

Abstract

Prospect and Issues of Educational Reform (I) – In the Field of Higher and Lifelong Education

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In the era of cutting-edge convergence technology, it is expected that a new industrial structure different from the one in the past shall be established due to the appearance of more advanced technologies, including artificial intelligence robot, Internet of the Things (IoT), self-driving car and Nano-Bio Convergence Technology. This so-called the 4th industrial revolution is expected to cause not only innovations in economic and social system, but also revolutionary changes in the ways humans live and think. In these contexts, it is required for the higher education, which plays a pivotal role in fostering highly qualified professionals for national competitiveness, to respond immediately to the recent social changes. In addition, as it is anticipated that the 4th industrial revolution shall have more profound and long-term effect on humans in the era of 100 aging society, the educational reform in the field of lifelong education needs to be established to cope with these changes. Further, the educational reform in lifelong education is seeking a new momentum for various changes in the modern society, including reduction in the number of students,

carrying out work and study side by side, earning credits and degrees in various methods and lifelong strengthening of ability. In the era of convergence technology, as the barrier between higher and lifelong education shall be reduced, it is necessary to provide directions for educational reform in higher and lifelong education in the integral perspectives and to evaluate the synergy effects in those reforms.

Last year, UNESCO World Education Forum 2015 adopted the Incheon Declaration of 'Education 2030: Towards inclusive and equitable quality education and lifelong learning for all,' which suggests a new vision of 'transforming lives through education.' As the worldwide changes in policy directions and visions are taking place and international societies are strengthening their efforts to realize them, Korea is also called to respond. As a global agenda of higher education, it is emphasized that access to higher education must be guaranteed for every person with academic competence and will, and they need be provided with the education which is not "supply side," but helpful for learners to increase economic activity.

Among 17 the UN's Sustainable Development Goals (SDGs), which is also called 'Post-2015' development agendas, have 17 goals, the 4th goal is to ensure inclusive and quality education for all and promote lifelong learning. It means that ensuring quality education and promoting lifelong learning became important issues in the world development and the world will increase its effort to achieve the goal (National Institute for Lifelong Education, 2015).

In this context, a two-year (2016-2017) research has been planned to investigate the prospect of future educational reform in higher and lifelong education to respond initiatively to future changes in 2030 and to suggest policy issues for educational reform.

The main task for this first year research is to investigate 'the prospect of future educational reform.' In this sense, the research aims to establish a foundation to develop policy issues for educational reform in higher and lifelong education for the second-year research by anticipating environmental changes in the future society in relation to higher and lifelong education in various points of view and by suggesting important policy issues in the field of higher and lifelong education.

The second-year research is to suggest 'policy issues for future educational reform.' It seeks to specific policy issues for future educational reform by closely reviewing policy directions of educational reform in the field of higher and lifelong education to prepare

for the changes in the future society based on the first-year research.

This research first investigates the prospect of the changes in the future society in relation to higher and lifelong education, and the changes of both domestic and foreign policies for higher and lifelong education with demographic, economic and social structure in the future society and the changes in the field of science and technology. The research then analyzes big data on opinions from netizens, news articles and academic materials. Finally, the research suggests the visions and the policy directions for educational reform in higher and lifelong education that may be the fundamentals of development of policy projects in a provisional level in the following year.

To this end, various methods have been conducted, including literature research, big data analysis, expert conferences, colloquium and collection of extensive opinions from the future education committee. The research results are as follows.

■ Prospects of Changes in the Future Society in Relation to Higher and Lifelong Education

The summary of the analysis results of the prospect of the changes in the future society in relation to higher and lifelong education with demographic, economic and social structure and the field of science technology are as follows.

First, as for the demographic structure, it is anticipated that as the number of students has been constantly reduced since 1990s, the capacity of colleges will be more than the number of high school graduates in 2020, the society shall enter into the super-aged society due to low birthrate. As the ageing population is more than the number of students from 2016, it is expected that in 2026, the ageing population will reach 20% of the whole population. Moreover, with decrease in total fertility rate, it is expected to face demographic cliff worldwide.

