

Nurturing Creative Problem Solving Ability of the Gifted in Confucian Society

Seokhee Cho

St. John's University

It has been understood that Confucian culture only blocks creative problem solving(CPS). However, it is claimed that Confucian culture exerts positive and negative influence on nurturing CPS. Confucian culture fosters CPS by urging strong motivation for learning, and building rich base of knowledge and skills in general and in specific domains through teaching joy of learning and hard-working fueled by parents' education fever. Confucian culture has negative influence on CPS with emphasis on obedience and conformity. Keju system, as a part of Confucian culture, resulted in excessive private tutoring to prepare for the high-stakes test, delimitation of students' experiences to matters to be tested, and students' weak interest, self-concept, and self-directed learning. Negative influence from Confucian culture on CPS is analyzed and some suggestions are provided for revising educational policies and educational practices in order to maximize the creative problem solving in Confucian countries.

Key words: Creative problem solving, Confucian culture, Gifted education

In the age of innovation through rapid changes, we will be faced with unprecedented problems(Davis & Meyer, 1999). Since it will not be easy to identify problems in the future, it seems very essential to develop creative problem solving ability for the gifted in the future. Sternberg & Lubart (1996) also asserted that creativity is extremely important for the prosperity of the development of national economy.

Recently, Asian students marked the highest mathematics scores in a survey covering 41 of the OECD countries(OECD, 2003). Singapore students ranked the first in both math and science. South Korea, Hong Kong, Taiwan, and Japan ranked from second to fourth respectively on them at test, administered as part of the Third International Mathematics and Science Study(TIMSS). In science, Taiwan, South Korea, Hong Kong, and Japan ranked from second to fourth.

However, Asian students are thought to be less creative than Western students(Kim, 2005; Kwang, 2001), because they are obedient to the teachers and elders in the community. Confucianism has been pervasive in East Asian countries including China, Korea, Japan, Vietnam, Hong Kong, Singapore, and Taiwan in structuring morals, in shaping law and government, in determining how an individual views problems, the world and himself. Confucianism can be a good ground for explaining the barriers in developing creative problem solving ability of the Asians and in searching for means for nurturing creative problem solving ability of the people who have been influenced by Confucianism.

I. Dynamic System Model of Creative Problem Solving

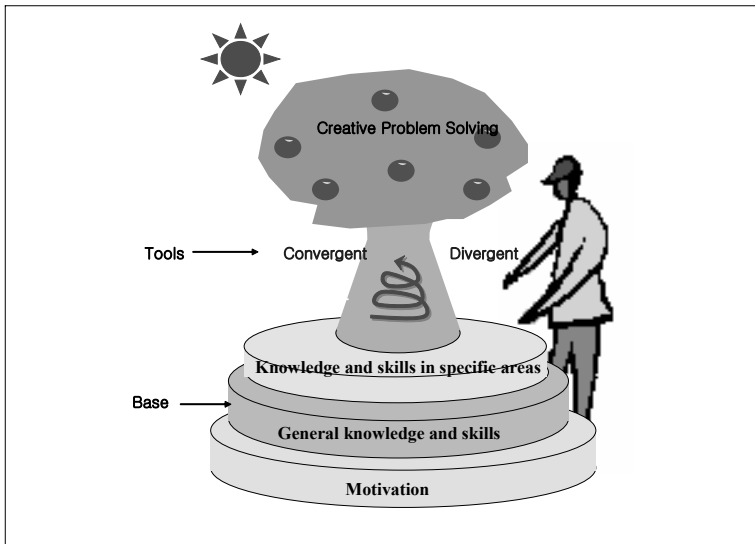
It is necessary to review the nature of creative problem solving in terms of its components and dynamics of interaction among components of problem solving. Sternberg(1988) defined creativity as producing unique and

useful solutions for problems. Since creativity is exercised during problem solving, creativity and creative problem solving are used interchangeably in this paper. Creativity has been studied by numerous scholars either on personality characteristics of the eminent scientists(Amabile, 1983; MacKinnon, 1962); cognitive aspect such as divergent thinking processes(Guilford, 1967; Mednick, 1962); or social factors(Amabile, 1983; Simonton, 1984). The studies on specific aspects of creativity broke its concept to bits and pieces. Creativity tests developed by Guilford's(1967) and by Torrance(1962) have narrowed down the concept of creativity to divergent thinking processes.

