Post Catch-Up Innovation and Development of Creative Talent in Korea: Limitations and Challenges

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ABSTRACT

Korea faces challenges from the recent development catch-up countries and the absence of catch up incentives. For Korea to solve the issue of post catch-up problems and create a new development path based on creative innovation, there is an urgent need to secure a system design capability for the production of creative knowledge and talent that can create a competitive society. However, the conservative inclination and a lack of a customer-oriented attitude of Korean universities and professors leads to a standardization of talent and a passive restructuring of the curriculum by universities instead of a direct correspondence with the demands of companies and society. The compatibility of Korean university education with the demands of society remains the lowest in the world and creative education in Korea faces a difficult situation. The world is transforming from a knowledge-based economy to a creativity-based economy and a competitive society will led by creativity, not by knowledge. The success of a country in nurturing creative talent will determine its future national competitiveness. For Korea to be become a global leader in the new era of creativity, it needs to make proactive preparations. It is imperative for Korea to transform the educational system from the previous cramming system to a creativity-nurturing system.

KEYWORDS: post catch-up innovation, nurturing of creative talent, limitations and challenges of creativity-nurturing system

1. INTRODUCTION

Korea is in the transition from catching up with advanced countries to producing world-leading research and development (Song and Hwang, 2006; Song et al, 2007; Seong, 2008; Seong & Song,

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2008). To accomplish system transition to post catch-up, it is important to nurture creative talent. When Korea pursued a catch-up model, the skills to solve given problems were essential. However, in this post-catch-up era where there are no countries or models to benchmark, the development of creative researchers who can identify problems, pro-actively address them, and come up with creative solutions has emerged as an important issue.

The old model encouraged education centered on cramming and memorization skills, since the quick imitation and absorption of advanced knowledge were critical. However, the catch-up education model now faces serious limitations. In response the Lee Myung-bak administration is leading education reforms to foster creative talent through deregulation, autonomy, and competition The Lee administration is pursuing a variety of educational reforms, such as the diversification of high schools, teacher evaluations, evaluation of the national education scores, and the development of high-quality institutional resources, and well-balanced textbooks with a view to building confidence in the academic curricula for public primary and secondary schools.

These efforts to modernize face fundamental limitations, since there still remains the legacy of the "catch-up" educational policies, especially in the university entrance system and the university evaluation system. The university entrance examination system is based on objective and multiple-choice questions while the university assessment system focuses on research performance. These factors serve as major structural obstacles to nurturing creative talent. Korea needs fundamental solutions to these limitations to ensure that the new education system successfully nurtures creative individuals. This study examines the current status and problems in nurturing creative talent and explores fundamental solutions to them.

2. SITUATION OF POST CATCH-UP INNOVATION AND THE IMPORTANCE OF DEVELOPING CREATIVE TALENT

2.1 The Shift from Catch-Up to Post Catch-Up Innovation

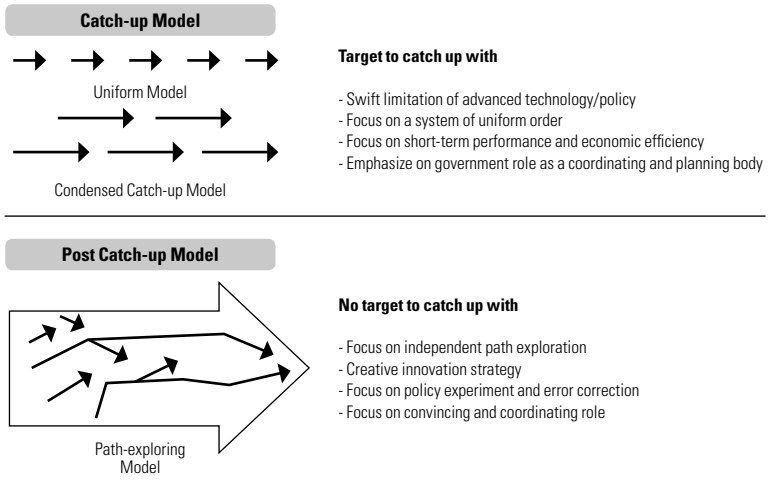
Korea is now in a new era where there exist no countries for Korea to catch up with; future innovation must be driven by domestic solutions. Korea has advanced by swiftly imitating, learning established technologies, and following the previous policies of advanced countries. However, as Korea enters the post catch-up period, the past catch-up mode of development faces limitations. A new mode of problem-solving as well as self-reflection of past innovation system is needed for Korea to better respond to the new circumstances.

