



The Effects of Early Childhood Education and Care Quality on Child Outcomes in the Republic of Korea: Within the Context of Employer-Supported Childcare Centers

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**The Effects of Early Childhood Education and Care Quality
on Child Outcomes in the Republic of Korea:
Within the Context of Employer-Supported Childcare Centers**

(大韓民国における早期幼児教育および保育の質が幼児の発達に与える効果：
事業所内保育施設の事例からの検討)

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ABSTRACT

There is a growing body of evidence that high quality early childhood education and care (ECEC) contributes to children's academic performance and socio-emotional skills. Provision of quality ECEC can predict children's education level and socio-economic status in later stages of life. In recognition of the importance of quality intervention in the early years, the United Nations (UN)'s Sustainable Development Goals (SDGs) have adopted the Target 4.2 to ensure that all children are given opportunities for quality early childhood development, prompting the global education community engage more actively in this effort. Although there is less literature in the Asian context pointing to the long-term benefits of ECEC, it is recognized in the Republic of Korea (Korea) that ECEC contributes to educational attainment – albeit relatively shorter-term compared to studies conducted in the Western countries – as well as both cognitive and non-cognitive development of children. In recent years, a series of policy changes have taken place in Korea with objectives to ensure equitable access to quality ECEC, especially for children aged 3 to 5 years before entering primary education.

Ensuring access to and quality of ECEC services hold particular importance from Korea's social policy perspectives. Currently, Korea is reported to have the lowest fertility rate among OECD countries and is categorized as a country with the fastest ageing population. One of the principle measures that the government is implementing in order to boost the fertility rate is to increase access to quality ECEC services by increasing the number of employer-supported childcare centers from 2018 and by improving the quality of childcare centers by making Childcare Center Quality Accreditation compulsory from 2019.

In light of the growing importance of quality ECEC, and with increasing enrolment rates in ECEC centers internationally, two domains of quality parameters for center-based ECEC have emerged in relevant studies – structural quality and process quality. Structural quality refers to elements including child-teacher ratio, class size and teacher qualifications. Process quality measures children's daily experiences in classrooms, mainly through teacher-child interactions. Both aspects of ECEC

quality have been demonstrated to be associated with the quality of classrooms. In the midst of such growing importance of quality, several quality assessment tools have been developed including CLASS (Classroom Assessment Scoring System), which measures emotional support, classroom organization and instructional support.

Although Korea has yet to establish a set of definitions for the quality of ECEC, the concepts of structural and process quality have been recognized and a series of policy efforts have been implemented to increase the level of quality. In 2013, the Nuri Curriculum for Ages 3 to 5 and Nuri allowances were introduced for all children in this age range to benefit from the high-quality education and to develop character skills through effective interactions in classrooms. In the context of the Nuri Curriculum, character skills which refer to personality and socio-emotional skills that are critical for one to build harmonious relationships with other members of the society. Character skills also include the abilities to take the leadership in one's tasks and exercise empathy towards others within the rules and moral standards of the society. Such socio-emotional skills are most effectively cultured during early childhood and have lasting effects through lifetime. Building character skills through positive classroom interactions are emphasized throughout all five learning areas of the Nuri Curriculum. Attributes of character skills coincide closely with those socio-emotional skills and student agency, stressed highly to form part of the core competencies to be developed for early learners to thrive in the future job market during the 4th industrial revolution. As such, the policy objectives to increase the quality of ECEC are manifested clearly in the Nuri Curriculum by prescribing the learning areas (input) through effective interactions (process), to achieve development of character skills (output).

In spite of such recent policy focus, research and relevant support measures have not yet caught up to complement these policies in order to ensure successful implementation; that is to verify whether the input and process are contributing to achieving the output, from the educational quality framework perspectives. As all childcare centers implement Nuri Curriculum as the basis to plan most of the daily activities – verified by teacher survey, the study aims to answer two large research questions: (1) To what extent do teacher-child interaction and child individual characteristics (age, gender and mothers' working status) predict child character skills? (2) To what extent do teacher and

classroom characteristics predict the quality of teacher-child interaction?

This study is significant in four aspects. First, the study provides up-to-date data on the classroom quality of Korea's childcare centers, produced through direct classroom observation by a certified observer, using the most widely used international classroom quality assessment instrument. This will allow for more updated international comparison of Korea's classroom quality, which has been reported to be relatively low in the past studies conducted before the introduction of recent measure to improve ECEC quality. Second, this study targets employer-supported childcare centers, whose role is being increasingly highlighted by social policy perspectives with the fastest growing numbers but have not been studied for quality extensively in research compared to kindergartens. These types of centers are also likely to be where children spend the longest hours exposed to teacher-child interaction as they have the longest operation hours. In addition, the study targets children aged 3 to 5 years, unlike a majority of previous studies that focused on children aged 5 years. Third, the study looks into the association between teacher-child interaction and children's character skills, by using child initiative scale which captures three aspects of character skills – emotional skills, communication/social skills and motivation. The association between teacher-child interaction and child character skills have yet to be investigated in other studies. Fourth, this study tests teacher and classroom characteristics to see which of these variables have positive/negative predictive power over teacher-child interaction. Results from these tests will provide evidence that can inform support measures that can be designed or modified to ensure classroom quality of ECEC environment.

The study observed 41 classrooms recruited through snowball sampling and surveyed 41 teachers from the observed classrooms in employer-supported childcare centers in Korea's Metropolitan area. Then a total of 375 children from these classrooms were assessed by their teachers who they have been interacting with since the beginning of the semester (March). In order for the author to use CLASS observation scale, the author received intensive official training in the US and passed the CLASS certification exam in order to become a certified observer. For child's character skills assessment, the study used the Child Initiative Scale.

The following hypotheses were set before conducting the analyses to answer the research

question 1: (1-1) the level of child development outcomes are higher for girls and older children, and for children whose mothers are not employed; (1-2) aggregate teacher-child interaction score significantly increases the child's self-initiative score; when measured separately, each of three domains of teacher-child interaction has significant positive effect on child outcome; (1-3) when teacher's interaction score is higher, the differences in child outcomes score caused by child individual characteristics become mitigated. The second set of hypotheses for research question 2 are as follows: (2-1) the current quality of teacher-child interaction in Korea's childcare centers has increased in the recent years compared to that observed in the past studies; (2-2) teacher-child interaction score is higher in classrooms of teachers with higher education level and more frequent training but it is not significantly associated with teachers' experience or age; (2-3) teacher-child interaction score is higher in classrooms where child-teacher ratio is low and the overall classroom size measured by the total number of children in classroom is small. Hierarchical Linear Modelling (HLM) was used for the analysis for research question 1 as the collected data belonged to two different levels – child level (level 1) and classroom level (level 2), and child level data was nested in classroom level data. For research question 2, which only concerns classroom level, multiple regression was used.

The results showed that child initiative scores were higher for older children and for girls in all three domains – emotional skills, communication skills and motivation. However, mother's employment status did not show significant association with child outcomes. Teachers from this study scored higher than all Korean studies and most international studies on two domains – emotional support and classroom organization. On instructional support, teachers from this study performed better than the other two study types but lower than one previous Korean study where all teachers were sampled from kindergartens. As for the effect of teachers' interaction on child outcomes, results show that higher teacher total score predicted higher child initiative in all child outcome domains. When the teacher score is broken down to individual domains, teachers' emotional support score could predict all domains of child outcomes. However, classroom organization showed positive association only with children's emotional skills but not on communication skills or motivation. Teachers' instructional support had significant association with children's communication skills and motivation but could not

predict children's emotional skills. The study also found that teachers' interaction skills did not influence the effect size of child gender or mothers' working status on child outcomes but showed that teachers' positive interaction has stronger impact on younger children's emotional skills and communication skills.

Among teacher characteristics, teacher education level (bachelor's degree) and frequency of targeted teacher training had positive association with teachers' interaction skills. For childcare centers, the minimum education level required for a 3rd degree childcare certificate is a high school diploma with training and there are still more than 5,000 teachers with 3rd degree certificate as of 2018. There are additional teachers who now have been promoted to 2nd degree certificate holders but may have entered the workforce with a high school diploma. As childcare center teachers are now expected to play the equivalent educational role as kindergarten teachers with the introduction of the Nuri Curriculum for Ages 3 to 5, the education requirement for teachers in classrooms for children aged 3 to 5 may be increased to bachelor's degree or only teachers with 2nd or 1st level certificates could be assigned to such classrooms. The association between teachers' interaction score and teachers' years of experience was concerning. Teachers with 5-7 years of experience scored lower than the base group of under 4 years of experience but the difference was insignificant. However, teachers with longer than 8 years of experience scored significantly lower than the base group in the total score. The negative association between long experience and teachers' instructional support was the strongest. In the policy context, it may be attributed to the fact that teachers in this group received in-service training based on former curriculum with weaker emphasis on teacher-child interaction. Also, as interacting with children requires high levels of sensitivity, long-serving teachers may experience decreasing sensitivity to interactions especially when their working conditions are unfavorable. Lastly, the years of experience may not be the best parameter to measure the amount of experience as the quality of experience with effective in-service training and feedback may need to be considered.

The study found policy gaps between the quality of ECEC that childcare teachers and centers are expected to produce and the adequate training that are provided. Currently, teachers receive one-off training of 16 hours before being able to teach based on the Nuri Curriculum. Then teachers are

obligated to take mandatory in-service training every three years; but courses related to teacher-child interaction are categorized as optional. Although Childcare Center Quality Accreditation has increasing number of indicators to assess teacher-child interaction, the only training opportunities that teachers receive are index training where the specifications of the indices are explained in an academic sense rather than focusing on the practical question of how to improve their individual skills. This study provides evidence to believe it is important to consider measures to ensure that long-serving teachers receive targeted training and perhaps more often than the mandated in-service training every 3 years.

As for classroom characteristics, child-teacher ratio did not show significant association with teachers' interaction score in both aggregate score and separate domains. However, class size – larger than 24 children per classroom – had negative association with emotional support and classroom organization. Such finding reassures policy makers that Korea's regulation of maximum 23 children per classroom is a valid level of regulation. However, the study found that there are centers that do not abide by this regulation and have up to 31 children per classroom. Additionally, the class size or child-teacher ratio are not included in the indicators of the Childcare Center Quality Assessment. Given the significant negative effect that large class sizes can have on the important quality aspects of the classroom that can predict positive child outcomes, it is deemed necessary to have measures in place for the government to monitor class size so the maximum class size can be controlled.