The limits of existing theories and studies were examined and several scholars suggested a new framework which can integrate various perspectives on creativity. Sternberg(1988) suggested creativity as a result of interaction among cognitive processes, knowledge, thinking style, personality, motivation and environmental resources. Urban(1995)'s component approach model of creativity suggests six factors, which are divided into cognitive and personal aspects of creativity. Amabile(1983) suggested creativity composed of knowledge and abilities in specific area, creativity related skills, and motivation. These new theories generally emphasize dynamic interaction among various factors instead of emphasizing one specific factor related to creativity.

Based on the review of recent theories of creativity by Amabile(1983), Sternberg(1988), and Urban(1995), a model of creative problem solving was suggested as in [Figure 1] by Cho(2003). The model shows that the creative problem solving ability is an organic system which is fully influenced by the environment and components are dynamically interacting each other depending on the person, problem, processes, and environment with varying degrees of involvement. Creative problem solving requires a base, which is composed of motivation, general knowledge and skills, and knowledge and skills in specific domains. The base provides materials for the thinking processes to utilize. Convergent and divergent thinking manipulate the know-

ledge and skills in their mental reservoir in order to solve problems in a new and useful ideas or products.



[Figure 1] Dynamic System Model of Creative Problem Solving adapted from Cho(2003).

The creative problem solving can be dried up or rotten depending on the micro- and macro-environment like an organic system. Both macro-environment such as culture, tradition, and value on learning and creativity, national policy on and social recognition of the value of knowledge property, and educational policies such as university admission, and micro-environment such as expertise, passion and attitudes of parents and teachers on education exercise influence on the creative problem solving of an individual residing in the environment.

Each culture as an environmental factor for creative problem solving nurtures each of these components to different degrees. Confucian culture seems to nurture the base of creative problem solving the best(Gao, 1998; Kim, 2005). Even though Kim(2005) found Confucianism presents cultural

blocks to creativity in general because of hierarchy, obedience, conformity, gender inequality and suppression of expression, However, Confucian culture provides a base for building motivation, knowledge and skills in general and in specific domain. This is well evidenced in Asian students' high academic achievements in several international comparative studies on students' academic achievements(OECD, 2003) It was possible because Confucian culture induce the society, especially the parents, place high priority on education (Lee, 2000; Hyun, 2003). Meanwhile, the Western culture nurtures the tools for creative problem solving better than Eastern culture(Cho, 1999), since reasoning has been a significant tradition since 17th century in Western society as understood by most of the constructivists(Shutkin, 2004).

II. Positive Effects of Confucian Philosophy on Nurturing Creative Problem Solving Ability

For Confucian culture value the joy of learning, hardworking connected with social mobility through examinations, and family values, the base for creative problem solving of students in Confucian society could be nurtured better than in other societies.

1. Joy of learning connected with high social prestige

One of the main teachings of the Confucius is the joy of learning and practice. In the section on learning of Analects, the Confucius articulated the joy of learning and practice of the learned(子曰 學而時習之 不亦說乎). Yu & Suen(2005) quoted “all pursuits are of low value; only studying the books is high(万船皆下品, 唯有凌夷高)” by He(2001). The Confucius teaching on the “joy of learning” has also helped children be highly motivated and have enough knowledge and skills needed for creative problem solving.

2. Belief in the perfectibility of human being

Confucianism is premised on the concept of the perfectibility of human beings: in other words, a person's fortune in life is not predetermined at birth by wealth, social status, or any religious sense of being "chosen". Based on this philosophy, children work hard to get the best scores in exams, since they believed that "effort", not ability, can make differences in their achievement.

