POECD ESP Longitudinal Study of Skill Dynamics (Ⅱ): Validation of OECD Longitudinal Design in Korea

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This research is the second-year research of the OECD ESP Longitudinal Study of Skill Dynamics (2014-2016) that is being conducted for the participation of Korea in Education and Social Progress (ESP) Project Phase 2 conducted by OECD/CERI. The main purpose of the OECD ESP Project is to examine the various variables that have an effect on the skill formation process and to analyze the socioeconomic results brought about by learning environments and abilities—in other words, the causal relationship of social progress (Kim et al., 2014). For this, OECD member states are constructing the foundation of large-scale "longitudinal study of skill dynamics" in cooperation with OECD (Kim et al., 2014), and Korea is preparing the implementation and result analysis of the large-scale international "longitudinal study of skill dynamics," which will actually be conducted in the future, by arranging the base of the main survey of OECD ESP based on this research. In particular, in this second-year research, the feasibility of the OECD longitudinal design as well as the possibility of its application and implementation in Korea were identified.

This research is the second-year research of the "OECD ESP Longitudinal Study" and the ultimate purpose of the three-year longitudinal study, including this year's study, is as follows: first, to examine the various learning environment variables that contribute to the skills formation process; and second, to identify the dynamic relationship

between the relevant variables by analyzing the socioeconomic results caused by learning environments and abilities, that is, the causal relationship of social progress. Accordingly, the ultimate purpose of the three-year longitudinal study is to examine the longitudinal development trends in the changes of such causal relationship with the lapse of time. For this, this research will contribute to the construction of the base of the main survey of the international longitudinal study, which will be conducted in the future, by preparing the base for the joint international development of various tools for the measurement of various variables, such as "skill," "learning environment," and "social progress," which can be jointly used with OECD member states, verifying the feasibility and reliability of the OECD measurement tools in Korea by carrying out large-scale domestic pre-survey (carried out in the first quarter of 2014), and by focusing on the verification of the possibility and feasibility of the implementation of the longitudinal study design, which was constructed in cooperation with OECD, in Korea.

For the above research purposes, various research methods were used such as literature analysis, questionnaire survey, and visit to domestic experts council and OECD experts council. Among them, the questionnaire survey research procedure can be summarized as follows: The survey sheets are mainly in two types—the 2015 OECD/KEDI education and social progress survey sheet, and the 2015 OECD/KEDI cognitive skills survey sheet (for elementary and middle school students). First, the "education and social progress survey" sheet is the modified and supplemented version of the survey sheet that was used in the 2014 survey. It includes questionnaires about the learning environment of students, social and emotional skills, social progress, and background information. The "cognitive skills survey" sheet was developed by this research team using Reading and Math questions among the PISA 2009 and PISA 2012 open questions for reference based on the cognitive skill conceptual frameworks of OECD ESP in the process of this year's research. It is composed of survey questionnaires for elementary and middle school students. The research students for 2015 are the first- and fourth-grade students of the elementary schools, first-grade students of the middle schools, and first-grade students of the high schools located in Daegu Metropolitan City, who were already recruited in the 2014 first-year longitudinal

study. In 2015, these students moved on to higher grade levels, and currently, they are second- and fifth-grade elementary school students, and second-grade middle school and high school students, respectively. However, low-grade elementary school students experienced difficulty in responding to this questionnaire survey, and we let the parents of those students respond with or on behalf of the students in the first-year survey. However, thinking that the responses had some limit to be regarded as the official response of the students, this research decided to exclude low-grade elementary school groups from the questionnaire survey in the future after a discussion with OECD. Accordingly, the research subjects of this year are a total of 2,652 students composed of fifth-grade elementary school students, except second-grade elementary students, second-grade middle school students, and second-grade high school students. The questionnaire survey was conducted for about four weeks from May 18 to June 12, according to the schedule of each school.

The following analysis was conducted based on the collected data. First, to explore the composition elements according to the development of new measurement tools such as the health level test, "exploratory factor analysis" was conducted, and to confirm the feasibility of the measurement tools, the "confirmatory factor analysis" was conducted. In addition, to check the reliability of the measurement tools, Cronbach's alpha analysis was also conducted. Second, to diagnose the awareness of students on the learning environment, cognitive and social emotional skill level, and personal happiness and social progress level, "descriptive statistics analysis" was conducted. Third, to verify the group difference of such background variables as cognitive and social emotional skills, personal happiness, and social progress, two-way analysis of variance (ANOVA) was conducted. At this time, grade, gender, academic background of the parents, awareness on the family's economic status, and experience on infant education were used as background variables. Fourth, to analyze causal relationships, such as the effect of the environment on cognitive and social emotional skills, the effect of skills on social progress, and the effect of the learning environment and skills on social progress, "hierarchical regression analysis" was conducted. Lastly, to diagnose the longitudinal trends of students' responses, "growth mixture model analysis" was conducted. The analysis results can be summarized as follows.

First, the results of the feasibility analysis of the health-level measurement tool showed that the overall goodness of fit was favorable to some extent at .064 based on the RMSEA index, and both the CFI and TLI indices were close to .90, but there was a room for further improvement in the future.