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LIST OF ACRONYMS AND ABBREVIATIONS

CLASS	Classroom Assessment Scoring System
DAP	Developmentally Appropriate Practice
EAS	Emotionality, Activity, Sociability
ECCE	Early Childhood Care and Education
ECERS	Early Childhood Environment Rating System
ECD	Early Childhood Development
ECEC	Early Childhood Education and Care
GDP	Gross Domestic Product
KICCE	Korea Institute of Child Care and Education
KEEP	Korean Education & Employment Panel
IBE	International Bureau of Education
LOE	Local Offices of Education
MOE	Ministry of Education
MOEL	Ministry of Employment and Labor
MOEST	Ministry of Education and Science Technology
MOEL	Ministry of Employment and Labor
MOHW	Ministry of Health and Welfare
NAEYC	National Association of the Education of Young Children
NEPS	National Educational Panel Study
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
ORCE	Observation Record of the Caregiving Environment
PISA	Programme for International Student Assessment
SDG	Sustainable Development Goals
UN	United nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

CHAPTER 1:

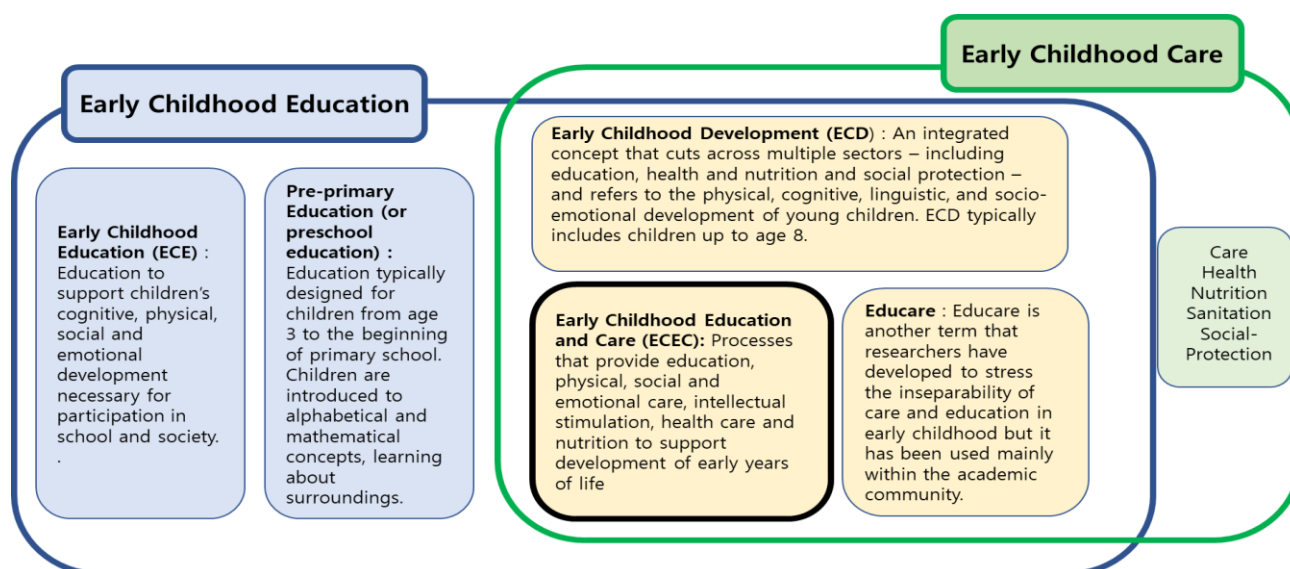
INTRODUCTION

1.1. Background

There is a growing body of evidence that early childhood education and care (ECEC) contributes to children's academic and socio-emotional development as well as social benefits by increasing productivity (Károly et al., 2005). Investing in early childhood care and education yields higher returns than investing in any other periods in life (Heckman et al., 2006; Heckman & Masterov, 2007). Perry Preschool Project of the US found that investing 1 US dollar in ECCE can produce up to 16.14 dollars of return (Schweinhart et al., 2005). Recognizing such importance of ECEC, Sustainable Development Goals (SDGs) Target 4.2 prompts the global education community to “by 2030 ensure that all girls and boys have access to quality early childhood development, care and pre-primary education”. Early child education and care is referred to by diverse terminologies depending on each country's policy focus and coverage as shown in

Figure 1-1 below.

Figure 1-1: Different Terminologies Related to Early Childhood Education and Care



Source: Created by the author based on (UNESCO-IBE, 2013)

In recent years, many education systems have reflected the increasingly highlighted importance of early childhood education care and care in their policy efforts (OECD, 2017). The Republic of Korea (Korea) is one of the education systems that have made a remarkable policy changes in order to in terms of both increasing government expenditure and redesigning the national early childhood education curriculum. For this study, the terminology ECEC will be used as it is the term used in Korea's policy context where there is a growing movement to integrate the functions of early childhood education and care are (KICCE, 2013; Choi, 2016).

The impact of ECEC has been investigated from diverse perspectives including the positive impact on educational attainment, economic gains and social benefits. In a number of studies, Heckman argued that investing in early childhood care and education yields higher returns compared to investing in any other periods in children's life (Heckman et al., 2006; Heckman & Masterov, 2007). Heckman & Masterov (2007) found that early childhood education programs designed for disadvantaged children contribute to decreasing the rate of crime, increasing the possibility of graduating from high schools and attend colleagues, reduce possibility to repeat grades and costs for special education. The study also found that ECEC can improve educational achievement as evaluated by test scores, In particular, cost-benefit analyses of such interventions reported rates of return of 16%, out of which 4% is for participants and the other 12% is for the society as a whole.

The Effective Provision of Pre-School Education (EPPE) project is one of the first large-scale longitudinal study conducted for European countries using national samples of young children's development (Siraj-Blatchford et al., 2004). The project investigated the impact of early childhood education, in particular, childcare environment at home and pre-primary school environment that children were exposed to. The findings of the project include that attending pre-school can enhance a wide spectrum of development in children compared to those who did not. In addition, the study found that the duration of participation is important; that is, starting early before reaching the age of three years contributes to stronger intellectual development. The project also pointed out that participating in ECEC can bring about significant benefits to disadvantaged children, especially when the education provided is of good quality (Siraj-Blatchford et al., 2004).

The High/Scope Perry Preschool study was a research experiment that identified short-term and long-term effects of high quality pre-school programs for children from disadvantaged families (Schweinhart et al., 2005). The study sampled 123 children from low-income families that were identified as being at high risk of academic failure. Among them, 58 of them were assigned to high-quality early childhood education environment when they were 3 and 4 years old. The rest received no pre-school education. Researchers then collected their data at ages 3 to 11 and at different intervals until they reached the age of 40. The study found that early interventions have significant positive effect in terms of education level, economic status, crime reduction, family environment and health. With respect to education, the program found that much higher percentage of participants (77%) in the treatment group graduated from high school compared to the control group (60%). The participants also outperformed significantly on a number of intellectual and linguistic tests. In terms of economic aspects, higher percentage of program participants (70%) were more likely to be employed than non-participants (50%) at age 40. The program group also demonstrated significantly higher annual earnings than non-program group. The cost-benefit analysis found that the program produced \$16.14 per dollar invested (Schweinhart et al., 2005).

It should be noted that a larger volume of the evidence provided above pointing to the long-term benefits of ECEC comes from non-Asian countries. It is important, however, to look into studies conducted in the Asian context in order to see if the benefits of ECEC are reflected differently varying social contexts. In a Japanese study by Ogawa (2018) - based on nationwide data from the Survey of Education, Social Stratification, and Social Mobility in Japan (ESSM) - participation in pre-primary education showed significant effect on educational attainment. Participants aged between 40 to 49 years old who had participated in pre-primary education were more likely to have progressed to four-year universities, although its effect is not as significant as parents' education level and family's socio-economic status. Another study conducted in Japan by Akabayashi et al. (2013) found that pre-primary education contributes to educational progression and non-cognitive skills but the target of the study was primary and secondary school students. Therefore, pre-primary education can be considered to be conducive to educational progression to secondary level and development of non-cognitive skills but are not deemed a determining contributor to reaching the final stages of the

education level. In addition, as the study did not take into consideration parents' jobs and household culture factors, the effect of participation in pre-primary education may have been presumed to be significant factor for educational attainment. The two studies point to potential positive effect of participation in pre-primary education in later educational attainment, although its effect is deemed somewhat limited to the secondary level education and not as significant as the effect of parents' education level and family's socio-economic status.

In Korea, a study by Lee and Kim (2012) found that policies geared to alleviate short-term financial restrictions like tuition reduction, will have less effect in narrowing the gaps in accessing four-year college in Korea than policies to promote early intervention to ensure children's development. However, other than Lee and Kim (2012)'s study, academic research has been focused more on short-term effect of participation in ECEC on the academic achievement. Cho and Kim (2013) found that enrollment in ECEC centers can increase children's performance in primary education. That is, children who participated in kindergartens or childcare centers achieved higher satisfaction about their academic achievement, better ability to concentrate as well as stronger emotional stability (Cho & Kim, 2013). The study also found that such improvements in child performance in primary education can be enhanced not only by the duration of ECEC participation but also by the quality of early childhood education. Ham (2002) also verified the effect of ECEC in increasing the ability to concentrate for children enrolled in grades 4 to 6 in primary schools (Ham, 2002).

The studies mentioned above in Japan and Korea reveal that are focused more on the effects of ECEC on the students educational attainment or performance of up to primary or secondary level. There is a lack of research that study longer-term effect of ECEC reaching students' academic results at higher education level. Rather, studies that look into variables predicting enrolment in higher education often include family factors or participation in other education levels but hardly include experience in ECEC as a potential predictor. For instance, Kim (2014^[9]) and Ahn (2017) analyzed the factors that can predict a students' progression to higher education as student's academic performance in lower secondary school and family's socio-economic status using Korean Education & Employment Panel (KEEP) survey data. However, enrolment in early childhood education and care

service has not been included as a potential predictor to increase enrollment in higher education institutions. Rather, these studies found associations between family's socio-economic status or student's educational attainment level at secondary education and enrollment in higher education. A Taiwanese study found association between progression to higher education in Taiwan between parental education level and income level to see the impact of socioeconomic family backgrounds on students in attending universities but experience of ECEC was not considered as a variable. These results imply that research in selected Asian countries are focused more on shorter term effect of ECEC on academic achievement, which calls for more research evidence supporting the long-term effects of participation in early childhood education and care (Liu et al., 2006).

In the recent years, the focus in the policy attention has shifted from providing access to affordable ECEC to ensuring quality or services due to increasing evidence that lead to the importance of service quality as a determinant of the level of benefits for children (OECD, 2018a). Numerous international studies demonstrate that high quality ECEC programs can have positive effect on children's developmental outcomes, although it is a costly process to establish high-quality standards or to raise current standards. In particular, studies found positive effects of high-quality center-based ECEC on children's cognitive and socio-emotional development (Slot et al., 2015). With increasing enrollment in ECCE and number of hours in center-based settings, classroom quality has become a proxy for ECEC quality (Mashburn et al., 2008; Slot et al., 2015). Korea is one of the countries that has seen significant increase in the enrollment of children in early childhood education and care facilities in the recent decade, due largely to growing number of working mothers. Along the increasing participation rate in ECEC, the demand for high quality education has also increased, as demonstrated in recent policy changes.

Classroom quality consists of largely two domains of constructs; structural aspects and process aspects. Structural aspects of the classroom quality refer to more regulable traits of the classroom including child-teacher ratio, the total size of the class, teacher's characteristics, etc. Process aspects of the classroom quality refer to more day-to-day experiences that children are exposed to within classrooms, mainly through teacher-child interaction. Up to date, the focus of

research and policy efforts have been placed more on the quality of structural aspects – mainly three indicators of structural aspects that are child-staff ratio, group size and teachers’ qualifications; the so-called the “iron triangle” (Slot, 2017). Nevertheless, there is an increasing volume of evidence that indicate the benefits of process quality and its impact on child development outcomes. High level of process quality can contribute to children’s level of literacy and numeracy, as well as better social and behavioral skills. Such association between children’s development outcomes and process quality measured by teacher-child interactions were maintained in early childhood settings for both mixed groups of children and disadvantaged groups of children (OECD, 2018a).

Along with increased attention on high quality ECEC, quality monitoring is considered an important tool to improve quality and ensure largest benefits to children (Taguma, et al., 2012; OECD, 2015). Internationally, there are several quality assessment instruments including Early Childhood Environment Rating Scale’s revised (ECERS), which is used primarily to monitor environmental aspects of ECEC quality and Classroom Assessment Scoring System (CLASS) which is used more to assess process quality by measuring primarily teacher-child interactions (Sylva et al., 2006; Pianta et al., 2008). In Korea, quality assessment for early childhood education and care is conducted by the Quality accreditation system. In the recent years, the section that is dedicated to assess teacher-child interaction has recently been strengthened in the light of growing importance of the quality of teacher-child interaction in ECEC institutions (KCPI, 2018).

