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THE STUDY OF EDUCATION MECHANISM AND INNOVATION CULTIVATION OF GRADUATE STUDENTS

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ABSTRACT: *Graduate students are the new force of innovation in China and to improve the quality of graduate students is a popular topic in academia . Currently, there exist some deficiencies in postgraduate education, such as the teaching pattern which values theory more than practice, the dearth of innovative spirit and the absence of innovative capacity. These problems are rooted in unclear studying objectives, the lack of opportunities for practical working experience and the incorrect learning methods, etc. Therefore, in order to cultivate innovative graduate students, it's vital for us to refine the teaching methods to intrigue graduate students interest in innovation. And graduate students should receive comprehensive training which strengthens their capacity for literature reading and more opportunities for practical experiences.*

KEYWORDS: Graduate Students, Education Mechanism, Innovative Capacity

INTRODUCTION

Against the backdrop of breathtaking advancement of science and technology, the improvement of the comprehensive competitiveness and innovative capacity of our country depends largely on the cultivation of high-quality talents, especially on the scale and levels. Therefore, strengthening the innovative capacity is the major task in the postgraduate education. Both developed and developing countries have regarded the cultivation of innovative talents as a substantial link in reinforcing the overall competitiveness of the country and occupying the commanding height of the international economy.

The academia has been working for a long period on these popular projects: how to intrigue the innovative enthusiasm; how to complete the curriculum system of the graduate students; how to improve their learning methods; how to strengthen their innovative capacity in the scientific research. Currently, the education of postgraduates is in the face of some practical problems. For example, graduate students are insufficient in motivation for innovating. Apart from that, the postgraduate curriculum system in which rote learning is typical, follows the old path of that in undergraduate education, resulting from the lack of scientific research practice and innovative capacity. According to *The Comprehensive Investigation Report of Postgraduate Education Quality in China*, over half of the tutor (53%) and nearly half of the

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management staffs (47%) consider the postgraduate innovative capacity as average or even poor. In response to these circumstances, our country should spread no effect to optimize the postgraduate development mechanism in order to foster innovative talents with creative spirit and knowledge.

This study probes into the measures of improving the cultivation of the postgraduate innovative capacity of graduate students mainly from two aspects of graduate students and colleges. We organized the paper as follows. Section 2 provides the experts' discussion on the development of the postgraduate innovative capacity. In section 3, we analyze the weaknesses in fostering the postgraduate innovative capacity in light of learning motivation, classroom teaching, research practice and learning methods, etc. Next to that, we discuss the mechanism and methods for the development of postgraduate innovative capacity and put forward the strategies to improvement.

LITERATURE REVIEW

In the study of postgraduate innovative capacity, some experts put forth three elements of postgraduate research ability: systematical thinking ability, innovative thinking ability and practical ability. Systematical thinking ability is the ability to create new concepts, put forward new ideas, discover new things and solve new problems with the use of a chain of relative theoretical knowledge. Innovative thinking is the creative thoughts generated by the thinking subject. Not only can this way of thinking disclose the essential attributes and inherent laws of the objective world, but yield peculiar and original thinking results which are significant to the society and extend the frontiers of human knowledge. Practical ability refers to the physical and psychological characteristics which ensure individuals to effectively apply knowledge and technical ability to settle practical issues.

In the study of how to intrigue the learning and innovative momentum of postgraduates, some experts propose the concept of postgraduate learning ability composed of three elements including learning momentum, learning tenacity and leaning capacity. Learning momentum arises from the objects and the interest of the learners. Learning capacity reflects the perseverance of the learner. And the learning ability refers to the depth and the scope of learners' knowledge and their application competence in practical issues. Learning momentum originates in the objectives, interests and motivation of learning. The momentum will be more powerful with larger objectives and greater interest. Learning tenacity, which is the core of learning ability, roots in one's learning spirits, psychological quality, intelligence, volition and interests, etc. The learning time will be extended with deeper understanding and stronger perseverance. Learning capacity, which is the key to effective learning, hinges on the learning methods, mainly including reading ability, memory, comprehension, judgment, and learning efficiency, etc. The postgraduate learning ability is the sum of different aspects covering learning momentum, stamina, methods and strategies as well as innovative capacity, and so on.

