

## Tacit Knowledge Based on the Cultivation of Innovative Ability for Graduate Students

ZENG Lijuan<sup>[a],\*</sup>; MA Yunkuo<sup>[a]</sup>

<sup>[a]</sup>Associate professor. School of Humanities and Sciences, Northeast Petroleum University, China.

\*Corresponding author.

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### Abstract

Poland's tacit knowledge theory believes that tacit knowledge exists of coding, individuality and practicality, as well as the relative priority of explicit knowledge in theory. Study on the tacit knowledge theory to improve the level of postgraduate education, optimize the structure of smart graduate students, raising graduate students' innovative ability is of important guiding significance. Including postgraduates' innovative ability of the tacit knowledge based on the reasonable knowledge structure, creativity, creative thinking, creative skills, and so on. This perspective development of postgraduates' innovative ability through interdisciplinary integration, build up the academic atmosphere, enhance good research practice, build harmonious relationship between teachers and students to be achieved.

**Key words:** Tacit knowledge; Graduate students; Innovation ability; Developing

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### INTRODUCTION

Tacit knowledge is a unique and universal type of human knowledge, which plays a positive impact in human activities. Creation is a process, in which human generates novelty, unique and value achievement by a

complex and high intelligent mental activity. Though tacit knowledge could only be unspeakable, it embodied the various functions of intelligence, such as vision, flair, interest, skill, creativity and so on, and it makes creative activities more power and effectiveness. The goal of graduate education is to cultivate high-level specialized talents who have the capabilities of independent scientific research and can make the creative achievements in science or special technology, namely high quality talents with innovation ability. Tacit knowledge has important practical guiding significance to enhance the education of graduate students, optimize the structure of the graduate student's intelligence, and improve the innovative ability of graduate students.

### 1. THE CONNOTATION OF TACIT KNOWLEDGE

Tacit knowledge is also named implicit knowledge relative to explicit knowledge. This concept was first proposed by the Hungarian-born British philosopher Michael Polanyi (M. Polanyi). Polanyi put the knowledge into explicit knowledge and tacit knowledge in "individual knowledge" in 1958. Explicit knowledge can be described by the written word, map, and digital formula, while tacit knowledge refers to knowledge that human knowledge can not be conveyed in words or unclear. Existing as an objective in recessive mode, tacit knowledge is more than explicit knowledge in number, and a lot of knowledge like skills, methods, ability, attitude, communication, experience, emotional and other aspects of knowledge is tacit knowledge, skills, methods, ability, communication, attitude, experience, emotional aspects are tacit knowledge. If knowledge is compared to an iceberg, the part above the water is explicit knowledge, and the part in the water is the tacit knowledge. Polanyi often say, "We understanding more than we know," and this as their epistemological proposition, and this is regarded as their

epistemological proposition.

In Polanyi's theory of knowledge, tacit knowledge is difficult to code. Explicit knowledge can usually use the formula, theorem, law, principle, system, regulations and instructions and other ways to express, while tacit knowledge is often personal experience, skill, impressions, intuition, the team's understanding, insight, values, beliefs and other forms, and it is difficult to articulate in words, language, images and other forms. The essence of explicit knowledge is to encode, format and structure human knowledge, and make it systematic and logical with the strict standard of language. Compared with explicit knowledge, tacit knowledge is still in a non-code, non-formatted and not logical state. Tacit knowledge is hard coded, making it difficult to collect tacit knowledge through conventional methods or spread information through conventional tools. For example, skilled swimmer may reach the world level, but it is difficult to express the unique perception of his techniques and skills to spread to others or share with others.

Tacit knowledge deprives from personal highly practical experience. It is a highly personal knowledge with personal and practical. Tacit knowledge exists in the organization which has private, special background knowledge, that is the special knowledge that everyone in the organization has, and it relies on individual experience intuition and insight. Scientists in scientific research use individual skills, experience, intuition, inspiration and enthusiasm for learning to get important discoveries and breakthroughs, but not just follow the general scientific rule. Individual participation and the level of political consciousness have considerable directing. Therefore, the acquisition of tacit knowledge depends on personal feeling, practice and understanding in the production and life. People gradually formed in the brain about such problems of intuition, inspiration, thinking mode and knack in the social practice, in particular problem or task "Scene". This knowledge is grasped through some practical experience, and it can not be learned, imitated and remembered, and even if some degree of learning, memory and imitation can only be from the shape of god.