"Catch-up" means later-comers that follow the path already taken by advanced countries. The concept of catch-up includes targets to catch up with as well as the destination. On the contrary, in the post catch-up mode there is no path to follow or targets to catch up with. Post catch-up is fundamentally different from catch-up as the former explores a new path and sets new targets or destinations.

Post catch-up innovation means innovation activities that follow the technology development locus of advanced countries and those that form a new locus. In case of late-comers, areas of post catch-up innovation are often where existing industries are reinvigorated by new technologies. Post catch-up innovation does not simply emphasize high tech or world class technology but considers the creation of a new locus as an important task by leveraging unique attributes while being based on regional or traditional industries (Song et al., 2007: 290-291; Seong, 2008: 60-61).

Discussion on post catch-up innovation is often focused on innovation activities of companies who are the key players of innovation. However, when the discussion is expanded to the issue of supporting post catch-up activities through policies and institutions, post catch-up activities can be discussed at the national innovation system level. The concept of post catch-up raises the need for late-comers to come up with a new development model and implementation strategy that is different from the past after they succeed in catching up with advanced countries (Seong, 2008: 60). The post catch-up mode illustrates the issue with the legacy of the catch-up system and emphasizes efforts to solve this issue.

FIGURE 1 Difference between Catch-Up and Post Catch-Up Models



2.2 Key Challenges in Late-Comers Post Catch-up Innovation: Concurrent Involvement of Society and Technology

Latecomer countries lack knowledge, resources, and infrastructure in post catching-up innovation activities, they have the experience and legacy of catching-up countries; however, their innovation is different from that of advanced countries. Unlike the situation of advanced countries, the social system of latecomer countries is not fully developed. Therefore, latecomer countries face the challenges of future forecasting and infrastructure building while performing innovation activities (Song and Hwang, 2006; Song et al., 2007; Seong, 2008). However, latecomer countries are more flexible in responding to a changing environment since they are not as dependent as advanced countries on existing knowledge, systems, networking ability, and intensive capital investments (Perez, 1988; Perez & Soete, 1988; Schienstock & Hämäläinen, 2001). As result, in the areas where the technology life cycle is short, an opportunity is available to latecomers and the possibility of catching up by latecomers with advanced countries increases (Lee and Lim, 2001).

Post catch-up innovation requires a new approach as it involves the development of technologies and the creation of markets as well as the systems through which these technologies are developed and utilized. While catch-up innovation was focused on imitating existing technologies, post catch-up innovation requires perspective and knowledge different from those of catch-up innovation. It is

necessary to develop capabilities to forecast future technologies as well as the future of society where innovative technologies are used and diffused in order to pursue innovation in technology along with the creation of markets and systems at the same time. The knowledge about new technologies and the understanding of new markets and systems from the liberal arts and sociological perspective are important in innovation activities (Song et al., 2007: 20-24; Seong, 2008: 62).

2.3 Developing Creative Talent as a Key Element of Post Catch-up Innovation

To drive creative innovation by moving away from catching-up to post catch-up, to develop creative talent is one of key success factors. Countries like Finland and Japan have transformed their innovation systems from catch-up to post catch-up style through the emphasis of the role of universities as the source of creative talent and knowledge. Finland emphasized the role of universities in supporting the development of creative talent when overcoming a serious 1998 economic crisis and attempting the migration into an independent innovation system during the 1990s. In Finland, this effort led to the development of high caliber talent through R&D investment and quality education at the national level (Schienstock, 2004; Nieminen & Kaukonen, 2004). Meanwhile, Japan emphasized the development of creative knowledge and talent to overcome the limitations of a catch-up mode that started to emerge from 1980s. To promote differentiated knowledge creation and utilization that can add value, the Japanese government developed various policy efforts including the promotion of linkages between different innovation players and strengthening talent mobility (MEXT, 2006).