High quality ECEC has significant impact on child development outcomes (Howes et al., 2008; Mashburn et al., 2008; Bhang & Chung, 2015). Perspectives of input-process-outcome educational quality framework attest that the quality of education should be understood through the cycle of the entire educational process (Scheerens, 2011). From the view of Scheerens’ educational quality framework, structural quality can be considered as input, process quality can represent process, and child development outcomes can be equivalent to outcome. Globally, there are different levels and scale of efforts by countries to monitor quality of ECEC. The domains and indicators, and whether the monitoring system embraces all or part of the input-process-outcome aspects, and whether or not it includes child development outcomes differ greatly across countries (OECD, 2015b; Jang & Song,

2014). Currently, there are many variations as to how countries monitor child development outcomes (Jang & Song, 2014; OECD, 2015b).

Among the strands of child development outcomes, the importance of non-cognitive skills is receiving growing attention. The strong impact of non-cognitive skills on schooling performance of children and adolescents as well as predicting occupational attainment and wages through higher productivity are well documented (Heckman, 2006; Heckman & Masterov, 2007). In addition, Kautz et al. (2014) found that development of non-cognitive skills can improve educational attainment as well as strengthen the prospects in the labor market outcomes (Kautz et al., 2014). Studies found that early interventions through high-quality childcare centers contributed more to boosting children's non-cognitive skills, in particular social development in childhood (Schweinhart et al., 2005).

There are diverse traits that fall under the category of non-cognitive skills. Character skills, personality skills, socio-emotional skills, motivation and self-discipline are often used as proxies to non-cognitive skills (Heckman and Kautz 2013; Kautz et al. 2014). In particular, "character skills" is used to refer to the personal attributes that are not measured by IQ tests or achievement test. They can be phrased as soft skills, personality traits, non-cognitive skills, socio-emotional skills, motivation and preferences. Heckman and Kautz (2013) argued that character is a skill that can be developed through a life cycle. Character can be developed through interactions with family, school and through social environments and can lay foundation for success in later years. They also argued that high-quality early childhood education programs can improve character skills in the most cost-effective way (Heckman & Kautz, 2013). Character skills is also one of the primary goals of Korea's early childhood education and care curriculum, although there is no standardized methods to assess the development of character skills given the aforementioned challenges of assessing these non-cognitive skills.

Table 1-1: Descriptions of Cognitive Skills and Non-Cognitive Skills

Type of skills	Cognitive Skills	Non-Cognitive Skills
Description	• Fluid intelligence (the rate at which people learn) • Crystallized intelligence (acquired knowledge)	• Character skills • Socio-emotional skills • Communication skills • Motivations • Adaptability • Personality traits
Assessment	• IQ tests • Standardized achievement tests	• Self-reported surveys or observer reports

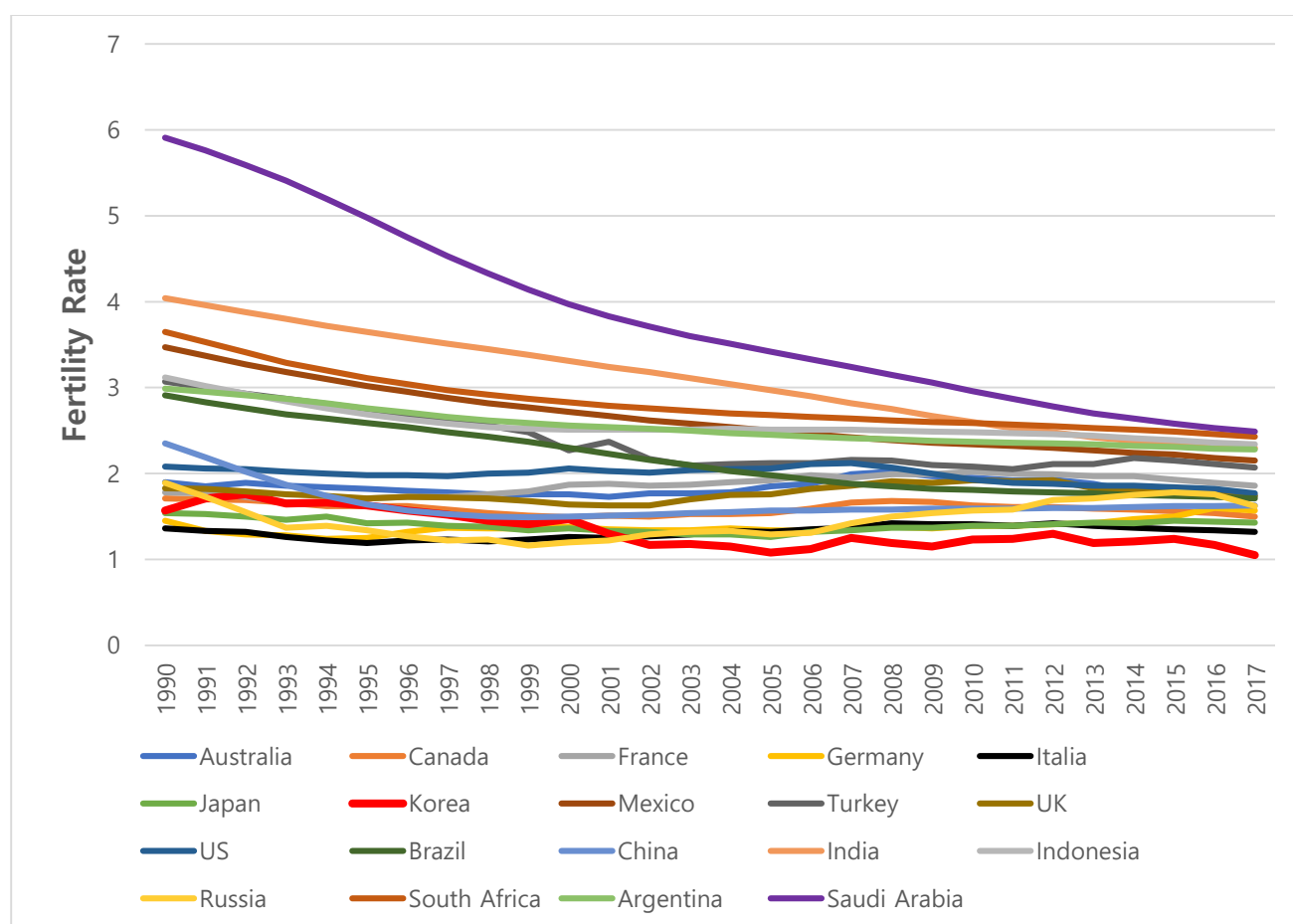
Source: Created by the author based on Heckman & Rubinstein (2001); Heckman & Urzua (2006); Heckman (2012); Heckman & Kautz (2013)

Previous studies have developed a widely-accepted taxonomy of character skills called the Big Five; Openness to Experience, Conscientiousness, Extraversion, Agreeableness and Neuroticism as explained in the Annex (Heckman & Kautz, 2013). As explained in more detail in Table A-1 in Appendices, openness to experience refers to tendency to show openness to new experiences; conscientiousness refers to tendency to be responsible, achievement oriented and ambitious; extraversion refers to interest in the outer world; agreeableness means tendency to cooperate; and neuroticism/emotional stability represents self-control and self-efficacy. Whereas cognitive skills can be tested through variety of evaluation tools such as IQ tests and standardized achievement tests, non-cognitive skills can be assessed through self-reported surveys or observer reports, which makes it more challenging and time consuming to assess.

In Korea, ECEC holds particular importance as one of policy measures to address its world-lowest fertility rate (See Figure 1-2 and Table A-2 in Appendices). In 2001, Korea was labeled as a country with the lowest fertility rate, recording the total fertility rate of 1.3, which further decreased to 1.2 in 2015 (Lee & Choi, 2015; OECD, 2018b). The total fertility rate refers to the entire number of children that are born to each woman considering that she was to live to reach the end of the child-bearing age and end up giving birth to children according to the prevalent age-specific fertility rates. It is calculated by summing up the age-specific fertility rates that are defined over the five-year interval. The OECD states that presuming that there is no net migration and with the fixed mortality rate, the

fertility rate of 2.1 children per woman is the minimum level that can ensure a largely stable population (OECD Data, 2019). Along with other key indicators, fertility rate reflects the causes and impact of economic and social development. Some reasons behind significant decline in birth rates of the world during the last few decades are delayed family formation as well as child-bearing and decreased family sizes that people desire. In case of Korea, a survey found that the primary reasons behind these alarmingly low fertility rate are financial burden of childcare and working mothers' difficulties to return to work (Matsumoto & Hashimoto, 2015). Such results highlight the need to ensure affordable access to ECEC services in order to provide favorable environment for families to have children. Figure 1-2 below shows that Korea is ranked as a country with the lowest fertility rate among the G20 countries. Increase in government assistance for early childhood cares services has significant effect on facilitating women's employment.

Figure 1-2: Fertility Rates (Total fertility rate: children/woman): 1990 – 2017

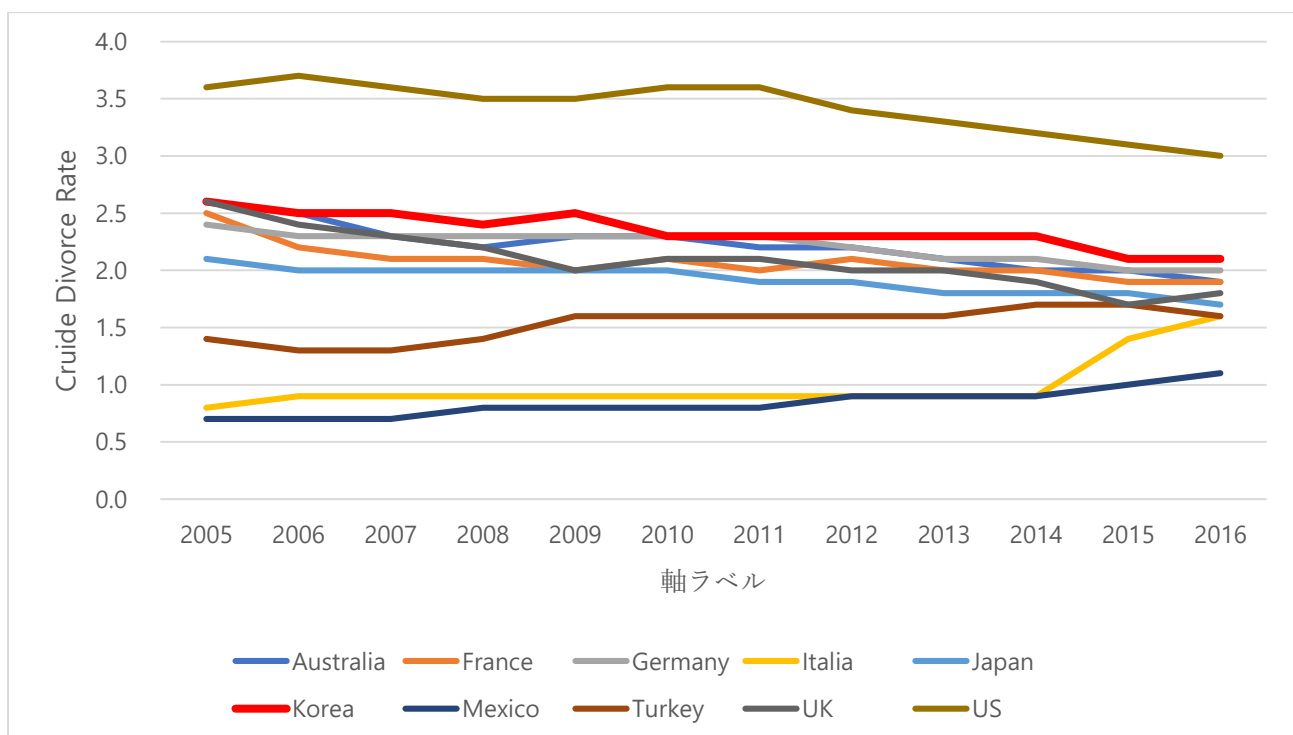


Source : OECD Data (2019)

At the same time, making the childcare cost more affordable has a relatively large effect on the utilization of early childhood care facilities by single mothers (Matsumoto & Hashimoto, 2015). That is, enhanced government support to subsidize childcare cost can provide meaningful assistance to working mothers to remain in the workforce.