The Confucius said that by being an excellent scholar, an individual can be a high official(學以優之士). For the past 1400 years, studying and being selected as the best scholar through examinations was of the highest value of any families in China. Yu & Suen(2005) stated that the exam system for selection of high officials(科舉制度) was perceived as equitable and fair and the only means for upward mobility for a poor person since Song Dynasty. Adopted by various nations including Korea and Vietnam, the examination system has been viewed as a "meritocratic solution to the widespread problems of nepotism and corruption in the nomination system that had preceded them.(Yu & Suen, 2005, p.25)" In Korea, paper-pencil tests for selection of the lawyers, government officials, and diplomats(司法考試, 行政考試, 外務考試) are still implemented. Such examinations allow those who pass the exams move upward in the social ladder with a bright future.

The survey found that Singapore's students on average spend 4.6 hours a day doing home work compared with the international average of 2~3 hours. Also, children in many Asian countries attend school on. The diligence has Asian students be equipped with affluent knowledge and skills needed as a base for creative problem solving.

3. Education Fever for Success

East Asians influenced by Confucian culture have tended to think of the

family, rather than the individual, as the fundamental unit of society. The family members dream and work together. Young students and their families dream of the bright future of high social prestige preparing for the national exams for university entrance. Entering into a university of high reputation is a dream of many families.

Yu & Suen(2005) asserted that the Chinese education fever for the success on examinations was rooted from the Confucian philosophy and national exam system for selecting the talented or high officials(科舉制度, 考試), which is a kind of high-stakes test. Chinese current National Entrance Examination(高考), a critical step for upward mobility, again placed importance on education. Similarly in Korea, Kim, Lee, and Lee(2005), based on a research through Delphi process with Korean experts, defined the education fever as “parents’ desire and motivation to help their children to be successful in their lives”. The definition implies that “education fever as parents’ educational motivation, investment behavior, and desire for achievement to help their children to be successful academically and financially” (pp.11~12). Japanese “high education fever” phenomenon was introduced to Western readers by Dore(1976), Cummings(1980) and Rohlen(1983). Dore (1976) recognized that this phenomenon in Japanese similar to those in East Asian societies.

III. Negative Effects of Confucianism on Nurturing Creative Problem Solving Ability

Confucianism influenced Asian students negatively against nurturing their creative problem solving ability. Valuing hierarchy in human relationship have children easily give up their original ideas and questions conforming to parents, teachers and elders. Competitive system of examinations in the East has produced mentally skewed students who are good at passing examina-

tions but flounder at creative problem solving(Zeng, 1999). Valuing excellent scholarship for high social prestige have strengthened parents' education fever resulting in excessive private tutoring, which weakens students' interest for learning, academic self-concept, and self-directed learning attitude(Yu & Suen, 2005).

1. Obedience and Conformity

Confucius said "I transmit but do not create. I believe in and love the ancients"(Analects 7:1). It implies that the essential qualification for teaching any thing is to "review the old, so as to find out the new(溫故而知新)" (Analects 2:11). Instead of creating something new, understanding the old was more valued. In a very broad term, the Confucian philosophy is based on establishing order in society by maintaining strict hierarchies in social relationships and by subscribing to a clear code of moral conduct. Fairbank (1992) wrote:

Parents were superior to children, men to women, rulers to subjects. Each person therefore had a role to perform, "a conventionally fixed set of expectations to which individual behavior should conform."(p.51) If we take this Confucian view of life in its social and political context, we will see that its esteem for age over youth, for the past over the present, for established authority over innovation has in fact provided one of the great historic answers to the problems of the relatively lower scores on creativity test(p.53).

2. National Exam System for Selecting High Officials

The national examinations for selection of high officials(科舉, 考試) amplified parental education fever for success on the examinations in order to secure high social prestige. Investigation on the Japanese educational

system and entrance examination system by OECD(1971) revealed that the Japanese system is marked by intense competitiveness and that the destructive strains are imposed on thousands of young Japanese(Nakamura, 2005). Korean households spend about 10% of their income on private tutoring. Families with middle and high school students spend about 30% of their income. The higher a families' income, the more they spend on private tutoring. However, the lower a families' income, the heavier the burden for the family becomes for spending on private tutoring(Hyun, Lee, & Lee, 2003; Lee, 2005).