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There are numerous research about the relations between college educational methods and the improvement of students' academic levels. Learning methods are of great significance both to teachers and students. According to the results of more than a decade's research, different strategies, techniques and process in learning produce varying results. Some scholars divide learning methods into two categories: extensive learning methods and deep learning methods. Marton and Saljo, who performed research on this topic earlier, highlight different results yielded by extensive and deep learning. Educational methods used to help students reach the answers to the questions conveniently, whereas they put more emphasis on the cultivation of students' innovative capacity and the improvement of the competence to analyze and solve problems nowadays rather than providing simple answers.

Deep learning method is more appropriate to graduate students. Kirby et al. explained why deep learning methods gain more, holding the view that deep learning is able to integrate former knowledge with the present one to form a new system and graduate students are bound to have a broader view. Superficial learning that merely scratches the surface of discipline problems, however, is suitable for the search for multiple research directions only.

There are many scholars conduct research on the learning methods of graduate students. For example, some hold the view that extensive learning is conducive to the understanding of all kinds of objectives and missions and avoid failures in further studies. On the contrary, the learners adapting deep learning methods have a strong tendency towards thorough understanding of real and connotative meanings. Unlike undergraduates, graduate students with explicit research directions are supposed to conduct further research and pursue innovative development rather than being superficial. In this sense, deep learning is more suitable for the learning of graduate level. There is a dearth in the learning methods of graduate students which means that relative research are of significance.

Foreign experts combine various individual factors, including age, gender, major, full-time or part-time learning methods and working experience, together to study the deep learning method of graduate students. In accordance with the research conducted by Chan, different individual features and different adapted learning methods will produce different learning effects. Graduate students will encounter less troubles with the adoption of deep learning methods. Simultaneously, they will master essential techniques for research which enable them to fulfill the tasks of scientific research.

As to the research of postgraduate practical education, Ren Zhian (2014) put forward the new mode"1+PIE" when studied the cultivation of innovative capacity of graduate students major in three-year economic management. "1" refers to the first year of postgraduate studying and "PIE" is the abbreviation of "practice of innovation education", implying the innovative practical education. "1+PIE" is the new mode of the cultivation of postgraduate innovative capacity, in which graduate students are supposed to mainly extend their theory knowledge in the first year and receive innovative practical education in the second and the third year.

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ANALYSES IN THE INADEQUACY OF POSTGRADUATE EDUCATION

Under the current circumstance, there exist a few shortcomings in the cultivation of graduate students mainly reflected in the following three aspects. First, some graduate students have improper learning motives. Second, they are insufficient in the experience of scientific research and social practice. Third, their learning methods are inappropriate.

Improper Learning Motives

Graduate students have improper learning motives because their learning objectives are unclear. In China, there were 1,760,000 applicants participating in the postgraduate examination in 2013, and 1,720,000 in 2014. Rather than pursuing knowledge and noble cause dedicated to science, however, some students, without explicit schema, enter themselves in this examination because of the lack of jobs or the suspension of employment. There are also some candidates participating in the postgraduate examination out of sheer slavish blindness. These sorts of people are full of longing to postgraduate study and life which turn out to be inferior to their imagination and even more arduous and monotonous, and thus their learning initiative flags. Worse even, graduate students feel confused and unconfident for the career prospect of postgraduates is dismay. Conducted among 835 graduate students from 6 research universities, including the Sun Yat-Sen University, the South China University of Technology, the Jinan University, the South China Normal University, the South China Agricultural University and the Southern Medical University, by the postgraduates major in economic management at the South China Agricultural University, the research, adopting on-spot random sampling method, reveals that graduate students with high expectation have low satisfaction. Under the circumstances that personal expectations contradict the reality, graduate students have insufficient autonomy that they are confined to texts and teachers and just scratch the surface of the knowledge without the courage to probe deeper, challenge the authority and be more innovative and realistic.