In addition, the divorce rate in Korea is relatively high which implies there is a growing number of single-parent households where childcare can become a bigger challenge, further highlighting the role of ECEC (Ju & Lee, 2005; OECD Family Database, 2018). Divorce rate can be measured as the number of divorce that took place during the given year per 1,000 people. Figure 1-3 below shows that crude divorce rate (CDR) in Korea is higher than a majority of G20 countries with data. In addition, among OECD countries, Korea ranked relatively high in terms of the divorce rate, indicating that a growing number of parents will be facing challenging in balancing employment and childcare. Divorce has direct effect on the patterns of childcare and the role of childcare facilities and teachers can significantly alleviate the emotional instability and of fear of separation suffered by children in post-divorce households (Ju & Lee, 2005).

Figure 1-3: Crude Divorce Rate of Selected G30 Countries with Data (2005-2016)



Source: OECD Family Database (2018)

As a way to ensure provision of equitable access to high-quality education to all children, the Korean government introduced the Nuri Curriculum – an integrated education curriculum to be taught to all children aged 3 to 5 years enrolled in ECEC centers in 2013, following the introduction of the Nuri Curriculum for 5 year-olds in 2012 (MOEST and MOHW 2012). The introduction of the Nuri Curriculum holds strong implications for the childcare centers in the Korean context where the ECEC services are delivered through the dual system of kindergartens and childcare centers. In the past, childcare centers traditionally played a stronger role for care rather than for education while kindergartens played the educational role. In addition, the curriculum taught in kindergartens and childcare centers were separate. The quality of education services in childcare centers was reported to be lower than that of kindergartens (Kim et al., 2018^[2]). With the introduction of the Nuri Curriculum, the childcare centers began to play a stronger education role.

The Nuri curriculum places increased importance on teacher-child interaction as part of pedagogical instruments to improve quality of services as well as to ensure children's school readiness and character development. With the introduction of the Nuri curriculum, the government's investment in the provision of early childhood education and care has increased significantly increasing the government accountability to deliver on their policies and produce intended results. The Nuri curriculum places a strong focus on teacher-child interaction and development of children's self-initiative in the course of learning and the alignment of learning content with primary school curriculum (MOEST & MOHW, 2012).

Currently, the definition of the quality of early childhood education and care is not yet officially established in Korea, although Korea's policy documents in relation to quality recognize the concept of ECEC quality similar to the internationally accepted understanding; structural quality that govern more environmental aspects of ECEC service and process quality that refer to child's day-to-day experience focusing on teacher-child interaction. Although the Korean ECEC system does not have officially established set of definitions for ECEC quality, Korea Childcare Promotion Institute (KCPI) administers childcare center quality accreditation for childcare centers as a way to monitor the service quality of the institutions that are largely in line with the recognized concept of quality

reflected in Korean policy documents. KCPI is an agency under the auspices of the Ministry of Health and Welfare established to maintain and improve the quality of childcare center in Korea.

The quality accreditation operated on a voluntary basis until the end of 2018 and has not become mandatory for all childcare centers starting in 2019. It assesses childcare centers in four major domains – educational childcare curriculum and interactions, educational childcare environments and operating management, health and safety and staff (KCPI, 2018). The growing importance of teacher-child interaction that is stressed in the Nuri curriculum is also reflected in the domains of childcare quality accreditation system. If teacher-child interaction is the input element that is becoming increasingly emphasized by the Nuri curriculum, there is character skills development that is stressed as the outcome. Character education is emphasized in the Nuri curriculum as the most principle objective of early childhood learning.

Currently, child development outcomes in early childhood education and care settings in Korea are not included in the quality assessment of the ECEC centers, which is mainly carried out by the Quality accreditation System (Jang & Song, 2014; Choi & Cho, 2016). The Nuri curriculum promotes the development of non-cognitive skills which can otherwise be referred to as character skills or socio-emotional skills. However, the development of such skills have not been included in the Assessment System to assess the quality of ECEC centers, although the child development outcomes form an important part of the quality of education. Globally, countries have different policies governing child development outcomes in the early years. Some countries have developed development outcome assessment tools for early childhood. For instance, Canada has developed EDI (Early Development Instrument), which assesses physical health, social capacity, emotional maturity, linguistic skills, cognitive skills and communication skills. This instrument has also been introduced to other countries like the United States, Australia, United Kingdom, New Zealand, Chile, the Netherlands and Egypt. The Head Start program of the US conducts the Head Start REDI (Research-based, Developmentally Informed) Program in order to see child outcomes focusing on children's school readiness. Some countries conduct child panel surveys on a regular basis in order to collect longitudinal data on child development trends. Germany has a panel research which followed the

development of children until they reached adulthood, titled National Educational Panel Study (NEPS) to study the educational environment, social inequity, educational decision-making and education level of immigrants. Korea conducts a child panel study every year, which is operated by the government in order to follow the development trajectory in physical development, cognitive skills, language, and socio-emotional development of infants who were born in 2008. This panel study will continue until the year 2027 when these children will become adults. Nevertheless, this survey is conducted only against the selected number of children and their early childhood learning environment cannot be controlled. Other types of child outcome studies in Korea are focused more on school readiness which is dedicated more to see the development of cognitive skills and knowledge acquired.

1.2. Problem Statement

Currently, there is no assessment or observation tool to measure character skills of children, although the Nuri Curriculum's main objective is to nurture character skills. The strands of such soft skills or socio-emotional skills are challenging to measure as direct observation or self-report methods need to be used that need specified techniques and can also be time-consuming (Heckman & Kautz, 2013). Child outcome assessment in Korean ECEC services are not yet mandated by the government but are administered independently by each service centers without clear guidelines (Han, 2015). At present, there are efforts to build theoretical foundation that positive interactions contribute to character skills (Kim & Lee, 2017^[3]) as there do not exist standardized assessment test to measure this skill set both domestic or international (Go, 2016; Heckman & Kautz, 2013).

Character skills development holds significant policy relevance in Korea's early childhood, primary and secondary education. In 2016, the government introduced the Character Education Promotion Act to promote development of character skills in all education levels up to secondary education as a way to ensure wholistic development (The National Law Information Center, 2019). The government further plans to set up Character Education Promotion Committee to develop related

learning areas to be incorporated into curriculum as well as teacher training plans accordingly. The Act describes the character skills as personality and capacity to self-regulate and live in harmony with others, community and environment; values including communication, respect, cooperation, responsibility, etc.; proactive initiative, knowledge, socio-emotional skills (The National Law Information Center, 2019). The objective of the Act is to nurture future members of the society with solid foundation of adequate character skills. Although the new early childhood education and care curriculum in Korea places strong importance on the development of character skills that are mainly socio-emotional skills, assessment of such skills have not caught up with the policy focus as of yet. Globally, there is a growing number of studies that attest to the positive effect that socio-emotional skills can yield for academic performance as well as later occupational outcomes (Heckman & Kautz, 2013; Lee & Stankov, 2018). A study investigating the association between classroom quality in early childhood education and care settings in Korea and its impact on children's character skills or socio-emotional skills will be warranted to verify the changes that the new policy focus and the new curriculum have been able to produce.

As the amount of hours that children spend in ECEC centers increases, the importance of quality center-based ECEC services is increasingly emphasized (Kwon, 2015). In particular, the importance of classroom quality supported by teacher-child interaction in center-based ECEC centers is becoming more highlighted in Korean ECEC policies, as shown in its new national curriculum and revised quality indicators for ECEC facilities. However, there is lack of assessment about teacher-child interaction despite growing focus on quality of new ECEC policies (Kim, 2013^[8]). Moreover, despite the growing domestic policy efforts to promote higher quality of early childhood education and care in Korea, unfavorable evidence exists as to the level of Korea's ECEC services (Taguma et al., 2012; Jang & Song, 201; Vermeer et al, 2016). The Korean government has introduced a new national early childhood education and care curriculum – the so-called Nuri curriculum - in 2012 in order to increase the quality of center-based early childhood education and care services. The said curriculum was first launched and disseminated for all children aged five years enrolled in kindergartens and childcare centers. In 2013, this curriculum was further developed and expanded to benefit children aged three and four years given the importance of ensuring high quality education

from early on (MOEST & MOHW 2012; Fujiwara, 2014).

The major objective of the Nuri curriculum was to ensure equitable access to high quality education and to provide an equal start to all children. In particular, in the Nuri Curriculum for Ages 3-5's Teacher Guidelines, teacher-child interaction is emphasized as an important element of quality teacher-child interaction, which can promote child learning. Classroom quality supported by high quality teacher-child interaction is considered a determining factor that can define the level of classroom quality (Mashburn et al., 2008; Kwon, 2015; Slot et al., 2018). Along with the increased emphasis on teacher-child interaction measured by teacher-child interaction, Korea's Quality accreditation system for early childhood education and care facilities has also reflected such change in its criteria, by increasing the number of indicators to assess teacher's interaction skills. Although the policy efforts and assessment measures to emphasize teacher's interaction skills exists, there has been research gap exists in identifying the predictors that can increase teacher-child interaction in this aspect that can boost the overall classroom quality. OECD (2018b) compiled a large volume of research that demonstrate the positive impact of high quality teacher-child interaction on child development outcomes and later academic performance, but there is lack of research on what teacher characteristics or classroom characteristics are associated with higher teacher-child interaction. Research to identify predictors of classroom quality can inform policymakers on measures to increase classroom quality. Identifying structural factors that can be more readily observed and regulated with the potential to contributed to increased process aspect of the quality – teacher-child interaction measured by their interaction skills – will be key to improving the overall quality of ECEC in Korea, in line with its ongoing policy efforts.

As part of its efforts to promote higher fertility rate, the Korean government introduced an initiative in the year 2016 to oblige all workplaces with more than 500 employees or more than 300 female employees to operate employer-supported childcare centers. In 2018, threshold for having mandatory employer-supported childcare centers decreased from 500 to 300. The main objective of this initiative is to facilitate access to childcare centers and to support employment of working mothers with children by providing quality education on site. As a result, employer-supported childcare centers

have become the fastest growing childcare centers in terms of the number of facilities as well as the number of enrolled children. Nevertheless, there is research gap to verify the quality of employer-supported childcare centers as the number of these facilities has grown only recently. Previous studies conducted in Korea to study the classroom quality of early childhood education and care centers have focused more on kindergartens as they have traditionally played a stronger education role. Even in recent years during which childcare centers have begun to play a stronger education function, the number of employer-supported childcare centers included in studies against childcare centers has been minimal (Kwon, 2015; Seo, 2016).

