest information and should carry out free discussions, daring to express their opinions, and even seize the opportunity to debate with their instructors and students. Therefore, he (she) should take part in laboratory regular discussions to report their progress and the difficulties encountered, and take the initiative to participate in academic conferences both at home or abroad, communicates with experts. There is not generationals parts on academic issues, graduates should boldly and actively offer an insight which should not be suppressed and excluded, but be encouraged. Also, the research work should follow the felling and has a certain degree of freedom, which can fully activated and mobilized academic thought, given full play to the wisdom and got a sense of achievement and satisfaction in overcoming difficulties in scientific researches. Nobel Prize Laureate in Chemistry, American biochemist Paul Berg (1980), the founder of modern genetic engineering technique, advocated that encouraging young people to discover the answer they pursue, is not one of the easiest learning methods, but it is the most rewarding way of learning. Maybe the most important contribution education can achieve is the development of students’ instinct and curiosity to pursue creative ways. Over time, a lot we learned will be forgotten, but the ability to ask questions and find out answers is hardly lost. Therefore, schools should strive to create such an academic atmosphere, and thicken the atmosphere. If only someone designated as personnel training object gives financial support, without paying attention to create the appropriate climate and atmosphere, the effect is not desirable.

**Calling for Strict Requirements for Cultivating Graduate Students**

Cultivating graduates must be strict, but at the same time must be appropriate and realistic. It can’t be divorced from reality, can’t blindly compete with schools of good conditions. Usually within the current university, Cultivating graduates has certain requirements, such as a specified time (usually three years) to complete the required credits, to publish a number of articles and papers on the authoritative magazine has also been demanded (from core journals SCI-indexed journals ranging), it’s also required to complete postgraduate professional practice certain period of time (about six months). In order to display high-quality graduate papers, doctoral tutor subjects often require a higher starting point, a certain innovation, and therefore quite difficult. Current papers from submission to publication period can be up to 1 year. It should be stressed, in just three years to complete so many tasks are not easy to fulfill. Especially greater difficulties in the study are encountered, and sometimes they can’t be resolved. The pressure on students is enormous. In this case, students always tend to choose scientific research which can be done Instantly, Simply, Roughly, do not choose to study with deep thinking and focus; in order to finish the graduate education on time, a lot of students can only be satisfied with the rough experimental data. Considering the above situations, we do hope through the process of cultivation of graduate students to complete a research work, but what is more important is to enable graduate students to receive solid training, learn to employ logic and scientific thinking or methods and the experiment technology of solid skilled, gaining the ability to find answers to the questions. The postgraduate educational system should be based on the actual situation of project progress, for example, Students participating in some key program or exploratory work with more difficulty, the schooling can be flexibly extended, not allowing one size fits all. To publish papers in some advanced journal,
students should not be confined be the first author. As long as they pass the graduation presentation, you can graduate. Qualified schools and disciplines should promote master-doctor continuous study, so that students have more time to engage in a more systematic exploratory research.

Assessing Qualifications of Tutors

The quality of the postgraduate is another key to cultivate the quality of graduate education, so the postgraduate tutor must be carefully selected, strict requirements especially to the doctoral tutor. Mentor requires knowledge, ethics, responsibility and personal charisma and other aspects are terrific. First, the teacher’s academic attainments are obvious, teachers’ knowledge, although not necessarily the master, but must have their own areas of expertise and in a first-hand experience and knowledge. If they are not professionally knowledgeable, incompetent, and unaware of any progress in related fields both at home and abroad, they lack in insight and innovation to teach the students. Secondly, ethics is also extremely important. Because teaching is not only to teach students to ask, but to teach how to behave, what teachers say and perform will naturally affect students. Of course an instructor does not have to be a saint, but being a teacher, you must guide as example, your professional ethics, social ethics and family virtues, style of work, and life goals must be positive. Particularly to emphasize is the sense of responsibility as a mentor. Many professors are knowledgeable, skilled, with high moral character, but because of other work, they are too busy, or they may be relaxed in training and guiding graduate students, even not strictly check the progress and quality of graduate work. Some professors work as tutors of a few schools, actually there is no time for them to provide specific guidance, even for a long time they have not been seen, lost contact with students, take irresponsible attitude toward work. Such a teacher should have self-awareness, quit early, lest perpetuated this misunderstanding. In addition, the instructor needs to have some personal charms. The so-called personal charm, was ordered students to feel his dear credible affinity, can lead students to overcome difficulties, to enable students to admire from acting in, rather than holding the shelf, so that students feel unattainable, at arm's length. Charisma also includes wit and humor, giving encouragement and comfort when students encounter difficulties, so that the laboratory atmosphere becomes lively and relaxed, only in this way can we build the friendship of harmony between teachers and students, to cultivate excellent students.

Cultivating the Graduate Student's Academic Integrity, Rejecting the Academic Corruption and Academic Bubbles

This point is vital, especially in the current situation. To enable graduates to be conscious that scientific research should be honest, it does not allow false and sloppy. After China have joined WTO, to establish credibility within the rules of the economy is extremely important, and carry out education in the academic integrity is equally important. Graduates only just entered the stage of studying science, only by establishing a solid ethical value can they be truly growing into a generation of younger scientists. This is a new century’s prosperity of the cause of science and technology. Currently under the negative influence of society, past the pure university campus and the academic fields have appeared in the fraud and plagiarism and other academic bubbles and the phenomenon of academic corruption, and to show in the graduate student education, even spread. Which should remain highly vigilant and take measures to prevent and clear, otherwise the corrosion to the career and talent cultivation of science and technology is great and far-reaching consequences.

In sum, we take it for granted that we should strengthen researches on the law of education, review currently the reflection of some personnel training and management, and strive to create a culture more quickly and optimize talents atmosphere and conditions, we should strictly select tutors. In planning to gradually expand the scale of recruitment we ought to give enough heed to grasp the quality of graduate students at the same time, adopting a policy of easy access, strict exit. Qualified schools may increase the proportion of students pursuing master-doctor degree, but requirements should be both strict and realistic. We should encourage graduate students to study
diligently and earnestly, on the basis of accumulation, they ought to carry out their own researches, so as to promote the innovational consciousness.

References