Tacit knowledge has an important value in human understanding activities. As an important type of people's knowledge, it not only exist in large quantities and function alone, but also control the whole process of human cognition, because tacit knowledge has the priority theory compared to explicit knowledge. Polanyi thought, tacit knowledge (Jian Mo) is self-sufficient, while explicit knowledge must depend on the tacit understanding and application. Therefore, for all knowledge, if it is not tacit knowledge, it must be rooted in ta cit knowledge. An absolutely explicit knowledge is unbelievable. Tacit knowledge is a kind of deep understanding in essence, explicit knowledge must be tacitly understood and used so that can be transformed and realize its value function. Tacit knowledge is the guide to explicit knowledge.

Polanyi's tacit knowledge theory reveals the tacit root of human knowledge and he thought human knowledge includes not only the explicit knowledge that can clear narration, but also the tacit knowledge that accompany individual action and can not be specify by language. Also he regarded the tacit knowledge as a fundamental of human innovation. China's higher education and graduate student education is a high-level teaching and talent training activities with the academic developing frontier knowledge as teaching content, training means as scientific research and knowledge innovation as the purpose. The cultivation of innovation ability is the core of postgraduate education, and the theory of tacit knowledge provides graduate student innovation ability with a new research perspective.

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## 2. ANALYSIS OF THE INNOVATION ABILITY OF THE GRADUATE STUDENTS FROM THE PERSPECTIVE OF TACIT KNOWLEDGE

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Innovation is the ability of the creation main body uses all known knowledge and experience, through scientific processing, modification or restructuring, in the field of human practice, develop the ability of making new discovery, new theory, using new methods, creating new things and solving new problem. Innovation ability is the unity of intelligence factors and non intelligence factors. Intelligence factors includes professional domain related knowledge and ability, intellectual ability and cognitive style, and non intelligence factors includes a series of personality like innovation consciousness, independence, adventure, personal energy, curiosity and insight, preoccupied, energetic style of work, good psychological quality of accepting failure, and social environmental factors. From the perspective of tacit knowledge theory, these factors not only have the explicit knowledge taught and expressed by language, but also tacit knowledge that is difficult to be described by language, but can be revealed in action. So the innovation ability also can be said to be the coalition of explicit knowledge and tacit knowledge. Therefore, from the perspective of tacit knowledge the innovative ability of graduate students includes at least the following aspects:

### 2.1 Reasonable Knowledge Structure

In today's knowledge economy era, a personal breakthrough innovation in one area and make a useful contribution to society, is not entirely depend on the amount of knowledge he owns, but more depended on whether it has a reasonable knowledge structure. All things are an interrelated organic entirety, and knowledge structure is same as other things that the interdependent, interrelated and interaction mastery among all kinds of knowledge can make the overall advantage and the

transactional change of knowledge. The knowledge not only includes the objective clear explicit knowledge but also includes a large number of tacit knowledge. Relative to explicit knowledge, tacit knowledge has the priority of logic, the most abundant material library of dominant knowledge database, with tacit knowledge involved, human beings can constantly understanding of explicit knowledge and incorporate them into their knowledge of the original system, so as to create their own new knowledge framework. The students' scientific and reasonable knowledge structure should be based on explicit knowledge, with the dominant of tacit knowledge, the two interaction, coordination, and promote the benign cycle and rise of the knowledge.

## **2.2 Create Awareness**

The premise of creative activity is that people are good at finding problems found to be good, and are willing to try to solve the problem by optimization means. This awareness of willing to change and innovation is the premise of creativity and the psychological condition which are ensure the successful implementation of creative activities. To create awareness includes creative motivation, creative interest, creative emotion and the will to create. People create motivation generally derives from the complexity and novelty attract then resulting in strong problem consciousness which is the creation of the motivating factors to stimulate people's strong desire for knowledge, when people immersed in a positive thinking and enthusiastic mental state, it is easy to produce inspiration and wisdom to create. Postgraduate education consciously lead them into some complicated things and the new things, in the scene which has problem, it stimulate their potential energy makes invisible knowledge -- faith, perseverance, responsibility and fully released in order to promote the generation of new knowledge and generate individual experience, skills, enrich the individual tacit knowledge.