In terms of the policy context, despite the fastest growing number of employer-supported childcare centers, the percentage of this type of childcare centers that participate in the national quality accreditation exercise is significantly lower than other types of facilities. Before participation in the quality accreditation became mandatory in 2019, the government was not able to enforce the non-participating facilities to volunteer. Table demonstrates the percentage of employer-supported childcare centers that participated in the quality accreditation scheme in 2016 was around 60 percent. Therefore, it can be said that the quality information about 40% of the employer-supported childcare centers was not available to parents. However, from the year 2019, the quality information about all childcare centers including the employer-supported centers will be available, indicating the growing commitment of the Korean government in ensuring quality of childcare services.

Table 1-2: Number and Percentage of Childcare Centers under Quality Accreditation (2016)

	Public	Social welfare corporation	Corporations	Private	Family child care	Parent cooperation	Employer-Supported	Total
Number of facilities	2,859	1,402	804	14,316	20,598	157	948	41084
Number of participating facilities	2,631	1,287	685	11,104	16,170	65	560	
Percentage of participation	92.03	91.80	85.20	77.56	78.50	41.40	59.07	79.11

Source: Created by the author based on KCPI (2018)

It should be noted here as well that employer-supported childcare centers has the longest operating hours in order to facilitate the extended work schedules of working parents. This means children enrolled in employer-supported childcare centers are exposed to the longest hours spent in the centers as well as the longest hours of engaging in interaction with teachers (Park et al., 2015; Kim & Kang, 2015^[5]). Therefore, studies are warranted to investigate the quality of education provided in selected employer-supported childcare centers and verify whether the quality ECEC can ensure positive child development outcomes.

1.3. Research Questions

The purpose of this study is to see the association between the quality of teacher-child interaction and the classroom quality of Korea's employer-supported childcare centers focusing on teacher-child interaction measured by their interaction skills with children and its impact on children's socio-emotional skills development by answering the following research questions.

Research 1. What are the factors that predict children's socio-emotional skills?

- 1.1. To what extent do children's characteristics predict their character skills?
- 1.2. To what extent does classroom quality predict children's character skills?
- 1.3. To what extent does the effect of child characteristics on children's character skills vary depending on the level of classroom quality?

Research 2. What are the factors that predict the quality of teacher-child interaction in childcare center classrooms?

- 2.1. What is the current quality of teacher-child interaction in Korea's childcare centers?
- 2.2. To what extent do teacher characteristics predict the quality of teacher-child interaction?
- 2.3. To what extent do classroom characteristics predict the quality of teacher-child interaction?

1.4. Objectives of the Study

The overall objective of this study is to investigate the factors that can increase the classroom quality - teacher-child interaction measured by their interaction skills with children - and the factors that can predict children's socio-emotional skills. The study will target Korea's employer-supported childcare centers where children spend longer hours compared to other ECEC centers (Choi, 2014). First, this study will assess teacher-child interaction by using Classroom assessment scoring system (CLASS) and analyze whether the results are higher depending on group size, child-teacher ratio, teachers' education and experience level, teacher age, and the frequency of training received. Second, the study will analyze the effect of teacher-child interaction as well as children's individual characteristics – child gender and age - on their socio-emotional skills measured by the Child Initiative scale.

In short, this study will attempt to;

- i) identify factors that predict classroom quality (i.e. teacher/classroom characteristics);
- ii) investigate the association between classroom quality and children's socio-emotional skills
- iii) analyze the effect of child characteristics on their socio-emotional skills; and
- iv) examine the influence of classroom quality on the effect size of child characteristics on child outcomes.

1.5. Significance of the Study

This study bears significance in that it contributes to the current literature in the following aspects;

- i) First, this study provides up to date data on the classroom quality in Korea's ECEC centers focusing on teachers' performance level (measured by teacher-child interaction) through direct classroom observation – this exercise will be particularly useful as past international

comparative study portrays the quality of Korea's ECEC as unfavorable. Teacher-child interaction can only be assessed through classroom observation by certified observers and there are only a few studies executed in Korean ECEC centers using the Classroom Assessment Scoring System (CLASS), which is the most widely used international observational tool (Bhang & Chung 2015; Kwon 2015; Byun 2017). With this said, this study can provide useful and updated information about the classroom quality of Korean ECEC centers, which can also facilitate international comparison on ECEC quality, which has previously demonstrated unfavorable results for Korea.

- ii) Moreover, this study is the first research attempt in the Korean context that targets exclusively employer-supported childcare centers in Korea, which will provide valuable data on the teacher-child interaction quality in this type of centers that is fastest growing in numbers and where children are exposed to the longest hours of interaction due to their longest operation hours (Korean Educational Statistics Service, 2019; MOHW, 2019b). In addition to providing data from the Korean context to inform international comparison, this study will also allow comparison of the quality of ECEC among different types of centers.
- iii) This research investigates the association between teacher-child interaction and children's socio-emotional skills, the relationship that has not yet been explored extensively in the Korean context. The limited number of studies conducted in Korea that saw the association between teacher-child interaction and child development outcomes have not focused mainly on socio-emotional skills; rather, they were focused on school readiness and knowledge acquired through the Nuri curriculum (Kim, 2013^[8]; Bhang & Chung, 2015; Yoo & Lee, 2019; Song, 2019). Given the increasing importance of socio-emotional skills emphasized in both the new ECEC curriculum as well as academic research (Heckman & Rubinstein, 2001; MOEST & MOHW, 2013), studying this relationship between teacher-child interaction and children's socio-emotional skills will provide important evidence to verify the relevance of the new policy directions in Korea.

- iv) In addition to studying the association between teacher-child interaction and child development outcomes, this study also investigates the predictors of teachers' performance measured by teacher-child interaction, which can provide valuable information to inform ECEC policies that govern the structural and process aspects of the ECEC quality. Currently, there is only one study that looked into teacher characteristics and classroom characteristics that can affect teacher's interaction scores measured on CLASS, but the variables used in this study are quite limited. In addition, there is currently no study that investigated the effect of teacher training on the level of teacher-child interaction measured by teacher-child interaction. Given Korea's recent policy shift to include indicators of professional development as indicators of center quality, evidence on the effect of teacher training will be valuable. This study looks into whether the quality of teacher-child interaction can affect the size of the effect of child characteristics on their socio-emotional skills development, in order to see whether high quality interaction skills of teachers can offset the effect of other variables that may affect child development outcomes. In addition, the study introduces the variable of mothers' working status to see whether this variable can influence children's socio-emotional development outcomes and whether quality teacher-child interaction can either enhance or reduce the effect of mother's employment on children.

More detailed elaboration on each of these aspects are narrated below.

First, this study provides more updated realities with regards to the classroom quality in selected ECEC centers in Korea measured by teacher-child interaction. Within the context of Korea, class observation is conducted only through direct classroom observation the state inspectors who carry out the quality accreditation, head teachers and peer teachers, and selected researchers that have recognized certification for observation and have been given permission by the institution and parents. Such administrative hurdles make it challenging for individual researchers to conduct classroom observation which is the most accurate method to assess teacher-child interaction, in particular, teacher-child interaction (Bhang & Chung, 2015). In the past, even when the quality accreditation has

been conducted, the detailed results of quality accreditation carried out by state inspectors were not disclosed – the only information made public is whether the ECEC center has passed the overall threshold to be accredited or not. However, since late 2018, the scores for each domain are now disclosed in the form of grades (KCPI, 2018), which makes quality status of classrooms of ECEC centers even more important than in the past. CLASS (Classroom Assessment Scoring System) is an observation tool that was developed to assess the quality of classrooms focusing on teacher-child interaction (Pianta et al., 2008). Since its introduction, it has become the most widely used international assessment tool for teacher-child interaction. In Korea, there has (Bhang & Chung, 2015; Kwon 2015; Byun, 2017).

In addition, this study will enable a comparison between international context and Korean context in terms of i) the status of structural quality and process quality and ii) the association among input, process and outcome dimensions of the educational quality frameworks. Results of this study will be useful in positioning Korea's ECEC services among international standards to guide comparative learning as well as to see the dynamics among these quality dimensions within the Korean ECEC landscape since, as mentioned in the problem statement, comparative analyses or meta-analysis available that involve Korea either provides rather outdated results of Korea's ECEC quality from pre-Nuri Curriculum years or do not have Korean data due to absence of relevant research (Taguma et al., 2012; Vermeer et al., 2016; OECD, 2018a). In terms of research evidence using Classroom Assessment Scoring System (CLASS), this study will contribute particularly to providing first-hand data as it will be one of the few studies that collected its own data based on direct observation of classrooms (Bhang & Chung, 2015; Kwon. 2015; Byun. 2017) by a certified observer of CLASS assessment tool.

Second, this study will target employer-supported childcare centers that have not been researched, even though this is the type of center where children are exposed to the longest hours of interaction totaling 12 hours or longer per day. This study targets exclusively children enrolled in employer-support childcare centers – the type of center that is increasing most rapidly in numbers as well as in enrollment numbers, and where children spend the longest hours. Due to the increase in

numbers which has taken place rather recently due to government legislation, this type of ECEC center has not been studied extensively in the past studies. With increasing number of employer-supported childcare centers and given the extended teacher-child interaction hours that children are exposed to in this type of facilities, it is justifiable to examine the education quality of these centers.

Third, this study will investigate the direct linkage between the classroom quality and the development of children's character skills, which is one of the main objectives of the Nuri curriculum. Most domestic studies that have been conducted to date have not focused more on children's school readiness or cognitive skills (Kim, 2013^[8]; Bhang & Chung, 2015; Yoo & Lee, 2019; Song, 2019). There is lack of research that analyzed the effect of teacher-child interaction on child's character skills or non-cognitive skills within the context of Korean childcare centers, for children aged 3 to 5, after the introduction of the Nuri Curriculum. As childcare centers have traditionally a weaker educational role for children, academic research on ECEC in Korea tended to focus on kindergartens. However, with the childcare center playing an increasingly educational role, and the importance of character skills development for the ages 3 to 5 as stipulated in the Nuri Curriculum, it merits significance to verify how teacher-child interaction can improve child character skills in childcare centers.

Against this backdrop, this study will measure classroom quality and investigate its impact on children's character skills, or socio-emotional skills, which is emphasized in Korea's current early childhood education and care curriculum as character skills (MOEST & MOHW, 2012). Children's socio-emotional skills or character skills as stipulated in Korea's ECEC curriculum, will be measured by child initiative scale (Oh, 2004). This scale is an assessment tool developed in Korea to be used by teachers to assess their children, focusing on emotional skills, communication skills and motivation level, which are key elements of character skills and also socio-emotional skills. Assessment of these skills has not been carried out in many previous studies due to challenges associated with the time-consuming nature of observing and evaluating such soft skills. Nonetheless, child initiative along with all three of its dimensions share many traits with the concept of "child agency" which is emerging as one of the important competencies in the 21st century skills. In particular, motivation is an increasingly interesting dimension in child development assessment that is receiving growing

attention in the midst of rapidly changing world but which has not been widely assessed due to lack of assessment tool to measure this dimension (Heckman & Rubinstein, 2001; Heckman, 2012). Therefore, by using this child initiative assessment tool, this study can investigate the association between classroom and the important elements of child socio-emotional skills that are emphasized in both Korean and international ECEC policy context. This study will also investigate whether the effect size of the impact of classroom quality on child development outcome varies depending on child characteristics including child age, child gender, and mother's working status. Similar studies conducted previously only used child age and gender or no child variables in their studies (Kenser, 2000; Bhang & Chung, 2015).