This change in demographic structure causes a variety of problems. For example, a rapid decrease in college enrollment due to the reduction in the number of students shall increase the number of colleges lacking new students, and the local colleges shall suffer more than the ones in the metropolitan area. In addition, a rapid entrance to a super-aged society shall lead to a decrease in working age population and to low labor productivity

and a severe manpower shortage. Besides, as the population decrease by low birthrate and ageing population will lead to a rapid decrease in working age population and to an industry and job acceleration, one of the biggest concerns is that the change will cause economic bipolarization and deepen income disparity of individuals.

The most important driving force of the changes of economic structure in the future society is the 4th industrial revolution, which started from the expansion of the market of artificial intelligence, and refers to the era of technology convergence by eliminating the boundaries across bio industry, physics and biotechnology based on digital revolution. In this light, robotics and machine learning are expected to cause changes of job competence in various industries by replacing existing occupations. In the future, it is expected that the demand on cognitive competency and complex problem-solving ability that demonstrate cognitive flexibility, creativity and logical and mathematical reasoning instead of the current core job capacities will increase.

The scale of the collapse in jobs caused by the 4th industrial revolution will be much larger than the one by the past industrial revolutions, and the income disparity between jobs will be widened due to the bipolarization of labor market. World Economic Forum (WEF) anticipates that 5.1 million jobs shall disappear due to the 4th industrial revolution. It also forecasts that the technological innovations of the 4th industrial revolution will be the important turning point that will bring a enormous change to the industrial and manpower structure. Especially, as the demands of creative talents is growing, it is necessary to provide education and evaluation methods for creativity.

As for the changes in social structure, the main issues are social inequalities by a diverse range of causes. Due to worldwide economic crisis, even those developed countries suffer from income disparity and poverty issues, thereby endeavoring to solve these issues by reforming financial and tax policies. Since there is significant correlation between employment instability and social inequality, various issues of inequality are arising, including income disparity and gap of educational opportunity according to the economic power of parents.

The issue of inequality is also caused by decline in social mobility. When in a society with low social mobility, the gap between social classes will be widened and it will be difficult to select talented people from the lower class in the future. Moreover, the change

in industrial structure by technology development may cause technology overload which takes place due to massive digital illiteracy caused by digital bipolarization and speed difference between the advancement of science technology and social change.

The changes in science technology require a new talent model to cope with the 4th industrial revolution. The education in the future shall focus on building a capability of learners to develop a new knowledge paradigm in the community value and to suggest various nodes to do so. It is necessary to constantly increase the opportunities for learners make a contact with others by science technology such as social media and to make efforts to create new capital by integrating with science technology such as Internet of Things.

The development of science technology needs to make learners develop their creativity and the government policy should support the development. To this end, what the members of the society should do is not to accept the advancement of science technology in a passive attitude, but to investigate the changes in science technology and the ways for positive application. This will be possible when there occur a public consensus, social changes and the advancement of science technology simultaneously.

▣ Prospect of Changes in Domestic and Foreign Policy on Higher and Lifelong Education

1) Higher Education

First, as for changes in domestic policy of higher education, low birthrate and ageing population are expected to reduce human resources to maintain the society and the number of students, causing direct influence on higher education. In the field of higher education, various changes must occur that colleges should have competitiveness to produce distinguished talents in response to the reality of lacking new enrollment. The environmental changes expected in higher education include reduction in human resources by low birthrate and ageing population, the rise of new industrial structure by convergence of knowledge and technology, the increasing demand on creative talents, expectations on educational institutions for lifelong education and expansion of globalization across the borders.

In this sense, the research suggests 7 agendas for future prospect of higher education

policy in response to changes in surrounding environment, including promotion of structural reform in higher education in response to reduction in the number of students and new enrollment to colleges, concentrated training in the core areas of new industrial structure, enhancement of educational competence of colleges to foster creative talents, expansion of openness of colleges by reorganizing academic affairs and degree structure, reinforcement of financial aid for higher education by the government, improvement of the role of colleges as an impetus of local development and innovations of expanding borders and teaching-learning method in higher education.