Under the catch-up innovation system, Korea has achieved a rapid volume growth based on the high zeal for education by Koreans. With a clearly defined objective of "catching up with advanced countries", education has focused on improving learning capabilities like how fast individuals can acquire existing technology and knowledge instead of developing creativity or logical thinking. Since the focus has been on the volume not quality of education, the evaluation criteria to identify high caliber talent has been standardized and uniformized; this method limits the opportunities for creative thinking or knowledge development.

Korea faces environmental changes such as catch-up by late-comer developing countries like China and the absence of targets to catch up with. There is an urgent need to secure a system design

TABLE 1 Innovation Model and Educational Policy in Catch-up versus Post Catch-up Situations

	Catch-up Innovation and Education/HR Policy	Post Catch-up Innovation and Education/HR Policy
Innovation model	Strategy of imitating and learning advanced technologies	Strategy of creating new technologies and markets
	Strategy of becoming a swift imitator	Strategy of becoming creative innovator
	Focus on improvement-oriented reverse engineering and technology commercialization	Focus on creative R&D and technology/knowledge architecture capability
Key Education/ HR policy	Focus on knowledge acquisition and learning capability	Emphasis on creative talent
	Uniform education focused on simple problem-solving skills and memorization	Individualized, specialized and diversified education
		Focus on problem-structuring and solving capability
	Emphasis on uniform and standardized evaluation criteria; ranking is important	Respect creativity and diversity and multi-evaluation criteria
	Supply-oriented HR development	Emphasis on demand-oriented talent development
	Volume growth of education system	Emphasis on the quality of the educational system
	Dependence on knowledge and individual capability in a single discipline	Focus on interdisciplinary knowledge fusion

capability for the generation of creative knowledge and talent that can solve the post catch-up issues and create a new development path based on creative innovation. The education system in Korea remains in the realm of catch-up innovation despite the changes in the internal and external environment as well as new social demands; this limits the opportunities to develop creative talent and secure quality education to help generate new knowledge or create new paths for innovation.

The issue of developing creative talent is linked with the overall socioeconomic paradigm shift that surpasses education. It is directly related with educational institutions from elementary schools to universities and with social systems covering industry-university relations, training and education, and the social welfare system. It takes a long time to educate and train talent. This investment in human resources should be supported by system changes from a comprehensive long-term perspective in order for education and training to produce results. Of note is that Japan and Finland approach education and innovation issues from a long-term system transformation perspective.

3. CURRENT STATUS OF CREATIVE TALENT DEVELOPMENT AND COMPETITIVENESS

3.1 History of Developing Creative Talent

Korean creative talent developed as a form of special education, deemed as "gifted education". This gifted education system progressed in Korea, with the establishment in 1983 of the "Gyeonggi Science High School" for gifted students in science.

The number of students receiving education for the Gifted and Talented (GT) started to increase with the establishment of one science high school per city or provincial educational office in the context of the balanced allocation of science high schools by region. To continue this trend, at the presidential reporting session on May 31, 1995, the Educational Reform Committee suggested strengthening GT education. The interest in GT education policy started to increase significantly with the inclusion of mandatory GT education in the Basic Act on Education in December 1997. In addition, the Act on Promotion of Education for the Gifted Children (enacted in 2000) and the 2003 enforcement decree for the act, set a legal foundation for the promotion of gifted education in public schools.

The inauguration of the Lee Myung-bak administration in February 2008 further boosted the national interest in GT education as the government started to emphasize the importance of developing creative global talent. The government presented “talent superpower” as one of the five national policy goals along with a detailed strategy of “developing world class high caliber talent”. In October 2008, the Presidential Advisory Council on Education, Science and Technology also presented “developing creative global talent” as a policy goal for the next five years. In September 2009, the Korea Science Foundation (KSF) was expanded into the Korea Foundation for the Advancement of Science and Creativity (KOFAC). All these efforts reflect the increased national interest and investment in developing creative global talent. With the announcement of the Basic Plan for Creativity Education in January 2010, the scope of creativity in education has been expanded from the category of special education to cover general education.

3.2 Current Status of the GT Education

The number and ratio of students receiving GT education in Korea has increased since the enforcement of the Act to Promote GT Education in 2003. As of October 2009, the number of students re-

ceiving GT education increased from 24,224 in 2004 to 73,865 and the ratio of beneficiaries of GT education increased from 0.32% to 1% over the same period.