Fourth, this study provides evidence on predictors of teacher-child interaction. In response to growing policy focus on classroom quality, some previous domestic studies in Korea attempted to assess classroom quality, but without looking into a series of structural factors that can contribute to increasing the level of teacher-child interaction. There is one study which measured teachers' interaction skills while considering several teacher and classroom characteristics, but the variables used were rather limited. The study only considered teacher-child ratio, teacher major and teacher number in the classroom, without including critical structural factors that have been mentioned in international literature to potentially affect teacher-child interaction. Such variables include the total number of children in classroom, teacher age, teacher education level, the number or years of teacher experience, and most importantly, the frequency of in-service training particularly on teacher-child interaction that teachers receive per year, which will be included as important variables in this study. Identifying such structural and more regulable factors that can increase classroom quality can readily inform policy to promote higher quality education in ECEC centers.

The impact of in-service teacher training, in particular, will provide very interesting results as the Korean government continues to place stronger importance on teacher-child interaction focused on their interaction skills with children without providing equally enhanced in-service training opportunities for teachers that have not received such training in both their pre-service and in-service training (Lim, 2012). Group size or the total number of pupils in is one of the most often considered

factor that is known to predict the quality of teaching and learning (OECD, 2018b). It is also factor that is relatively easy to measure as well as relatively easy to regulate. Many studies, however, tend to focus more, and sometimes exclusively, on the child-teacher ratio. This study will take an in-depth look at the effect of class size on teacher's interaction score and its effect on child development outcomes, which can help verify the relevance of the current Korean regulation on group size and compare it to international standards. In addition, there is currently no study that investigated the effect of teacher training on the level of teacher-child interaction measured by teacher-child interaction. Given Korea's recent policy shift to include indicators of professional development as indicators of center quality, evidence on the effect of teacher training will be valuable.

Korea has yet to establish national quality assessment system for child outcome. Even with the implementation of Nuri curriculum, whose objective is ensuring high quality education, quality assessment efforts have not caught up with increasing policy emphasis on quality. Quality assessment that is in place is only for input and process factors and there is currently no systemized outcome quality assessment managed nationally. In this light, this study will be an attempt to fill in the gap by conducting child development outcome assessment in connection with input and process quality assessment. In academic research as well, there is lack of studies that saw the association among structural quality, process quality as well as child development outcome from the perspectives of input-process-outcome educational quality framework (Scheerens et al., 2011). In addition, given the fact that the Nuri Curriculum, in an effort to improve quality, emphasized teacher-child interaction and child initiative, which is largely non-cognitive skills, this study can provide important evidence about the effectiveness of Korea's policy change efforts. In particular, this study will investigate the association among teacher/classroom characteristics (input) – teacher-child interaction (process) – child character skills (outcome).

In addition to investigating the association between teacher-child interaction and child socio-emotional outcomes, this study also probes into whether the level of teacher-child interaction quality can determine the magnitude of how child characteristics can affect child socio-emotional skills development – that is whether high quality teacher-child interaction can enhance or reduce the

effect of a child's individual characteristics. In addition, in the process of investigating the aforementioned effect size, this study included important variables that have not been considered in other studies. That is, this study introduces the variable of "working mothers" into the field of research, which has never been considered as a child variable in previous studies. Korea's recent ECEC policies have been centered around the government's mandate to support working women to boost the currently lowest levels of fertility rate, as some mothers give up their work in order to be able to raise their children or decide not to have children in order to remain employed. Therefore, this study attempts to see whether child development outcomes, in particular socio-emotional skills, can be affected by mothers' working status and whether the effect of mothers' working status on child developments can be influenced by the quality of teacher-child interaction. Results from such investigation can provide important insights into whether mothers' working status has any positive or negative influence on the children's socio-emotional skills as well as whether quality early childhood education and care can offset the fact that a child's mother may be employed.

The Table 1-3 below demonstrates the independent and dependent variables considered in past similar studies in order to present a glance into how this study can make contribution by providing additional information. The table shows that past studies conducted in the Korean context targeted more kindergartens and even those that targeted childcare centers did not include a large number of employer-supported childcare centers. In addition, most studies considered more cognitive development of children. Lastly, studies focused more on the effect of teachers on children, rather than which factors can actually increase the teacher performance. This study, on the other hand, included larger number of important variables that can be predictors of higher teacher interaction scores.

Table 1-3: Comparison of Variables between this Study and Past Relevant Studies

Author	Dependent variable		Independent variable		Samples			Additional variables	Analysis
	Parameter	Tool	Parameter	Tool	Center	Teacher	Children		
Kim (2013 ^[8])	Child performance based on Nuri curriculum	Nuri Observation Scale	Teacher-child interaction	Caregiver Interaction Scale	20 kindergartens, 14 childcare centers	34	424 (age 5)	Center size classroom size Teacher-child ratio Teacher experience	Multiple regression
Bhang & Chung (2015)	School readiness	School readiness scale	Teacher-child interaction	CLASS	31 kindergartens	31	372 (age 5)	Child gender, age	HLM
Kwon (2015)	Validity Test		Teacher-child interaction	CLASS	24 childcare centers	68 (for age 3-5)	-	Teacher-child ratio Teacher major, teacher number,	T-test F-test ANOVA
Byun (2017)	Peer Initiative	Peer Initiative Scale	Teacher-child interaction	CLASS	31 childcare centers	31	328 (age 3-5)	Child gender, age, teacher education, child-teacher ratio	HLM
This Study	Child child initiative	child initiative scale	Teacher-child interaction	CLASS	41 classrooms in Employer - supported childcare centers	41 Teachers	373 (age 3-6)	Teacher-child ratio Student # in class Teacher character (age, education, experience , frequency of training) Child character (age, gender, maternal employment)	Multiple regression, HLM

Source: Created by the author based on Kwon (2015); Bhang & Chung (2015); Kim (2015^[8]).

CHAPTER 2:

EARLY CHILDHOOD EDUCATION AND CARE IN KOREA

2.1. Overall ECEC delivery system

In Korea, ECEC is delivered through two separate institutions - kindergartens and childcare centers – that are governed by two different legal systems. First, the Early Childhood Education Act, which defines “children” as children from age 3 until they enter primary school, designates kindergartens as institutions established in order to provide early childhood education. On the other hand, the Child care Act defines “infant” as children under the age of 6, before they enter primary school. This Act stipulates “care” as social welfare services that are designed to support childcare centers as well as parents in order to provide protection and nurturing environment to infants in a healthy and safe manner. Under the Child care Act, Childcare Centers are designated as institutions that are entrusted by parents to provide childcare services. Based on these two legal systems, “early childhood” in Korea refers to a period for children when they are between age 0 to the point they enter primary school (Ministry of Government Legislation, 2019).

Table 2-1: Comparisons between Kindergarten and Childcare Center

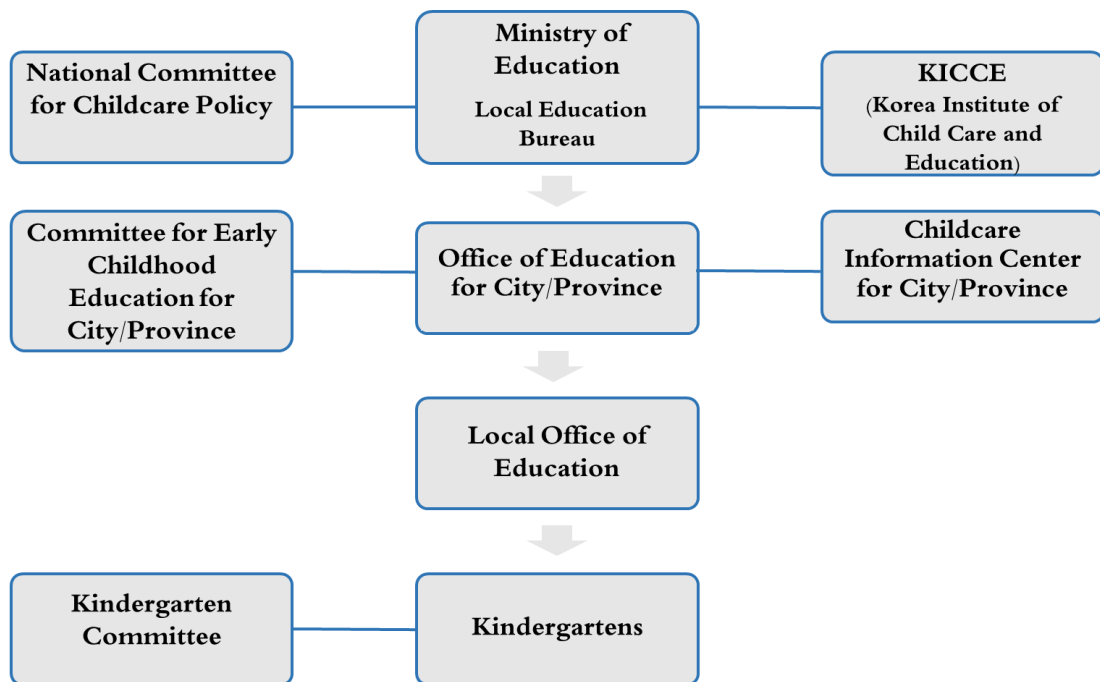
Category	Kindergarten	Childcare Center
Auspice	Ministry of Education	Ministry of Health and Welfare
Legislation	Early Childhood Education Act (Enacted in 2005)	Child care Act (Enacted in 1991)
Target Age	Ages 3-5 years	Ages 0-5 years
Function	Education (Main) + Care	Care (Main) + Education
Operating Hours	9:00-15:00 (6 hours)	7:30-19:30 (12 hours) + Extended hours
Teacher Qualifications	(1) 1 st Degree certificate: Among 2 Degree certificate holders, with 3 years of teaching experience OR with Master's degree and 1 year of teaching	(1) 1st Degree: i) Childcare teacher license (level 2) and 3 years of work experience in childcare + completion of promotion

	experience		training approved by the Minister of Health and Welfare 2) Childcare teacher license (level 2) + Master's degree (or higher) in childcare + 1 year of working experience in childcare + completion of promotion training approved by the Minister of Health and Welfare	
	(2) 2 nd Degree certificate: 2-year college degree or higher degree with designated credits in early child education OR Master's degree from graduate school of education (majoring in early childhood education)		(2) 2 nd Degree certificate i) College degree (or higher) with designated credits in childcare in relevant courses approved by the Ministry of Wealth and Welfare ii) 3 degree holder with 2 year of experience and training + completion of promotion training approved by the Minister of Health and Welfare	
			(3) 3 rd Degree: High school diploma (or higher) + training designated by the Ministry of Health and Welfare	
Curriculum	Before 2012	After 2012	Before 2012	After 2012
	Kindergarten Curriculum (Ages 3-5)	Nuri Curriculum (3-5 hours a day)	Standard Childcare Curriculum	Standard Childcare Curriculum (Age 0-2)
Quality Assurance	Kindergarten Quality accreditation (2008)		Childcare Quality accreditation (2005)	

Source: Created by the author based on KICCE (2015); UNESCO (2015)