The high-stakes tests have delimited students' learning, since students do not want to spend too much time learning subjects which will not be tested. Yu & Suen(2005) describe how Chinese students focus on learning subject matters to be tested, since "only tested subjects are offered in Grade 12 in order to fully prepare for the NCEE.(p.26)". The Keju system for selection of the high government officials was opened to the general public since Song dynasty. Since then, the test became more standardized. Currently, students study only those to be tested in the exams(Yu & Suen, 2005). Coach book on testing and private tutoring institutes are a huge professional industry. The severe competition delimited students' knowledge and skills only to the subjects to be tested. Distant association, which is one of the characteristics of divergent thinking and which is enabled when children have various experiences, was not encouraged.

Excessive private tutoring focused on exams weakens students' interest, academic self-concept and self-directed learning ability. Korean students ranked the lowest in "interest in learning" and "self concept in learning engagement" in reading and math according to the PISA 2003 results contrary to their high ranks in academic achievement(Lee, 2005). Students have few chances to participate in self-directed learning activities like reading books, public service and long-term projects with other students. The more

time students spend their time on private tutoring, the less they are engaged in the classroom learning. Because of this practice, students undergo repeated practice of the materials and students become bored when materials are taught again in the school according to PISA 2000.

IV. Future direction for nurturing creative problem solving ability of the Gifted

The learning environment of Asian countries is favorable and unfavorable at the same time for nurturing creative problem solving abilities of the gifted. The high education fever of parents and diligence of students are favorable conditions, meanwhile the obedience of students, authoritarian attitude of teachers, severe competition among students for success at the exams, high pressure from family members are unfavorable conditions for nurturing creative problem solving abilities.

It seems necessary to devise an identification and evaluation system which can maximize the positive effects and minimize the negative effects of the environment. Gifted education programs should secure psychologically free and safe environment from pressure or anxiety for not making mistakes and failure. Gifted education programs should include self-directed research activities in order to nurture creative problem solving abilities. In evaluation, it seems necessary to employ more rough grading system such as A, B, C than 92, 95 so that students do not have to be too much concerned about scores.

1. Identification of the gifted and evaluation of students' performance

In countries where Confucian philosophy prevails, how to identify the gifted and how to evaluate performance of students can influence nurturing of creative problem solving abilities of students since students spend a great deal of time preparing for examinations. In many families, parents work

together to get the maximum scores on tests. Private tutoring institutes may analyze the problems of previous years and teach students on how to take tests for better scores. Evaluation authorities are reluctant to use open problems for identification because of relatively huge expense required for scoring diverse answers for open problems and also because parents may suspect the objectivity and reliability of professionals' judgment on students' creative products.

It is necessary to devise an identification system which can identify the 'real' gifted but not the 'manufactured' gifted. The 'real' gifted means the student's high scores on exams which require complex mental processes represent his/her actual potential, meanwhile the 'manufactured' gifted means the high scores are not consistent with their actual potential. Problems used for identification of the gifted should require interactions among all the components of creative problem solving(Sternberg & Lubart, 1995, 1996; Urban, 1995) and bring about beneficial effects to students who practice solving the problem. Sum of test results of each component is not the same as the result of an interaction among the components. Therefore, identification test should employ open problems where wild interaction among components of creative problem solving is allowed(Kim, Cho, & Ahn, 2003, Maker, 1994, 1997). Furthermore, recent study suggests that talent search process should adopt problem finding and experimental designing tasks(Chin & Chia, 2006; Jung, Cho, Seo, Shin, & Heo, 2004). Tests should allow enough time for students to solve open problems. Korean example is presented below.

In many of the school boards in Korea, students go through multiple stages of identification from logical thinking test at the 1st stage, creative problem solving test in math or science with open problems at the 2nd stage, and oral interview with teachers for in-depth discussion or performance test at the 3rd stage. Each year, problems to be used at the 1st and

the 2nd stage are developed by the National Research Center on Gifted and Talented Education. In Korea Science Academy, the high school for the gifted, the applicants go through evaluation with documents such as teachers' recommendation, portfolio, and school records at the 1st stage, math and science creative problem solving test(paper-pencil) at the 2nd stage, and 3 days camp for evaluation of actual performance at the 3rd stage since 2002.