As of October 2009, the number of GT educational institutions tripled from 414 in 2004 to 1,283. The composition of GT educational institutions by type is as follows, 21 GT schools and science high schools, 295 GT training centers, and 967 GT classes. GT classes account for more than 75% of the total GT educational institutions. Those from GT training centers account for 53.3% of the total GT education beneficiaries in terms of the number of students receiving GT education.

There are still some challenges to address. First, the education for gifted children is provided out of the regular educational courses. framework Second, the curricula for gifted children in primary and secondary schools are not linked to those provided at universities. Finally, Science High Schools and Schools for Science-gifted Children rarely offer substantial and meaningful education that is beneficial to gifted students.

TABLE 2 Beneficiaries of GT Education by Year

Year	2004	2005	2006	2007	2008	2009
Number of students who received GT education	24,224	31,100	39,011	46,006	58,953	73,865
Number of elementary/ junior high/high school students	7,686,785	7,757,900	7,724,840	7,757,023	7,617,800	7,387,047
Ratio (%)	0.32	0.40	0.50	0.59	0.77	1.00

*Science High School students included from 2008

Source: Ministry of Education, Science and Technology (October, 2009), Proposal for improving student selection and education system of GT classes and GT Training Centers

TABLE 3 Overview of GT Educational Institutions

Classification	GT School, Science High School	GT Training Center		GT class	Total
		Education Office	University		
Number of institutions	21	254	41	967	1,283
Number of classes	243	1,834	593	1,567	4,237
Number of students	4,005	31,495	7,798	30.567	73,865
Ratio (%)	5.4	42.6	10.6	41.4	100

Source: Ministry of Education, Science and Technology (October, 2009), Proposal for improving student selection and education system of GT classes and GT Training Centers

3.3 The global competitiveness of Korean education

Korean educational competitiveness in primary and secondary education remains world class in educational fervor, enrollment in the post secondary education system, and student academic performance. According to the International Institute for Management Development (IMD) in Switzerland, the enrollment rate of Koreans in primary and secondary schools in 2009 was one of the highest, ranking 6th out of 57 surveyed countries. In addition, in the Trends in International Mathematics and Science Study 2007 (TIMSS 2007), Korean students ranked second globally in mathematics and fourth in science.

TABLE 4 TIMSS 2007 Mathematics and Science Achievement Results

Mathematics			Science		
Rank	Country	Average Scale Score*	Rank	Country	Average Scale Score*
1	Taiwan	598	1	Singapore	567
2	Korea	597	2	Taiwan	561
3	Singapore	593	3	Japan	554
4	Hong Kong**	572	4	Korea	553
5	Japan	570	5	England	542
6	Hungary	517	6	Hungary	539
7	England	513	9	Hong Kong**	530
8	Russia	512	9	Russia	530
9	United States	508	11	United States	520
10	Lithuania	506	12	Lithuania	519
14	Australia	496	13	Australia	515
15	Sweden	491	14	Sweden	511
19	Italia	480	16	Italia	495

Source: Ministry of Education, Science and Technology (October, 2009), Proposal for improving student selection and education system of GT classes and GT Training Centers

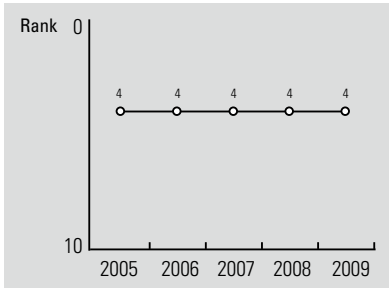
** The TIMSS Scale average across those countries was set to 500, and the standard deviation was set at 100.*
*** Hong Kong refers to Hong Kong Special Administrative Region.Source: IEA (2008), TIMSS 2007 International Mathematics and Science Report.*

Korea ranked high among participating nations in terms of the national fervor toward university enrollment, but near the bottom in quality. According to the IMD, Korea ranked 4th among 57 participating nations with regards to educational achievement in tertiary schools.

Korea scored low and ranked 51st out of 57 nations in the index of university education meeting the needs of a competitive economy.