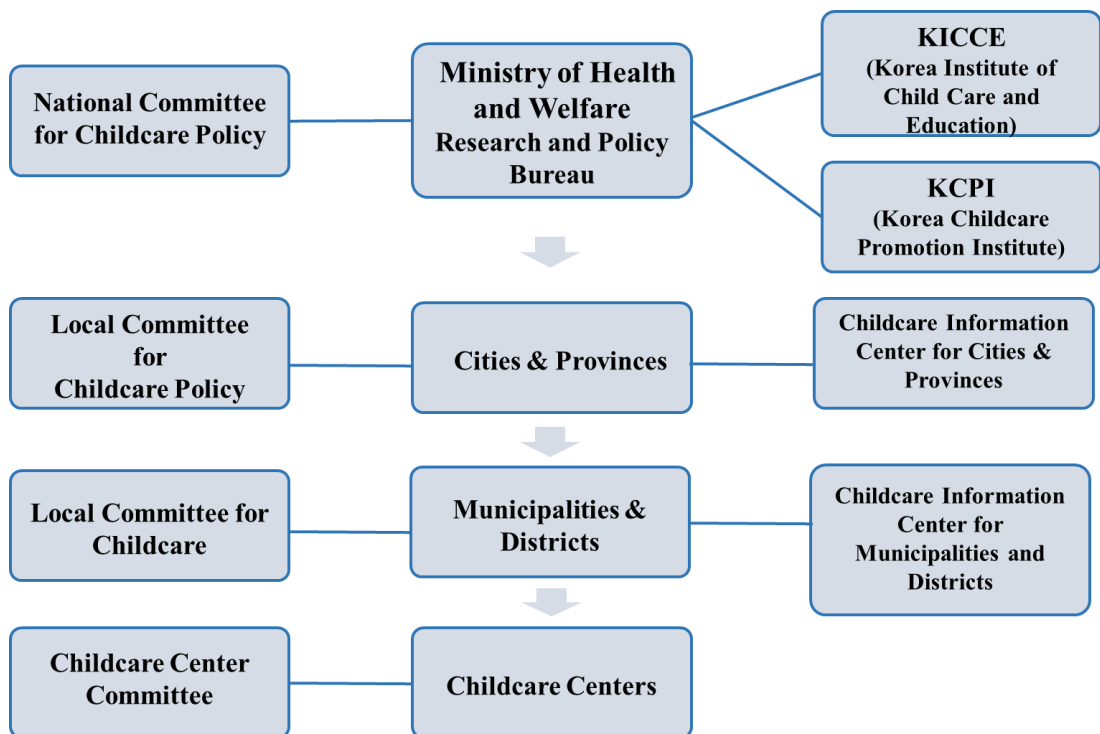
The delivery systems of early childhood education and early childhood care are separated and the decision-making mechanisms are also operated in separate streams. Figures 1-4 and 1-5 show the policy dissemination process for early childhood education and early childhood care respectively.

Figure 2-1: Early Childhood Education Policy Dissemination Process in Korea



Source: Created by the author based on Joo (2015)

Figure 2-2: Early Childhood Care Policy Dissemination Process in Korea



Source: Created by the author based on Joo (2015)

With the introduction of the Nuri Curriculum to be taught to children aged 3 to 5 years, the role of childcare centers for this age group has incorporated the educational function (Matsumoto &

Hashimoto, 2015). Teacher qualifications still show differences in both institutions, with qualifications slightly lower for teachers in childcare centers, at the lower end of the qualification threshold. Nevertheless, the official status of staff in both institutions is recognized as “teachers”, including all “childcare teachers” from childcare centers, including those who work with infants aged 0 to 2 years (MOHW, 2018).

As shown in Table 2.2, the number of both kindergartens and childcare centers is on the steady increase, indicating growing importance of center-based ECEC services. In addition, it should be noted that the number of childcare centers are significantly higher than kindergartens – close to four times as many – as the range of enrollment age is larger for childcare centers (0 to 6) compared to kindergartens (3 to 6).

Table 2-2: Number of ECCE Facilities by Year (2011-2015)

	2011	2012	2013	2014	2015	2016	2017	2018
Total Number of Kindergarten	8,424	8,538	8,678	8,826	8,930	8,987	9,029	9,021
Public Kindergarten	4,499	4,522	4,574	4,616	4,675	4,693	4,744	4,798
Private Kindergarten	3,922	4,013	4,101	4,207	4,252	4,291	4,282	4,220
Childcare Center	39,842	42,527	43,770	43,742	42,517	41,084	40,238	39,171

Source: Korean Educational Statistics Service (2019)

Table 1.3 indicates the number of ECCE facilities and children’s enrolment status as of 2014 according to different types of providers. The data indicates the percentage of public service centers for both kindergartens and childcare centers is rather low at 22.7% for kindergartens and 10.6% for childcare centers. In addition, the data indicate that the number of employer-supported childcare centers is rapidly increasing. Employer-supported childcare centers are discussed more in depth in section 2.10.

Table 2-3: Number of ECCE Facilities by Type (2010-2018)

Kindergarten					Childcare Centers							
	Total	National	Public	Private	Total	Public	Social welfare corporation	Corporations	Private	Family child care	Parent cooperation	Employer-supported
2010	8,388	3	4,498	3,887	38,021	2,034	1,468	888	13,789	19,367	74	401
2011	8,424	3	4,499	3,922	39,842	2,116	1,462	870	14,134	20,722	89	449
2012	8,538	3	4,522	4,013	42,527	2,203	1,444	869	14,440	22,935	113	523
2013	8,678	3	4,574	4,101	43,770	2,332	1,439	868	14,751	23,632	129	619
2014	8,826	3	4,616	4,207	43,742	2,489	1,420	852	14,822	23,318	149	692
2015	8,930	3	4,675	4,252	42,517	2,629	1,414	834	14,626	22,074	155	785
2016	8,987	3	4,693	4,291	41,084	2,859	1,402	804	14,316	20,598	157	948
2017	9,029	3	4,744	4,282	40,238	3,157	1,392	771	14,045	19,656	164	1053
2018	9,021	3	4,798	4,220	39,171	3,602	1,377	748	13,518	18,651	164	1,111

Source: Korean Educational Statistics Service (2019)

In parallel with the growing number of facilities, the number of children enrolled in ECEC centers are also growing. It is particularly notable the rate at which the number of children enrolled in employer-supported childcare centers is increasing. Employer-supported childcare centers are the only type of childcare centers where the number of children enrolled has more than doubled between the years 2012 and 2018.

Table 2-4: Number of Children Enrolled in ECEC Facilities by Type (2006, 2012, 2018)

Kindergarten					Childcare Centers							
	Total	National	Public	Private	Total	Public	Social welfare corporation	Corporations	Private	Family child care	Parent cooperation	Work place
2012	613,749	226	127,121	486,402	1,487,361	149,677	113,049	51,914	768,256	371,671	2,913	29,881
2018	694,631	3	172,272	522,110	1,415,742	200,783	92,787	41,298	711,209	302,674	4,360	62,631

Source: Korean Educational Statistics Service (2019)

Early childhood education and care is not part of compulsory education according to Korea's Basic Act of Education, although pre-primary education for children aged 3-5 years is free in principle. That is, of the total user fees charged by ECCE institutions, the portion charged for basic education curriculum is entirely covered by the government. In 2012, Nuri Curriculum for children aged 5 years was developed by the Korea Institute of Child Care and Education (KICCE), a state-run research institute, based on the shared competencies that were highlighted in former kindergarten and childcare curriculum. In particular, respect for other members of the society, nature, sustainable environment, understanding of domestic and international cultures and diversity were emphasized. Prior to extending the benefits to children from ages 3-4 years, KICCE designed the Nuri Curriculum for children of ages 3-4 based on the curriculum for 5 year-olds, focusing on basic life skills and personality building. The Nuri curriculum serves to ensure that all children enrolled in ECCE facilities have access to quality education by providing integrated curriculum in all facilities (OECD, 2012).

During the past decade, Korea's ECEC policy has undergone a series of state-led plans to provide high quality education to children. Early Childhood Education Advancement Plan (2009-2012) aimed to reduce financial burden imposed on parents and to provide high quality early childhood education services by improving curriculum and teacher policy. In 2012, the Nuri Curriculum for Age 5 was introduced with an objective to integrate the long-divided curriculums for

kindergartens and childcare centers starting with children aged 5 years, in order to ensure equitable access to high quality ECEC before entering primary school. Under the Nuri Curriculum policy, the government also began to provide integrated allowances - financed solely by the MOE budget - to parents whose children are enrolled in kindergartens and childcare centers, that were traditionally financed by two different sources – MOE and MOHW (Fujiwara, 2014). In 2013, the Nuri Curriculum was expanded to children aged 3-4 years enrolled in kindergartens and childcare centers. In the same year, the government announced Early Childhood Education Development Basic Plan (2013 – 2017), with objectives to ensure equitable ECEC opportunities for all children (Kim et al., 2015^[4]; Choi et al., 2016). From 2014, a move was initiative to integrate ‘early childhood care’ and ‘early childhood education’ which are traditionally governed by two different ministries – MOE and MOHW – and delivered by childcare centers and kindergartens respectively. The main purpose of this initiative was to ensure equitable access to high quality ECEC, increase user convenience, guarantee affordability and right to select services, reduce conflict among stakeholders, increase accountability of private ownership in light of growing public investment, improve efficiency in government expenditure and facilitate coordination among relevant ministries (Choi et al., 2016).

Employer-supported childcare centers hold an increasing importance in Korea’s ECEC. Article 14 of Korea’s Childcare Act stipulates that workplaces of a certain size are obliged to operate a childcare center for the employees. Until 2015, employers had an option to provide employees with childcare cash allowances instead of operating a childcare center. Starting from 2016, however, all workplaces with more than 500 employees or more than 300 female employees must operate a childcare center without an alternative to give out childcare cash allowances. Failure to comply with the strengthened regulation will result in fines of up to KRW 1 million (approximately USD 81,300) to be paid up to twice a year. Ministry of Employment and Labor (MOEL) provides the following financial benefits to workplaces that operate childcare centers.

Table 2-5: Government Support for Employer-Supported Childcare Centers

Benefit	Details
Initial Set-up Expenses	For workplaces that are holders of employer insurance, MOEL covers 60-80% of expenses for initial set-up and equipment
Salary and Operational Expenses	For workplaces that operate childcare centers that are certified by district office with certified teachers according to the Child care Act, MOEL provides KRW 300,000-800,000 (USD 250-680) per month (or KRW 450,000-1,200,000 (USD 380-1,025) for SMEs) depending on the working hours
Government Loan for Initial Set-up	MOEL provides government loans for initial set-up expenses to workplaces that operate childcare centers with 1-2% interest rate, up to KRW 700 million (USD 600,000)

Source: Created by the author based on Ministry of Employment and Labor (2019)

These measures are expected to bring about i) significant increase of private investment in childcare services, ii) ease working mothers' childcare burden and iii) potentially contribute to addressing low fertility rate in the long run.

2.2. Korea's recent ECEC policy and challenges

Korea's early childhood education and care has undergone a series of policy actions designed to established the advanced ECEC system. During the past ten years, the government has implemented several large policy schemes and introduced the new early childhood education and care. First, in the year 2009, the Korean government implemented the 'Comprehensive Development Plan to Promote the Advanced Early Childhood Education'. Second, the government introduced the Nuri Curriculum for Age 5 in the year 2012, followed by the Nuri Curriculum for Ages 3 to 5 in the year 2013. The government also initiated the 'Five-Year Plan for Early Childhood Education Development' to be implemented in the years 2013 to 2016 (Choi, 2016; MOE, 2019) as further explained in the table below.