The Lack of Scientific Research and Social Practical Experience.

Graduate students are wanting in scientific research and social practical experience. Graduate study links tightly to the future careers of graduate students. In order to be a senior administrator or a scientific talent, practical working competence has to count on the real work experience rather than depending solely on the mastering of the theories. At present, postgraduates who keep an eye on theories but ignore social practice, don't have enough opportunity for practice and are incompetent in real work because of the shortage of college research funding, scientific research projects and the communication among colleges, the government and enterprises. Related surveys show that 14.8% of the postgraduates and 17% of the doctoral students hold the view that the most difficult part of the dissertation writing is the poor practical conditions. Innovation roots in practice and the imperfectness of the research and practical platform greatly inhibits the cultivation of postgraduate innovative capacity.

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Incorrect Learning Methods

The majority of graduate students are longing to achieve academic excellence. Thus they are very diligent, but their study effect and efficiency is dissatisfying. In order to alter this conditions, postgraduate learning methods must be refined. Unlike undergraduate study, which focus on the existing and general knowledge, postgraduate study is supposed to explore the forefront of the subject and pioneer new realms. Therefore, there are no unchangeable handouts or textbooks for graduate students to learn, no certain knowledge to be imparted. In order to achieve deep learning, graduate students are supposed to collect, sort and read the materials for knowledge acquiring. Hence, the competence of collecting, sorting and applying is very important for the cultivation of graduate students' innovative capability.

Adrian Stagg and Lindy Kimmins, from the University of Southern Queensland in Australia, conducted a survey among the business school and the law school. From 2010 to 2012, they interviewed volunteer students total at 352 including 216 undergraduate students and 126 graduate students, before or after class with the purpose of studying graduate students' information searching behavior and material utilization capacity.

The results show that the majority of graduate students and undergraduate students—63 percent and 66 percent respectively—gather information by using Google. However, Google Scholar is used less frequently taking up 5 percent of the graduate students and 3 percent of undergraduate students. Nearly half of the students claimed that they *rarely* or *never* uses advanced search. Moreover, 20 percent of graduate students, 4 points higher than that of undergraduate students, go to library for information. Students are unable to select information, and worse even, graduate students are insufficient in the confidence to choose accurate information. About 39 percent to 47 percent of graduate students expressed their confusion in information selection, whereas only 31 percent to 36 percent of undergraduate students shared the same feeling. What's more, students are incompetent of judge the credibility and reliability of the information. About one third of students are unable to organize the information well and thus the subsequent research and thesis writing are badly influenced. When encountering difficulties in information searching, graduate students are more willing to turn to librarians for help compared with undergraduate students. Nevertheless, 25 percent to 33 percent of the students are not inclined to asking librarians for assistance.

Based on this investigation, we can draw the following conclusions. Firstly, graduate students have weak capacity of information searching. Undergraduate and graduate students prefer to browse famous websites rather than go to library when gathering information, and this conclusion is consistent with that of other researches (Biddux et al., 2011; CIBER, 2008; Colon-Aguirre & Fleming-May, 2012)[25,26,27]. Secondly, graduate and undergraduates students lack the confidence and capacity to determine and evaluate what kinds of research information they should gather. This conclusion is similar to the conclusions of previous research (ECAR, 2011, p. 9; Hampton-Reeves et al., 2009) [28, 29]. Thirdly, undergraduate and graduate students are incompetent in organizing and applying information. Approximately one third of the

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students said that their confidence and capacity are inadequate in fulfilling study tasks, as shown by the investigation. Lastly, about a quarter to one third of the undergraduate and graduate students are reluctant to seek assistance from librarians when they are in troubles.

In addition to that, Chinese graduate students have problems in literature reading, including the shortage in reading quantity, capacity for useful information acquiring and the initiative in reading.