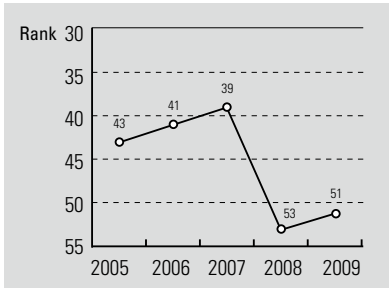
The educational competitiveness of Korea in the proactive and creative learning abilities of students was found to be low in primary, secondary, and tertiary education, compared to the educational fervor and outstanding academic achievement. According to TIMSS 2007, Korea ranked 43rd and 44th out of 49 countries in mathematics in both indices of "self-confidence" and "positive affect" that assess the proactive and creative learning capabilities of students. In science, Korea ranked 27th and 29th in each index among the 29 countries surveyed.

FIGURE 2 Higher Education Achievement



Source: IMD World Competitiveness Year Book, integration of last five year (2005-2009) data.

FIGURE 3 University Education Meets the Needs of a Competitive Economy



Source: IMD World Competitiveness Year Book, integration of last five year (2005-2009) data.

TABLE 5 Self-Confidence and Positive Affect in Mathematics and Science

Mathematics				Science			
self-confidence		positive affect		Self-confidence		positive affect	
Rank	Country	Rank	Country	Rank	Country	Rank	Country
1	Israel	1	Algeria	1	Tunisia	1	Tunisia
2	Jordan	2	Egypt	2	Jordan	2	Botswana
3	Qatar	3	Botswana	3	Colombia	3	Colombia
4	Egypt	4	Oman	4	Egypt	4	Oman
5	Kuwait	5	Tunisia	5	Saudi Arabia	5	Egypt
6	Scotland	6	Malaysia	6	Bahrain	6	Ghana
7	United States	7	Jordan	7	Iran	7	Jordan
8	England	8	Indonesia	8	Norway	8	Turkey
9	Bahrain	9	Turkey	9	Israel	9	El Salvador
10	Cyprus	10	Syrian Arab	10	United States	10	Iran
12	Sweden	12	Colombia	20	Kuwait	20	Norway
20	Australia	20	Thailand	27	Korea	27	Japan
30	Singapore	30	Bulgaria			29	Korea
40	El Salvador	40	Norway				
43	Korea	43	Scotland				
		44	Korea				

Source: IEA (2008), TIMSS 2007 International Mathematics and Science Report.

4. STRUCTURAL OBSTACLES TO THE NURTURING OF CREATIVE TALENT

The first structural obstacle to the nurturing of creative talent in Korea is the university entrance examination that is based on objective and multiple-choice questions. While this test method is effective in assessing the memorization ability of students, it is limited in effectively identifying and assessing the thinking ability in various forms. It also undermines creative thinking by requiring students to provide only one answer for each question instead of possible multiple solutions.

Memorizing a large amount of information in a short period of time and repetitive education prove to be very useful under this system. As a result, many of the primary and secondary school students preparing for university entrance examinations are encouraged to focus on cramming and memory-focused education.

This type of education has been further strengthened in primary and secondary schools by a traditional Confucian culture that prefers a unilateral way of teaching and learning to interactive discussions, as well as a catch-up educational inclination that emphasizes a rapid acquisition of knowledge.

The university entrance examination system is comprised of objective and multiple-choice questions that have some implications for gifted education. Students and schools are forced to prefer "prior learning" to "intensive inquiry learning" since the former places students in an advantageous position in university entrance exams.

The second obstacle is the current university assessment system that focuses on the research performance of universities. Over the past 10 years, the Korean government has pursued a wide range of projects such as Brain Korea 21 and World Class University with a view to strengthening the research

capability of universities. It has used the Science Citation Index Expanded (SCIE) as the most critical evaluation standard in the selection and assessment of quality universities.

In response, universities focused on becoming "research-oriented universities." However, universities ended up facing an obstacle to enhancing educational capabilities through the over emphasis of the importance of research achievements by professors rather than teaching abilities through the professor evaluation process.