Next, as for the changes in higher education policies in foreign countries, colleges in the future are facing a variety of both changes and challenges due to development of information communication and science technology. Particularly, worldwide demographic changes and globalization are expected to extend a significant influence on future higher education. The globalization in higher education means the increase in mobility of students, professors and institutions. As the competition among educational institutions will increase based on outcomes in the market economy system with academic and technological exchanges, many of the colleges will make more efforts to achieve world-class level. In the future society, decision making and political determination of each country and educational committees will sharply transform the aspects of changes of higher education by integrating with technology innovations in the future. Colleges will experience changes in accordance with financial aid and policy provided by the government. The worldwide social changes, such as war, famine, demographic changes and technology development, also raises the necessity for colleges to prepare the plans to improve in the future.

The summary of the agendas on future prospect of higher education policy in foreign countries in response to the changes in surrounding environment includes expansion of mobility across the nations and maintenance of the quality of education, expansion of financial investment in higher education, introduction of new technology and changes in teaching-learning methods, and improvement of mobility of acquisition of qualification, skills and higher education.

2) Lifelong Education

First, as for changes in domestic policy of lifelong education, advancement of technology such as IT raises the necessity to guarantee educational opportunities in overall education including lifelong education in a variety of ways, and to expand equality in access to education. As the advancement of technology also produces new types of learners and makes new types of learning possible, it is necessary to improve domestic lifelong education system to respond to the situation.

The 6 agendas to be considered important in domestic policies for lifelong education as a policy response to these changes are enhancement of open lifelong education system, expansion of lifelong education with learnfare, the third learning response, extension of learning support in small districts, specialization of lifelong education in each area and reformation of the government system to lead and respond to the changes in lifelong education.

As for policy changes of lifelong education in foreign countries, there is a trend towards accelerating industries and jobs to increase labor productivity and economic growth to overcome the problems of worldwide reduction in population due to low birthrate and ageing population. Particularly, as the speed of social change is increasing in accordance with advancement of science technology, the demand on new learning for adults is growing. Each country is endeavoring to provide policy support and establish the system to meet the demand of learning for adults in order to reduce digital inequality as well as economic inequality. Moreover, the advancement of IT devices such as social media, Internet of Things and wearable devices requires to establish the learner-oriented system and to provide education with IT technology in the education field.

In this light of global changes, the research examines the vision, strategy, goals and tasks suggested by major International Organizations such as the World Bank, the European Union, the UNESCO, the UN and the OECD as well as primary changes in education and training of IPTS in 2025. The 5 common agendas for the future prospect in relation to lifelong education include advancement to the society in which it is possible to provide life-cycle customized lifelong education, preparation of driving force for future growth by integrating lifelong education with vocational training, realization of lifelong education society without inequality and discrimination, advancement of nation-level system and

infrastructure to improve the quality of lifelong education and realization of ubiquitous lifelong education society by utilizing ICT and diversifying learning paths.

■ Investigation in Major Policy Issues through Analysis on Big Data

The research analyzed big data by using various methods such as word cloud analysis, semantic network analysis and words in vogue trend analysis based on the various data source, including portals and twitters used by netizens and news articles and academic materials. The major policy issues drawn from the analysis on big data by data sources are as follows.

1) Higher Education

(1) Opinions of Netizens

First, the result of analysis on word cloud, semantic network and words in vogue trends on Internet portals and twitters suggests tuition fees and national grant as the most important issues in higher education. It is revealed in the words in vogue trend analysis that the netizens are constantly focusing on tuition fees and national grant from the presidential election in 2012 to this year. Considering the fact that the majority of the users of Internet portals are ordinary people such as students and parents, it is shown that not policy makers or experts, but consumers of higher education are interested in making up tuition fee and receiving national grant. Especially, on twitter, as the issues related to school expenses such as college tuition fee and half-college-tuition policy are suggested in connection with negative phrases such as refusal to enter college, credential society and discrimination, it is observed that there is fundamental criticism on whether the college education is useful and necessary or not.