Firstly, graduate students have inadequate amount of reading. It's very important for graduate students to read extensively, because "only through extensive and in-depth reading, substantial knowledge accumulation and research training can graduate students construct a reasonable knowledge structure and enhance their academic ability and adaptability. Without a proper amount of extensive and in-depth reading, scientific research will be short of solid theoretical basis and proper academic accumulation." [31] It's out of question that without the insight into the frontier realms of the disciplines, graduate students restrained to textbooks reading will not have deep study.

Secondly, graduate students lack the competence in acquiring effective information from literatures [32]. Quite a lot of students cannot retrieve information effectively by using advance search, databases, keywords, the scope of discipline, time range and information source. In the face of a large quantity of literatures, some students don't know how to search for the core literatures, including literatures with high click-through rate, high citations and peer recommendation, in some specific realms with the assistance of the selection and analysis functions of databases (such as Web of Science, Elsevier, etc.) to selectively screen for useful, reliable and authoritative information. Also, graduate students are ill-informed of how to conduct research with the information gathered. They have poor capacity of using the information for thesis writing, for example they are unable to use software like Endnote, Note Express to classify literatures as well as take notes, rate and quote, etc. Therefore, their document management capacity is low.

Thirdly, graduate students lack reading enthusiasm and initiative. Student read the books designated by teachers mainly for finishing homework or passing the test. They are insufficient in study initiative and programmed poorly for knowledge accumulation and broadening.

THE STRATEGY TO IMPROVE THE CULTIVATION OF POSTGRADUATE INNOVATIVE CAPACITY

Learning interest, Professional View and Motivation in Innovation

Learning interest, professional view and motivation in innovation are crucial to postgraduate innovative capacity. The study of graduate students which is more challenging, innovative and initiative, varies distinctly from that of undergraduate students. Therefore, specific study and

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career objective and strong interest in learning are of necessity. Graduate students should be instructed in these aspects in the beginning of their admission to achieve in-depth understanding of their own subjects and majors so that they can prepare well for their employment directions. Teachers should educate students that they are supposed to love their subjects and majors, and that they are expected to devote wholeheartedly to their career and be an expert in their fields. This is the one and only way to stimulate graduate students' strong learning motivation to contribute to academic research and develop innovatively.

Participation in Scientific Research and Social Practice

Innovative capacity can only be nurtured in practice. Therefore, universities and colleges are supposed to put emphasis on scientific research awareness and practice awareness of postgraduate education. For one thing, postgraduate curriculum should take overall consideration of the need of scientific research and teach the latest and frontier knowledge of the subjects and majors to develop graduate students' scientific research spirits and provide guidance for innovation directions. For another, mentors should offer opportunities of taking part in project research to graduate students, requiring them to participate in the scientific research team of their own, undertake specific tasks and put forward explicit demands under the effective guidance of the mentors.

In America, academic graduate students are regarded as an important group in scientific research innovation by universities and the majority of them participate in their mentor's research groups. Some doctoral students even serve as the backbone of defense scientific research or major national scientific projects. Simultaneously, universities develop various measures to fund graduate students in performing independent scientific research and teaching, and encourage them to participate in different kinds of academic conferences. "According to the statistics, during the period of two-year master course studying, graduate students' independent research time is 108 hours, which is twice of the curriculum hours. [33] " Japan carries out innovative promotion mechanism of "the cooperation of government-enterprise-university-institute". By means of joint research system, delegating research system, delegating training system, scholarships endowment system, lecture and laboratory donating system and research center co-construction system, the government mobilizes enterprises to provide research grants for universities and create research conditions for graduate students in order to expose students to the practice of production and scientific research. By doing so, graduate students improve their innovative capacity, and provide enterprises with motivation for innovation at the same time. Through the research projects, graduate students have more social practice opportunities to combine theories with practices that they can develop their autonomic and innovative learning capacity effectively.