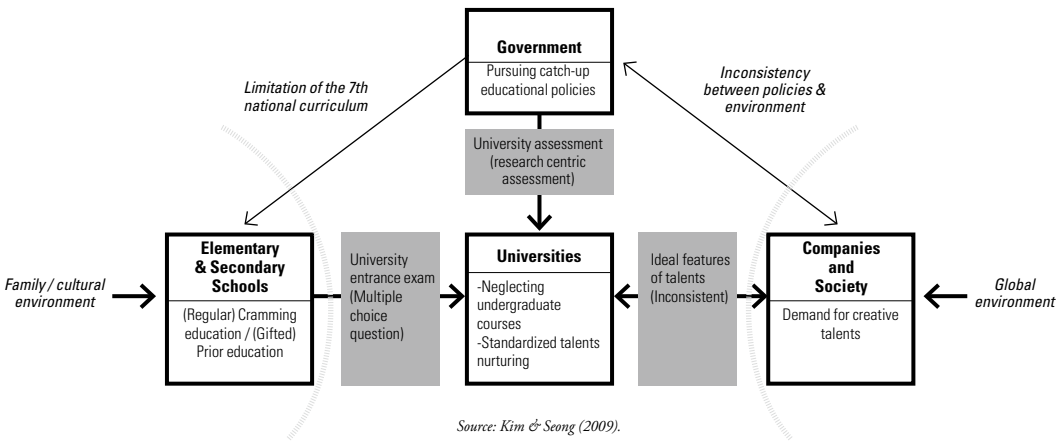
The tendency of assessing universities and professors based on research performance caused professors to spend more on time writing research papers than preparing for lectures. As a result, a vicious circle has been created which lowers the quality of lectures and undermines the trust of students in the education professors provide.

The last obstacle Korea faces is the inconsistency in the images of talented human resources required by universities, companies, and society. A gap has developed between the ideal features of the human resources desired by companies or society and those sought by universities as Korean society transforms from an industrialized society to a globalized creative society.

Companies and society have begun to demand human resources equipped with creativity, a challenging spirit, enthusiasm, global capability, and humanity to meet the needs of a globalized creative society. However, universities fail to teach students these skills to meet the requirements of companies and society, adhering to the outdated talent model of the Industrial Age.

The conservative inclination and lack of customer-oriented mind-set by universities and professors inevitably leads to the standardization of talent and a passive restructuring of curriculum by universities, rather than corresponding with the different demands of companies and society. The compatibility of Korean universities with the demands of a competitive society remains the lowest in the world and creative education faces a difficult situation.

FIGURE 4 Three Obstacles to the Nurturing of Creative Talent



Source: Kim & Seong (2009).

5. CHALLENGES FOR THE DEVELOPMENT OF CREATIVE TALENT

The first recommended solution to the structural limitations that Korea faces is to strengthen the capabilities of admissions officers to screen a portion of creative students. A university entrance system that can identify creativity is a prerequisite to induce creative education in primary and secondary schools.

The College Scholastic Ability Test (CSAT) demands only one correct answer for each question and limits its usefulness in assessing the ability of students to think logically and creatively. To address this limitation, the Korean government has introduced and is actively implementing the admissions officer system, considering it an effective alternative in realizing the goal of creative education.

This system is not without flaws. While there are high expectations for this system, there are some concerns over its possible side effects, such as the consistency of high school grading, a lack of well-trained and unbiased admissions officers, proliferation of private education, and a heavy burden on students and high schools in preparing for college admission. The improvement of the effectiveness of the admissions officer system will be crucial to the effective screening of creative applicants and fostering creative education courses in primary and secondary schools.

It is important to win the trust of students and parents in this new system by introducing an "admission officer qualification examination" that can ensure that admissions officers with expertise and integrity are selected. In addition, it is also important to secure fairness in the admission system that can be achieved through adopting an "admissions officer jury system" that would allow citizen jurors to participate in the screening process of admissions officers. It is also possible to improve the accuracy and credibility of basic assessment materials by devising methods that guarantee the reliability of student records.

Second, Korea should gradually reinforce "creativity-nurturing programs" in regular primary and secondary education. Most Korean policies on the cultivation of creative talent rely on selective schools, and efforts to develop the creativity of students in regular educational courses are inadequate compared to those made in the education for gifted students.

Education for the gifted is often considered as elite education and has triggered a huge demand for private tutoring in Korea, producing negative opinions among citizens that it runs counter to the principle of equal educational opportunity. However, many advanced nations have made steady endeavors to expand the base for creative talent and remove the negative image of gifted education through various efforts to strengthen the creativity of students in regular schools. Against this backdrop, there is a clear need to gradually expand educational programs and courses that nurture creativity in the regular education system, along with the ones for the gifted.