(2) News Articles

According to the result of the analysis on word cloud, semantic network and words in vogue by news articles, university industry cooperation, tuition fees, school expenses and university structural reform appeared as the most important issues. In particular,

if a common word 'university' is excluded from the analysis, 'university industry cooperation' accounts for the highest frequency across the research period from 2012 to 2016. While reducing the burden for school expenses by providing national grant and promoting university structural reform based on evaluation are considered as the representative policy of Park Geun-hye administration, those words frequently appeared as topic words on the new articles.

(3) Academic Materials

The analysis with academic materials on word cloud, semantic network and words in vogue by news articles revealed 'research,' 'curriculum' and 'teaching (professor)' as the issues attracting public attention as well as university industry cooperation which is considered important by the analysis with news articles. As stated above, it is understood that the researchers are affected by the Park administration's emphasizing enhancement of research ability and innovation by cooperating industry and universities to create the environment of creative economy.

The important words relevant to 'curriculum' include competence improvement, competence-based education, national competence development, NCS and engineering education. The reason that the curriculum became an important issue is the fact that educational curriculum is emphasized in the respective government-funded projects, including industry university cooperation or university structural reform. According to the investigation on academic materials, it is shown that the research topics that are closely related to government-funded projects or government policies of higher education take large portion in academic materials. At the same time, there are many research topics which indicate the researchers' reasoning on higher education, including analysis on issues in designing and operating college curriculum, utilizing new teaching method and media and the effectiveness of learning. Besides, it is worthy of notice that teaching competence, teaching development and recognition on new teaching-learning methods are covered as the issues relevant to 'teaching.'

2) Lifelong Education

(1) Opinions of Netizens

According to the word cloud, semantic network and words in vogue trend analysis on lifelong education, the academic credit bank system is revealed as an important issue. The public attention also goes to a learning planner, certificates, the certificate of a social worker, the certificate of a lifelong educator, the certificate of a nursing teacher and bachelor's degree. People also show their high interests in credits to take courses from the academic credit bank and in acquisition of the degree after finishing the courses. For this purpose, netizens are attracted to taking courses online to acquire certificates or degrees through the academic credit bank system for convenience and low expenses. In addition, netizens are aware of the lifelong education centers affiliated with universities as an important way to register for the academic credit bank. In summary, netizens understand the fact that the lifelong centers may take part of their reeducation and they are considering both lifelong centers and academic credit bank system as ways to acquire a degree or a certificate.

(2) New Articles

The result of word cloud analysis, semantic network analysis and words in vogue trend analysis with news articles show the important issue as acquisition of certificates due to considerable interests in lifelong education. That is, as unemployment crisis and economic crisis are on the rise as the social issues, people show great attention to the certificates for a social worker or a nursing teacher which can be a lifelong job and easy to enter into an employment. However, the interest in certificates rapidly decreased from April 2012 and showed constantly low level until 2016.

As for yearly change of the issues relevant to lifelong education, the interest in lifelong education started to rise from 2012, and the lifelong education for the disadvantaged and aged population through lifelong learning city or lifelong learning centers in relation to the project of creation of local lifelong learning city was the main concern in 2013. In 2014, along with the lifelong education for the disadvantaged and aged population, as the educational opportunity for the second phase of life for the middleaged people

is expanded, the provisions of lifelong education was increased 8 times compared to the ones in a year before. In addition, relevant keywords of lifelong learning centers, cyber university and the Air and Correspondence College are revealed for the educational opportunity without any limit in time and space. The operation and support for happy learning centers in local communities and train of experts are emphasized as a measure to enhance competence of lifelong education city. In 2015, people paid more attention to selection of the lifelong learning city and the happy learning center, and the comments from both the National Institute for Lifelong Education and the Ministry of Education relevant to selection of the lifelong learning city was increased more than 3 times. It is also shown that the college for lifelong learning and the Ministry of Education compose a semantic network with lifelong education as center, and happy delivery lecture service, lifelong learning city and credential recognition programs formulate a semantic network with lifelong education program as center. In 2016, in utilizing lifelong learning city to sustainable lifelong education in local cities, it is revealed that establishment of middle- and long-term plans to create a lifelong learning city with uniqueness of local community and the college for lifelong learning selected by the Ministry of Education compose an important semantic network.