In order to prevent the negative effects of repeated practice of certain types of problems, not only the problems but also the format of evaluation has been changed every year. In 2002, applicants were asked to identify problems and design experiments to solve them after reading a huge amount of reference materials. In 2003, provided with various materials and equipment, applicants were asked to devise and carry out experiments and to present results to the evaluator. In 2004, applicants were taught on a brand new concept and then were asked to apply the concept for solving open problems.

In spite of the enormous amount of expense needed for identification of the gifted, it has been judged worth while through a series of research(Seo, et. al., 2004, 2005). Such a practice of identification of the gifted in Korea may have risked objectivity and reliability to some extent. However, it was successful in increasing the validity of identifying the 'real' gifted. Furthermore, it has been saving gifted children from unnecessary practice of rote memorization for success at the examination.

2. Educational Programs for the gifted

The Dynamic System Model of Creative Problem Solving implies that it is essential to adopt holistic and open education approach for nurturing creative problem solving abilities. In Confucian society, it is necessary to provide a climate which fosters psychological safety and intellectual freedom within a structure where individuals respect one another(Sternberg & Lubart,

1995) in order to nurture creative problem solving.

Gifted education programs should secure a set of time and space where students can feel free to ask questions and explore alternatives without being afraid of making mistakes and giving wrong answers. Specialized school or classes for the Gifted is necessary in order to provide psychologically free and safe environment for them to take a risk for solving problems in a creative manner. Gifted education programs should also provide the gifted with chances to find problems in addition to solve the given problems (Patricola, 2005). Through a study on self-directed research abilities of the Korean gifted, Jung et al.(2004) found scientific creative problem solving ability was closely related to problem finding and experimental design ability. It was also found that the Korean gifted had a very high self-regulated learning ability but relatively low research ability. The results confirmed influence of the Confucian culture on the self-directed research abilities of the gifted. Therefore, the Korean gifted need to be exposed frequently to actual research experiences more than current practices.

One of the best ways is to allow students to plan on their own or choose alternatives for solving problems, trusting that the gifted can devise unique and useful solutions if they are encouraged to do so(Jung, et. al., 2004). The long-term projects of a small team or individuals should be integrated with training on concepts and skills on a big theme.

In Korea, teachers are provided with enrichment programs for nurturing creative problem solving abilities of the gifted developed based on a variety of well-verified models(Cho, 1998, 2003; Kim, 2003, 2004). However, teachers tend to take out some activities of the programs for teaching. In order to induce teachers to employ a systematic approach for nurturing creative problem solving abilities, “National Creative Products Fair of Gifted Education” has been held once a year since 2003. A team of teachers and students work together for a certain period of time with a creative product as their final goal. They submit portfolios of teaching and learning. and go

through probing questions sessions. These procedures of the Fair are intended to evaluate the quality of teaching and students' self-directed research abilities during the projects. Since there can be some parents who want to help their children or even do the projects on behalf of their children, it was necessary to probe the process of carrying out the project with teachers or students. Finalists' products were published for other gifted students and teachers(Jung, et. al., 2004). With the introduction of the Fair, teachers seemed to realize the importance of systematic approach for nurturing creative problem solving abilities better.

3. Teachers of the gifted

In maximizing the creative problem solving abilities of the gifted, Kwang (2004) asserted that school teachers play an important role in making the environment right. There are some conflicts between the practice of Confucian way of teaching and the teaching for nurturing creative problem solving abilities as shown in <Table 1>. However, the balanced integration of two approaches of teaching would be inevitable for nurturing creative problem solving abilities to the maximum extent.

<Table 1> Teachers' Attitude Toward Students' Behaviors

Authoritarian attitude focusing on students' desirable behaviors(East)	Democratic attitude focusing on realization of students' creative potential(West)
Focus on developing students' character and discipline	Focus on realizing students' creative potential
Expect students to do what they say	Trust students to do the right thing
Make decisions all by themselves	Empower students to make decisions
Exert control over student behavior	Support the personal autonomy of students' behavior
Reinforce the desirable but uncreative behaviors of students	Reinforce the creative but undesirable behaviors of students

Considering the importance of teachers' attitude toward nurturing students' creativity, professional development programs should be devised where teachers can learn on how they should response students' ideas and behaviors in order to maximize students' creativity.