Teaching Methods and Innovative Thinking of Graduate Students

The study of graduate students should depart from the studying strategies of accepting, memorizing and reproducing, and develops into a study pattern with innovative and critical

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thinking. The cramming and spoon-fed indoctrination styles in undergraduate teaching are impractical. Postgraduate teaching are supposed to cultivate the spirits of authority challenging and innovation. Therefore, we should encourage graduate students to think and find problems, and explore antidotes to the problems. Only increasingly deepening studying and research can match the studying demands in the education of graduate students. Therefore, postgraduate's classroom teaching should be heuristic and discussing which guide students' thorough thinking and research. A survey conducted by the South China Agricultural University indicates that in the link of course teaching, the degree of postgraduate education satisfaction will be higher with more advanced textbooks, richer teaching contents, more flexible teaching methods, more advanced teaching equipment and teachers with higher comprehensive and teaching qualities.

In America, the postgraduate classroom atmosphere is very active. Mentors encourage students to raise doubts, ask questions and debate at any time. They adopt a tolerant and protective attitude towards students who have different opinions and communicate with students equally in order to encourage students to challenge authority and study innovatively. In class, teachers seldom adopt the teaching way of lecturing but usually make use of the time in a single class to give brief introduction of some research topic and then leave the initiative to choose research topic to students. After preparation, students take turns to make presentations on the stage to state their research results and discuss with their classmates. During this process, teachers are only "sitter-ins" or "counselors". In order to prepare well for class discussion, students have to read a lot, collect information and make speech outline, etc. Similarly, as for practical curriculum, graduate students are protagonists in the experiment and teachers are just "sitter-ins" who duly give guidance and appraisal to students and encourage them to make bold attempts. And students should enhance their innovative ability by Critical, exploratory, independent and in-depth study is beneficial to innovative capacity improvement of graduate students.

Capacity of Literatures Collecting, Arranging and Applying

First of all, teachers should strengthen the guidance for graduate students in materials collecting. *Retrieval and Utilization of Literatures* is a compulsory course of graduate students which introduce the fundamental, methods, instruments and approaches in literature retrieval and library's collections and service items, etc. of the college library. This course should focus on the utilization of literature which improve postgraduates' capacity of judging, analysing, managing and deciding, and cultivates summarizing capability of graduate students. Teachers are supposed to manage students to operate by themselves with their own missions so that they can combine theory with practice and improve their learning efficiency. What's more, the literature reading and discussing course should be run to organize graduate students to read classic and foreign literatures, which is beneficial to improve graduate students' capacity of reading and summarizing so that they can have a better understanding of the literatures and broaden their professional knowledge.

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In the next place, the functions of library should be strengthened. According to the survey conducted by Southern Queensland University in Australia, compared with undergraduate students, graduate students are more likely to seek assistance from librarian, and the proportion of such students accounts for about three fourths to two thirds. Hence, librarians play an important role in the process of postgraduate study and research which is a challenge to librarians. And this conclusion is in accordance with the former research results (Cluett & Skene, 2006) [35]. It is mentioned in the former literature (Bury, 2011) [36] that because of the omnipresent net resources, students reduce the use of library, which turns library from "the manager of resources" into "the mentor of resources" and this trend is irreversible. As a result, librarians should reach their full potential. Firstly, universities may employ senior librarians to teach graduate students. Secondly, teachers should encourage students to attend various types of speeches held by the library on the theme of the usage of academic search engine and the retrieve of specialized databases, etc. Next, departments are supposed to contact initiatively with librarians, inviting them to the class to provide students with guidance in how to retrieve and read literature. Lastly, the library should provide graduate students with novelty search service, helping them to select the thesis topics and ensure the innovation. All in all, graduate students are supposed to make full advantage of the library resources to achieve in-depth study and cultivate their innovative capacity [37].

At last, mentors should exert their guiding influence. Mentors should provide graduate students with instruction in thesis topics selecting, literatures collecting at each stage as required in thesis writing of graduate students. In the next place, the skill of professional literature retrieval, including the popular search engines, databases, periodicals and websites which related to the major, should be imparted to graduate students. Next, Mentors should instruct graduate students to classify, conclude and summarize the materials and produce their own opinions and dissertations.

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