(3) Academic Materials

According to the analysis on word cloud, semantic network and words in vogue trend targeting 533 academic materials on lifelong education from 2012 to 2016, while the topic word of 'lifelong learning' most frequently appears in the academic materials, more of these materials belong to the dissertations or journals of other fields than of journals for lifelong learning. Considering the result with semantic network analysis, although 'lifelong learning' is prominently shown in semantic networks as an important topic word, the journals for lifelong learning usually deal with more detailed areas of lifelong learning. Besides, the topic words most frequently shown in the word cloud analysis such as 'lifelong learning,' and 'lifelong learning program' revealed the concentrated semantic connectivity with other topic words.

While the 'academic credit bank system' takes an important position as the important issue in both word cloud and semantic network analysis, it composes an independent

network with topic words related to learners in the general semantic network. It means that the academic credit bank system plays an important role in lifelong learning in Korea as well as is being researched as an independent policy area for learners.

According to the analysis on yearly change of the issues of lifelong learning in academic materials, the same words are revealed as important topic words and words in vogue in word cloud and semantic network analysis. This result is basically understood that the concepts of 'lifelong learning,' 'program,' 'lifelong education,' and 'learners' cover the whole field of lifelong education in academic materials. Although those words concerned showed the similar aspects in frequency from 2012 to 2016, the frequency of words such as 'lifelong learning' and 'program' relatively decreased from 2013. It may be due to the fact that the expression for those concepts were replaced by subordinate concepts or divided into various forms. To sum up the yearly issue changes, the main words of lifelong education were revealed that the words had comprehensive and various subordinate aspects and that they were used in different ways according to the research field. It seems that the lifelong education has a value of diversity.

■ Visions and Directions of Reform of Policy in Higher and Lifelong Education

1) Visions of Reform of Policy in Higher and Lifelong Education

The 4th industrial revolution is expected to cause not only innovations in economic and social system, but also revolutionary changes in the ways humans live and think. In these contexts, it is required for the higher education, which plays a pivotal role in fostering highly qualified professionals for national competitiveness, to respond immediately to the recent social changes. In the era of convergence technology, as the barrier between higher and lifelong education shall be reduced, it is necessary to provide directions for educational reform in higher and lifelong education in the integral perspectives.

In this sense, as the educational reform in the field of higher and lifelong education should have the creative and active orientation to lead the advancement of global educational competence by establishing educational ability and system to lead innovative changes in the future intelligence and information society, the policy vision is established as 'innovative future and enterprising education.'

2) Basic Directions for Reform of Policy in Higher and Lifelong Education

The policy directions for reform in higher and lifelong education is divided into basic directions and detailed directions. The basic directions are first established based on the prospect of demographic, economic and social structure and the advancement of science technology which are discussed in the prospect of the changes in the future society in relation to higher and lifelong education on the premise of policy vision suggested above.

First, the anticipation for the future and autonomous structural reform.

To effectively cope with the future society, a quick and systematic monitoring is essential. The government and colleges will need to systematically anticipate the trend of demographic change in the future and to conduct a simulation for the events that may occur in each area of higher education. The university structural reform in preparation for reduction in the number of students includes a variety of challenging tasks, such as the abolition of a college, financial support, the size and the characteristics of new enrollments, and changes in the governance and operation of the college. In order for higher education as a factor determining national competitiveness to cope with the future society with composure, the policy support must be provided to identify sensitive change trends and to improve the ability to respond autonomously.