Above prescriptions on educational programs and teacher training can be better realized when the educational policy can encourage such practice in each classrooms through evaluation of schools' and teachers' effectiveness on enhancing creative problem solving abilities. For example, the national policy which forces universities to apply uniform admission criteria such as SAT score, GPA score and no other assessment by individual university should be revised. Each university should be able choose the criteria by which students' creative problem solving abilities can be evaluated with diverse approaches.

In addition, all the above educational practices which can facilitate nurturing students' creative problem solving should be fostered through a national master plan based on the recognition of the importance of providing psychologically free and safe environment, implementing authentic assessment, and encouraging students' long-term research projects.

V. Conclusion

Creative problem solving requires several components interacting dynamically with each other. Students in Confucian countries do not develop these components in balance. While they are highly motivated for success at the exams and have good knowledge and skills in general and in specific domains, their thinking abilities are not well developed and utilized. It is because Confucian culture stresses the joy of learning, belief in the perfectibility of human being, high education fever and strong support from family members. However, severe competition for high social prestige

followed by success at examinations and heavy reliance on objective tests have deprived students of thinking opportunities and self-directed research needed for creative problem solving.

To foster creative problem solving abilities of students in Confucian society, it is necessary to provide students with more opportunities to think and question, meanwhile maintain the parents' and students' high motivation for learning. It would be possible by integrating Eastern and Western views and practices of teaching. Then, students will learn to respect teachers while they are skeptical of what teacher says, to follow instructions of the teacher closely while they question and argue with the teacher in class, and to have chances to pursue vigorously what they choose to (Kwang, 2004).

In order to maximize creative problem solving abilities of the gifted in Confucian culture, several alternatives in identification, educational programs, and evaluation have been suggested. Especially using open problems and judgment-based assessment for identification of the gifted and evaluation of achievements seems to be very critical for nurturing creative problem solving abilities. To bring about changes and introduce alternative ways in gifted education, teachers, educational administrators, and professionals need a great deal of courage, since there can be a strong resistance against the change questioning the objectivity and reliability of the new practices. In classroom settings, it is necessary to secure a learning environment which is free of anxiety and stress for high achievement through teacher training on how to encourage students to produce their own ideas, opinions, and to carry out self-directed research projects. In this way, it would be possible to maximize the positive effects and minimize the negative effects of Confucian culture on nurturing creative problem solving abilities of the gifted in Asian countries.

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= 국문초록 =

유교사회에서의 창의적 문제해결력 개발

조 석 희

St. John's University

유교문화는 창의적 문제해결력의 개발과 발휘를 방해하는 것으로 이해되어 왔다. 그러나 본 연구는 유교문화가 창의적 문제해결력 발휘에 방해가 되기만 한 것은 아님을 주장한다. 유교문화는 창의적 문제해결력의 개발에 도움이 되기도 하고 방해가 되기도 하였다. 창의적 문제해결력은 동기, 일반적인 지식과 기능, 특정 영역의 지식과 기능을 기반으로 확산적 수렴적 사고라는 도구를 사용할 때 발휘된다. 유교문화는 배움의 즐거움을 강조하며, 열심히 정진하는 자세의 소중함을 가르쳤고, 이로 인해 부모들은 높은 교육열을 끌어냈다. 그러나 유교문화 중에서도 위계사회에서 순종하고 타협하는 태도를 강조함과 계층 이동의 주요 수단으로서의 과거제도는 시험 문제 풀이에 치중하는 교육을 초래하여 창의적 문제해결력의 수단이 되는 사고 기회를 박탈하고 학생들의 흥미, 호기심, 자아효능감 등을 저하시킴으로써 창의적 문제해결력의 발휘를 억제하는 부정적인 기능을 했다. 이런 문제점에 대한 인식을 바탕으로 영재의 선발과 학업수행에 대한 평가, 교육 프로그램의 개발 및 운영, 교사 연수, 대학입학전형 등을 개선하는데 필요한 방안을 제시했다.

주제어: 창의적 문제 해결, 유교문화, 영재교육

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