## **2.3 Creative Thinking**

Creative thinking is the core of creative ability and the most effective and active factor in the creative activities. Creative thinking is often the result of the birth of new things, and it is often accompany mental activities such as the association, imagination, intuition and inspiration. Association and imagination along familiar to strange, strange to familiar with the thinking track, to unrelated things together by analogy, generating principle or the means of the transplant, to create new things or solve new problems. For example, the invention of radar and ultrasonic are both the results of imagination and thinking. Intuition, inspiration are both the activities creative often appear in mental phenomena, the intuition is a leap forward thinking that people don't analysis and the answer to the question step by step then make reasonable predictions, idea or insight. The intuition

thinking in essence is the high concentration of logical thinking, but the process is difficult to use language to describe clearly, even there is uncertainty, only the accumulated rich knowledge and life experience, and has a keen observation and insight, to ensure the validity of intuitive thinking. Inspiration is a sudden occurrence of valuable thinking, sufficient stock of knowledge, the target concentration and moderate relaxation is the basic condition for inspired. Therefore the cultivation of creative thinking, we must pay attention to the integration of a variety of types of thinking, the coordination, and the overall optimization effect.

## **2.4 Creative Skills**

A creative person can turn the creative or create ideas into dominant knowledge and presents as new theory, new technology and new things, which includes the information processing ability, general work ability, practical ability and operation ability as well as mastering and applying the innovative ability, innovation skills and abilities transitive ability. These comprehensive reflects the behavior of innovation subject skills action ability, in another word it is the skill of creation. Creation skill is the necessary way transformation between explicit knowledge and tacit knowledge, and it is a creation of objective conditions and subjective experience of individual value realization. Graduate students should have academic research capacity, which can analysis and synthesize the numerous information data, use scientific research methods and raise novel unique academic opinion; we need to have the practical ability, then we can use the certain skills to solve complex problems in the scientific research practice and use some skills to solve complex problems, take shape of innovative thinking and promote the transformation of knowledge.

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## **3. SILENT THEORY OF KNOWLEDGE'S ENLIGHTENMENT TO GRADUATE STUDENT INNOVATION CAPABILITIES RAISE**

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### **3.1 Pay a Great Attention to the Discipline Overlapping**

The person who the 21st century needs is the cross domain and cross specialized comprehensive talented person, the postgraduate education basis social reality demand, must speed up the discipline to fuse alternately. "Theoretical development cannot pause is only seeing each other in a relative independence each one discipline singles level, but should, in pressing various discipline own law of development and discipline special details construct various disciplines in the foundation, tries to improve the exchange and union between disciplines, presents the discipline community superiority". The

discipline manifests alternately specifically is: In the raise mechanism, wants the conformity resources superiority, sets up the discipline group and interdisciplinary research platform, makes among the different disciplines and knowledge innovation in the personnel training makes up for one's deficiency by learning from others' strong points, the dynamic fusion. In the curriculum construction, must pay great attention to the discipline seepage and writing coherence overlapping, not only need attach great importance to mastering system's specialized knowledge, moreover must specially pay great attention to know the solid and broad basic theory and rich humanistic knowledge, and has foresightedness and leading edge. Must appropriately adjust the public compulsory course the proportion and content, increases takes as an elective a kind of curriculum specialized, encourages the graduate student interdisciplinary cross specialized choice curriculum, develop student's aspect of knowledge. In the teacher construction, enhances the industrial studies with research cooperation, establishes the compound tutorial system, takes strengthening student's practical ability and scholarly research ability as the goal, displays all teachers' wisdom, teacher's academic specialty and graduate student's research direction organically links, enables the graduate student to obtain the omni-directional instruction and help in the study. Under the scientific technological advance highly integrated background, university's discipline intersects now with the dynamics of fusion must enlarge, the speed must speed up, because so, the postgraduate education raise top level, multi-skill and innovative talented person goal can realize effectively.