Second, the innovation in the system of fostering talents who will take a lead in the 4th industrial revolution.

It is expected that the demographic change of low birthrate and aged population and the advancement of the 4th industrial revolution will bring unprecedented rapid changes to the industrial structure and the labor market. The influence of the 4th industrial revolution is expected to shake the foundation of the economy and the society, such as main industries, a production method and the patten of consumption. In this sense, the talent model as well as job competence required by the society will dramatically change and the advancement of technology will bring the whole different-level changes to the method and concept of learning. It means that it is imperative to completely transform the contents of, scope of and the way and cycle of learning to acquire the knowledge and the skills which a member of society should be equipped with. Considering the role of higher and lifelong education as the mechanisms to provide the labor market with necessary human resources, the innovation in the system of fostering talents to cope with these challenges.

Third, improvement of social mobility and relief of educational inequality

As there are a diverse range of political, social and cultural fluctuations and changes in accordance with globalization, and various problems are derived from it in accordance with the condition of each country, the most prominent one is inequality caused by difference in the speed of growth. The problem of inequality in the global society is causing a lot of diversified problems, including income inequality. Since the higher the level of income inequality increases, the lower social mobility decreases, the most important thing is to invest in education to reduce income inequality. The reduction in social mobility not only causes the problems of economic inequality, but also hampers the social integration and makes it difficult to produce and utilize talents in the future society. The educational reform in the future society will need to be promoted into the direction to play a pivotal role in recovering social mobility and relieving various inequality issues, including educational inequality.

Fourth, establishment of a learner-oriented educational paradigm and cultivation of a new integral learning competence

The advancement of IT devices such as social media, Internet of Things and wearable devices will produce a new social value that will emphasize rational norms to solve various problems. It is expected that the rational norms will create a learner-oriented educational paradigm which makes it possible to reasonably standardize personal perspectives by requesting a 'Paradigm-Shift' that breaks down the fixed roles of teachers and learners creatively. In addition, as the total sum of information significantly increases, the great problem-solving competence is required to solve various problems creatively. As it is considered more important of new areas created by convergence of various areas, and the importance of new business items rises, new talents with integral learning competence are required. To this end, it is necessary to establish an educational platform to develop human competence needed in the era of artificial intelligence, to foster the characteristics of such talents, and to construct a system to produce the talents with such competence.

3) Detailed Directions of Reform of Policy in Higher and Lifelong Education

The detailed directions of reform of policy in higher and lifelong education are divided into the fields of higher education and lifelong education based on the prospect of changes of domestic and foreign policy in higher and lifelong education and the investigation in major policy issues by analyzing big data.

(1) Higher Education

- Restructuralization of the higher education system to produce human resources in macroscopic viewpoint
- Rearrangement of directions and strategies of university structural reform to enhance competitiveness
- Securing finances for higher education and enhancing stability of allotment system
- Re-establishment of visions, principles, contents and methods of college education in relation to the future tasks
- Systematization of the strategy to produce highly-qualified human resources for the new growth industry in the future
- Globalization of higher education as a strategy to respond to the future society and innovate higher education

(2) Lifelong Education

- Administration of open policy in lifelong learning
- Creation of a lifelong learning environment connecting welfare and education
- Introduction of Life Cycle Customized Lifelong Education Policy
- Integration and specialization of lifelong learning and vocational training for new growth engines
- Enhancement of support system for lifelong education to develop various career paths
- Support developing essential competence for the jobs in the new industrial society
- Construction and utilization of data system for research on the future prospect of lifelong learning

□ Keywords : Educational Reform, Educational Reform in Higher Education, Educational

Reform in Lifelong Education, Prospect of Changes in Future Society, Education in the Era of the 4th Industrial Revolution, Policy of Higher Education, Policy of Lifelong Education, Big Data Analysis, Policy Issues for Higher Education, Policy Issues for Lifelong Education, A Vision for Educational Reform, Policy Directions of Educational Reform