There is a need to consider establishing a training course for "creative thinking skills" in the regular primary and secondary curricula, so that students can learn a creative way of thinking at the start of their education. In addition, to properly educate and train teachers, Korea needs to encourage teacher education universities and teacher education colleges to include training courses on "creative thinking skills" in their curricula as a mandatory course. In addition, Korea should support the establishment of a master of science degree in "creative studies" with a view to fostering professionals who have expertise in nurturing creativity.

Third, Korea needs to promote diverse programs to strengthen the creativity of university students. Korean policies for cultivating creative talent focus on the primary and secondary curricula, while not paying enough attention to higher education. As a result, tertiary education creates an im-

pediment in nurturing creative talent and the creativity of students who have graduated from higher educational institutions remains low. In order to address this problem, educational programs and courses that can strengthen the creativity of students must be expanded in the tertiary education system.

Korea needs to establish an educational course for "creative thinking skills" and make this course compulsory in tertiary education, just as in the primary and secondary system. In addition, to allow professors to participate in the development of and the dissemination of creative teaching methods, the establishment of a "Research Center for Creative Teaching Method" is recommended for universities that have strength in certain fields of study.

In order to promote discussions and create a culture of experimentation in classes, Korea needs to review the possibility of changing the classroom environment from the current "overcrowded large lecture halls" to "lecture rooms in a round-table setting." In addition, it would be beneficial to encourage essay-type examinations or presentations to strengthen the divergent and convergent thinking capabilities of students.

Fourth, the performance assessment system for universities and professors needs to expand the share of "creative educational capability" among other indicators. The educational capability of undergraduate courses at universities has substantially weakened as most university rankings issued by the media and the government as well as professor assessment systems focus on research capabilities rather than actual educational performance.

The university ranking systems undertaken by the media and the government can influence government grants as well as the external image of the universities. In addition, professor evaluation results are closely linked to compensation and the promotion of professors. Therefore, most universities and professors are sensitive to the assessment system. In this sense, improving these two assessment systems must be accomplished before bringing about changes in the classroom settings.

There exists a need to develop and expand indicators assessing creative educational capabilities in the existing university assessment criteria used by the government and media. Starting in 2010, university rankings (currently compiled by JoongAng Daily) will evaluate education-centered universities separately from research-focused universities. However, the indicators capable of assessing the effectiveness of creative education are nearly non-existent.

The OECD plans to introduce the initiative called "the Assessment of Higher Education Learning Outcomes" (AHELO) to enable a qualitative assessment on the performance of teachers and students in university undergraduate courses.

When conducting professor evaluations, universities need to increase the weight of "creative educational capability" index in its assessment rather than the current evaluation that is centered on the research performance of the faculty. In order to expand the weight of "creative educational capability" in university assessment and professor evaluation systems, developing indicators that can correctly measure creative educational capability is required.

Finally, universities should enhance their capability to adjust to the diverse demands of companies and society. An educational system that can meet the requirements of employers is desperately needed in order for universities to nurture talented people who can effectively meet employer expectations.

The compatibility of universities with the demands of their customers remains the lowest due to the conservative inclination and lack of a customer-oriented attitude of the universities and faculty members. Universities need to upgrade and further strengthen their ability to meet the requirements of companies and society to nurture the creative talent demanded by employers.

Korea needs to establish a venue for the communication and exchange of knowledge between companies and universities, along with active support so that universities can redefine the ideal features of talent desired and demanded by companies. It should also support cooperation between industry and academia in developing new curricula and revamping existing ones in a way that a variety of knowledge and groundings acquired during university can correspond with the ideal features of talent desired by most companies.

Korea must increase efforts to specialize universities in order to meet the diverse demands of companies and society under the different conditions each university faces. Universities should move away from "department-store-like education" and seek ways to enhance global competitiveness by specializing in certain areas and roles.

The world is undergoing a major transformation from a knowledge-based economy to a creativity-based economy; society is projected to be led by creativity instead of by knowledge. The ability of a country to develop creative talent will determine its future national competitiveness. For Korea to become a global leader in the new era of creativity, it needs to make proactive preparations. A massive transformation of the educational system from the previous cramming system to a creativity-nurturing system is now required to develop future creative talent that meets the future demands of society.

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