### **3.2 Building Academic Atmosphere**

The graduate student academic activity is an important component of the postgraduate education and research programs, which is the graduate student raises the unit academic ecosystem the important level, it is an important link that the graduate student raises. Therefore, the university must try hard to build the strong academic atmosphere and loose academia, arouses graduate student's enthusiasm, displays graduate student's creativity, provide the opportunity and instruction for graduate student's ability training. First and foremost, the university must seriously implement the postgraduate education innovative program, encourages the graduate student actively to participate in inside and outside the school various innovative programs, does the research of high level; Besides, strengthens with the domestic and foreign universities, the scientific research institute and enterprise and so on cooperation, the regular development professionalism, regional characteristic and forward-looking graduate student academic exchange activity, the gain discipline front tendency, expands the graduate student aspect of knowledge; The lost but not the least,

encourage the student actively to participate in the full of meat, various academic forum and academic Sharon, through the academic exchange activity, broadens one's outlook with the mentality, increases the dominant knowledge and silent knowledge, enlightens the wisdom, the promotion research capability and academic accomplishment, the promotion innovation quality comprehensively enhances.

### **3.3 Strengthens the Scientific Research Practice**

The education scientific research and practice are to raise graduate student's important link, to training the graduate student professional ability, fosters graduate student's innovative spirit and practical ability has the special vital function. The university must actively introduce the graduate student technological innovation incentive mechanisms, takes enhancing the graduate student innovative spirit and innovation capabilities as the goal, provide the creative practice condition and environment. In the teacher stratification plane, must give full play to teacher's leading role, the guidance student carries on the creative study, ponder and research closely unifies, sharpens the research capability, the promotion academic personal status and research standard. The teacher must participate in scientific research item to the graduate student the opportunity, lets the graduate student in participating in the process of research, grasps the scientific research mentality and method, Utilizes this discipline and related discipline elementary theory and method in the actual research asks and solves the question. In the system stratification plane, the school must strengthen scientific research training the effective management and control to student, reforms the graduate student technological innovation subsidization policy, sets up the graduate student technological innovation fund, the subsidization graduate student applies for the research project, supports the graduate student to undertake independently to the scientific progress has the scholarly research of material effect either has the important application prospect project or the technological innovation research, the drive graduate student makes the innovative success. In the social stratification plane, actively carries out the industrial studies with research cooperative education, through builds the graduate student innovative research base with the enterprise and unit, by "school teacher enterprise teacher" the double tutorial system comprehensively improves the graduate student raise quality. Through the close union of teaching and scientific research, the display enterprise's manpower and scientific research resource superiority, to promote the graduate student theoretical knowledge to the transformation of practical ability, strengthens the technological innovation to realize and apply the R & D capability, to promote the graduate student to develop comprehensively, becomes the top-level and multi-skill innovator.

### 3.4 Construction a Good and Harmonious Teachers and Students Interactive Relationship

Teacher's raise to graduate student innovation capabilities has the enormous influence, teacher's research direction, the academic level, the scientific research spirit and even the humanistic thought will become the origin of student silent knowledge. Polanyi consistently attaches great importance to the scientific culture uses "apprentice system" the raise pattern, the skill that because in the scientific knowledge "cannot describe in detail cannot transmit through the rule way, because it does not have the rule. It can only have the way of apprentice to transmit through the skilled worker. Teacher in teaching process and scientific research process, not only expressed clearly the visible carrier load's dominant knowledge, moreover teacher own personality, makings and thinking mode subtly will also affect the student, helped the student to form to the humanistic special characteristic silent knowledge. As the teacher and student compares notes to exchange the interaction by the one-to-one way frequently, teacher's ideal and faith, experience and skill, manner and spirit unconscious will be imitated by the student with inheriting, forms the stealth transmission of silent knowledge. Benign priests and disciples relations, need to establish in respecting and trust foundation, on the one hand, how the teacher in studying and research guides the student to follow the academic request and standard patiently carefully, how to investigate the literature, the shift data, and inspires the student to propose that by the new angle of view and new mentality the question, solves the problem; On the other hand, the graduate student sought for advice to teacher positively on own initiative, exchanged sincerely frankly, caused itself to obtain many research experiences. In this kind of democratic equality's good contact situation, teacher's Germany, wisdom and sentiment will not have the critique to gradually influence and influence student, in understanding, caring about and cherishing the process

of student, forms the magnetic field attraction student, the graduate student can also display the identity and unique individuality, exchanges with the teacher modestly on own initiative, causes ability that the thought analysis ability, begins to operate and solves the question ability to obtain the exercise and enhancement independently.

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