Second, using two-way ANOVA for each background variable (grade, gender, family's economic status, infant education experience), the variables, which show the group difference and causal relationship more firmly and significantly using the 2014 research results for reference, were selected, and their contents were reported, focusing on cognitive skills (knowledge acquisition, knowledge inference), character (extroversion, affinity, faithfulness, emotional stability, openness), morality, creativity, happiness level, health level (health knowledge, eating habit management, hygiene management, body and stress management), and citizen participation (except voluntary activities), safety level (bullying damage experience, illegal downloading, experience of theft incidents in schools). In cognitive skills, there is an interaction between grade and gender, and middle and high school students showed a higher value of cognitive skills than elementary school students. The female students showed higher value of cognitive skills than male students and especially, there was a significant gender difference in high school students. Also the meaningful difference appeared according to the academic background of the fathers, economic level, and infant education experience. The interaction between grade and gender and between grade and infant education experience existed in faithfulness. Only in second-grade middle school students, male students showed higher value of faithfulness than female students. In addition, a statistically significant difference appeared in relation to the academic background of their fathers, their economic level, and infant education experience. With this, female students showed higher emotional stability than male students, subject to some difference depending on their economic level. Morality, on the other hand, included interaction between grade and gender. Elementary students showed the highest value of morality, followed by middle school students and high school students. Female students showed a higher value of morality than male students. In addition, a statistically significant difference appeared in relation to the academic background of their fathers, economic level, and infant education experience. Elementary school students showed

the highest value of creative character, followed by middle school students and high school students, and female students showed higher value than male students, subject to some difference depending on the academic background of their fathers and economic level. Elementary school students showed the highest value of happiness level, followed by middle school students and high school students. Female students showed higher life satisfaction (happiness level) than male students, and a statistically significant difference appeared in relation to the academic background of their fathers, economic level, and infant education experience. In health level, there was no meaningful difference according to grade and gender, and the total value of the health level increased with the higher academic background of their fathers, a higher economic level, and more infant education experience. In voluntary works, an aspect of citizen participation, there was no meaningful difference in grade and gender, but the total value of the health level increased with the higher academic background of their fathers, a higher economic level, and more infant education experience. In bullying damage experience, an aspect of safety level, the interaction existed in the difference in economic level, and in illegal download experience, the interaction existed only in grade and gender. High school students experienced the most number of school theft incidents, and male students experienced theft incidents more than female students. The difference between male and female students was more significant in high schools.

Third, the results of the hierarchical regression analysis to analyze causal relationships, such as the effect of learning environment on cognitive and social-emotional skills, the effect of skills on social progress, and the effect of one's learning environment and skills on social progress, are as follows. First, family environment, such as the number of books, free communication, recommendations on new and various experiences, and happiness level of mothers, had the greatest effect on cognitive skills, followed by school environment. The unique explanatory power of family environment had the highest effect on faithfulness and emotional stability, among social-emotional skills, followed by school environment and local society environment. On morality, the unique explanatory power of school environment had the greatest effect, followed by family environment and local community environment.

The unique explanatory power of school environment and family environment had the greatest effect on creative character, followed by local community environment. The result of a hierarchical regression analysis to examine the effect of cognitive skills and social-emotional skills on life satisfaction (happiness level) showed that social-emotional skills had a significant effect while cognitive skills were not relevant. Among social-emotional skills, faithfulness, extroversion, morality, and emotional stability had a positive effect on life satisfaction (happiness level) with "faithfulness" having the greatest impact and "emotional stability" with the lowest. Among learning environments, school environment, family environment, and local community environment had an effect on life satisfaction, in descending order. In health level, social-emotional skills had higher unique explanatory power than cognitive skills, and among social-emotional skills, morality, openness, faithfulness, and creative character had high unique explanatory power, in descending order. Among learning environments, family environment, school environment, and local community environment had high explanatory power, in descending order. In voluntary works, social-emotional skills had higher explanatory power than cognitive skills, and among social-emotional skills, morality and openness had higher explanatory power. Among learning environments, local community environment, family environment, and school environment had explanatory power on voluntary works, in descending order. In bullying damage experience, social-emotional skills had higher explanatory power than cognitive skills, and among social-emotional skills, emotional stability had the highest explanatory power, together with a negative effect. It implies that emotionally stable students are likely to have less bullying experience damage. In addition, among learning environments, family environment, school environment, and local community environment had an effect on bullying damage experience, in descending order. In illegal download experience, social-emotional skills had higher explanatory power than cognitive skills, and among learning environments, family environment, school environment, and local community environment had an effect on illegal download experience, in descending order. In theft incident experience, social-emotional skills had higher explanatory power than cognitive skills, and among learning environments, school environment, family environment, and local community environment had an effect on theft incidents

in descending order.

Fourth, the result of the "growth mixture model analysis" to diagnose the longitudinal trends in students' responses is as follows. Social-emotional skills, such as faithfulness, emotional stability, and creative character, and happiness level did not show a significant time effect, and only morality showed a statistically significant effect on time, which indicates that the morality of the students increases with the flow of time. The variables that have an effect on morality increase include the recommendation of new and various experiences, parental relationship, and the stability of one's local community. The voluntary works also showed the statistically significant effect on time and that the substitutability and faithfulness, among social-emotional skills, had positive effects. All bullying damage experience, illegal download experience, and school theft incident experience had a statistically significant positive relationship with time. The number of books and morality had an effect on illegal download experience, while emotional stability, the number of books, and openness had an effect on school theft experience. This research could not conduct growth mixture analyses on cognitive skills and health level because they were not measured in 2014 but first measured in 2015.

Lastly, this research derived the implications for Korean school education and educational policies by combining all the questionnaire survey statistical analysis results and literature analysis results. It also discussed methods of possible support for the research in the future.

Keywords: social and emotional skills, cognitive skills, well-being, health, volunteering, safety, longitudinal design