Table 2-6: Main Policy Actions taken under Recent Early Childhood Education Policies

Comprehensive Development Plan to Promote the Advanced Early Childhood Education'		Five-Year Plan for Early Childhood Education Development'	
Objective	Policy actions	Objective	Policy actions
Reduction in early childhood education fees	• Phase-in expansion of free early childhood education • Improvement of the quality of education provided at private institutions (by providing financial incentives for personnel and facilities) • Increase in the number of public kindergartens • Promoting the establishment and operation of additional kindergartens including employer-supported kindergartens • Strengthening of kindergarten regulations including illegal operation of private institutions for children	Expanding access to early childhood education	• Continued expansion of free early childhood education • Systematic increase in the number of kindergartens • Establishment of kindergarten information system • Standardization of regulations with regards to kindergarten facilities • Improvement of early childhood environment including meal plans, sanitation and safety.
Establishment of advanced childhood education policies	• Introduction of integrated kindergartens information disclosure system • Introduction of advanced financial and accounting regulation for kindergartens • Introduction of credit card payment system for the payment of enrollment fees • Establishment and operation of kindergarten governing committee • Publication of annual status report of early childhood education	Improving efficiency in kindergarten operation	• Improvement of operation in public kindergartens • Increasing support system for private kindergartens • Upgrading kindergarten evaluation system • Introduction of financing and accounting system of kindergartens • Continued development of kindergarten governing committee
Future-oriented education curriculum	• Revision of curriculum to incorporate future-oriented elements • Enhanced operation of after-school curriculum • Diversification of special programs • Encouraged usage of IT instruments for education	Continued development of curriculum and after-school programs	• Continued implementation of Nuri Curriculum • Introduction of accreditation system for education materials • Continued development of after-school curriculum • Deployment of designated teachers for after-school programs
Deployment of quality teachers	• Improvement of teacher training and teacher recruitment system • Development of customized teacher training to enhance professionalism and provision of peer learning	Ensuring quality of teachers and improving self-efficacy of teachers	• Increasing qualifications for teachers for the Nuri Curriculum • Customized training for high quality teaching • Improvement of teacher

	• Recruitment of high quality teachers • Development of evaluation system for head teachers		- recruitment system • Improving working conditions and ethical awareness of teachers
Strengthening of early childhood education support system	• Establishment of comprehensive information disclosure system • Enhanced investment of local governments in childhood education • Efficient responsibility sharing among supporting agencies • Enhanced campaigns to raise awareness about early childhood education	Strengthening of early childhood education support system	• Establishment of comprehensive information disclosure system • Enhanced campaigns to raise awareness about early childhood education • Strengthening cooperation network for early childhood education • Increasing support for the Nuri Curriculum

Source: Created by the author based on Choi (2016)

Along with these new policy initiatives, the government expenditure in the development of ECEC in Korea has also increased. In the year 2012, government expenditure channeled to early child education support increased 32.4 percentage point compared to the previous year 2011. Along with significantly increased volume of government expenditure on ensuring access to and quality of early childhood education and care, it is considered a crucial mandate to strengthen accountability for public resources invested in ECEC as well as to improve effectiveness of ECEC services. This provides another reason to verify if Korea is equipped with an effective quality monitoring system to deliver the government's initiatives to improve quality of ECEC services.

The Comprehensive Development Plan to Promote the Advanced Early Childhood Education, introduced in the year 2009, aimed primary at providing high quality early childhood education while at the same time lessening the financial burden on the parents in enrolling their children in kindergartens. Under this plan, the government focused on increasing the number of kindergartens fostering the professionalism of the teachers as well as improving the working conditions of the staff at kindergartens. As mentioned earlier, following the introduction of the Nuri Curriculum for Age 5 in 2012, the government introduced the Nuri Curriculum, which is an integrated curriculum to be taught to all children aged 3 to 5 years enrolled in any ECEC services including kindergartens and childcare centers as a way to provide equitable access to high quality education to all children. With

the introduction of the integrated educational Nuri Curriculum for Ages 3-5 for both kindergartens and childcare centers, the services provided in the childcare centers catering to children of 3-5 years can be essentially considered educational services. Following the introduction of the Nuri Curriculum, the Five-Year Plan for Early Childhood Education Development focused on ensuring successful implementation of the Nuri Curriculum and building on the achievements produced by the Comprehensive Development Plan (Choi, 2016; MOE, 2019).

In Korea, access to ECEC services are closely related the government's efforts to tackle the world-lowest fertility rate. In 2006, the government initiated the "First Phase Plan for Low Fertility and Ageing Society" in order to address the low fertility rate (Presidential Committee for Ageing Society and Population Policy, 2006). Under this plan, the beneficiaries of financial allowance of ECEC was expanded to cover larger income brackets and electronic voucher system was established (Kojima, 2009; Matsumoto & Hashimoto, 2015). As part of this plan, in 2016, the Korean government obligated employers with more than 500 employees to operate on-site employer-supported childcare centers for employees as a way to facilitate workers' access to ECEC services and to ensure continued employment of working mothers. Economic prosperity of a country depends heavily on securing and maintaining high ratio of employment-to-population ratio and the growing number of women participating in the labor market has contributed to greater government investment in the ECEC services (OECD, 2016b, 2018a). In addition, adequate access to quality ECEC services and other support to ensure work-life balance provide mothers and fathers better opportunities to enter the job market and abilities to manage work and family responsibilities (OECD, 2017a). In this vein, the Korean government initiated the 3rd Phase of the Mid- to Long-Term Childcare Plan (2018 – 2022) beginning in 2018. As part of this Plan, the government will strengthen the mandate to operate employer-supported childcare centers, by lowering the threshold from companies with 500 or more employees to 300 employees or more. Also, as a way of improving the working conditions of the childcare teachers, the government will deploy 15,000 additional support teachers as substitute teachers. The government will also hire 700 additional substitute teachers (MOHW, 2019).

Such initiative by the government highlights the increasingly important role of childcare

centers in ensuring favorable childcare environment for working mothers so that they can continue their employment and have access to readily available childcare services. As childcare centers cater to children of all ages from 0 up to entrance to primary school – as opposed to kindergartens that are open to children from 3 years and above – they have impact over much larger number of children and families and makes access to these services more critical to working mothers who intend to return to work shortly after giving birth.

Along with mechanisms to ensure access to ECEC services, the Plan for Low Fertility and Ageing Society introduced in 2006 pledged to improve quality of ECEC services to in order to provide reliable childcare to parents. The quality of childcare centers as opposed to kindergartens has traditionally been of particular concern in Korea. In 2005, a survey found that the Korean public was unsatisfied with the quality of ECEC services, particularly ones that are provided by private institutions (Presidential Committee for Ageing Society and Population Policy, 2006). Such concerns have made it an important task to ensure efforts to improve service quality of childcare centers. Currently, the government has in place childcare center quality accreditation system which is separate from kindergarten quality accreditation system. The quality accreditation is operated on a voluntary basis and assesses childcare centers in four major domains – educational childcare curriculum & interactions, educational childcare environments & operating management, health and safety and staff.

Another important policy initiative currently underway within Korea's ECEC landscape, is the integration between early childhood education and early childhood care (Fujiwara, 2014). As mentioned earlier, the two streams or services – education and care – are governed by two different Ministries – Ministry of Education and Ministry of Health and Welfare. However, since 2012 when the Nuri Curriculum for Age 5 has been introduced for all children aged 5 years - followed by the Nuri curriculum for Ages 3 to 5 for all children aged 3 to 5 years - in both childcare centers and kindergartens, the traditional functions played by these two institutions have somewhat narrowed. Nevertheless, there still exists a wide range of legal and administrative differences between the governance of the two streams. For instance, there is controversy surrounding the competition between childcare centers and kindergartens in recruitment of children aged 3 to 5 years – the age

group that can be enrolled in both institutions. In 2013, under the initiative of the Ministry of Education, the Committee for Integration of Early Childhood Education and Care as well the working-level coordination bodies have been established in order to promote systematic policy coordination between related stakeholders in achieving the integration of the two delivery systems. The main objectives of the integration of early childhood education and care are; i) to provide equitable access to high quality ECEC to all children; ii) to ensure convenience, affordable prices and informed choices from the consumers' perspectives; iii) to promote social integration by minimizing the potential conflict among the related stakeholders; iv) ensuring adequacy and efficiency in the government expenditure; and v) establishing channels of policy coordination among related ministries. The working-level coordination bodies then set out to collect the opinions and demands from the parents and to identify the major sources of conflict among the stakeholders to ensure gradual implementation of the integration (KICCE, 2016; Choi, 2016).

Under the leadership of the Committee for Integration of Early Childhood Education and Care, the delivery and administrative systems of the two lines of institutions will be gradually integrated while the categories of institutions within each delivery system will also be streamlined. That is, the existing 3 types of kindergartens (national, public and private) will be narrowed to public and private, while the existing 7 types of childcare centers (public, social welfare cooperation, corporations, private, family-based childcare, parent cooperation, employer-supported) will be categorized into 3 types – public, private/employer-supported/others, and family-based childcare centers. In addition, integration of governing ministries, financing sources, governing laws, monitoring and evaluation measures, teacher training, comprehensive information system will be carried out. The following measures aimed at integrating the delivery and administration system of childcare centers and kindergartens have been implemented under the integration initiative.

Table 2-7: Integration of ECEC Delivery System by Stages (2014-2016)

Year	Objective	Policy actions taken
2014	Overall administrative system	• Focus placed on implementing preliminary administrative measures to prepare for the integration • Expansion, coordination and integration of the information disclosure system for enrollment fees, extracurricular activities, meal plans, etc. • Preliminary measures to integrate the quality accreditation system for kindergartens and childcare centers • Development of commonly applied financial and accounting regulations for the two institutions
2015	Regulatory adjustment and coordination	• Coordination of the payment system for the enrollment fees at the two institutions • Coordination of the facilities and environmental regulations including the size of classrooms, child-teacher ratio, etc. • Coordination of the service hours, integration of educational curriculum
2016	Integration of financing and working conditions	• Phase-in provision of support to ensure balance in the working conditions for staff in kindergartens and childcare centers • Phase-in integration of financing sources for the governing ministries - Ministry of Education and Ministry of Health and Welfare - Local Offices of Education and Municipalities

Source: Created by the author based on KICCE (2016); Choi (2016)

2.3. Nuri Curriculum

In 2012, the Nuri Curriculum for 5 year-olds was implemented, integrating the curriculum and subsidies for the two institutions. Prior to the introduction of the Nuri curriculum in 2010, Korea witnessed increasing demand for early childhood education and care and social issues related to ECEC provision. First of all, in the year 2010, the fertility rate in Korea reached the historic low, recording 1.22 children per woman (Statistics Korea, 2019). Demographic changes caused by significantly low fertility rate can bring about a number of social issues as the decrease in the size of the productive workforce, increase in the number of aged population and accompanying social costs. Growing costs paired by parents to enroll their children in early childhood education and care services was one of the primary reasons that caused low fertility rates in Korea (MOEST & MOHW, 2012). Also, in 2010, approximately, 90 percent of children were enrolled in early childhood education and care facilities –

kindergartens or childcare centers. And the remaining 10 percent of children were not receiving any benefits, which led to voices calling for enhanced government subsidies to make ECEC services more accessible and affordable. In addition, government expenditure for pre-primary education is on the rise. In 2011, the proportion of government share of ECEC expenses for OECD countries on average was 79.7%. The proportion in advanced countries were higher compared to emerging and developing countries – France (94.0%), Finland (90.6%), United Kingdom (86.1%), United States (77.8%). However, the proportion in Korea stayed at 49.7%, calling for higher government expenditure in ECEC (MOEST & MOHW, 2012; OECD, 2014a). By law, the government of Korea claims the responsibility to provide free education and childcare to children in the last year before entering primary education. However, by the year 2011, the government only covered partial expenditure for education and childcare and the benefits only covered families in the lower 70% of the income bracket. Calls for quality education that can be accessed through both kindergartens and childcare centers were also growing in order to ensure that all children can benefit from an equal start (MOEST & MOHW, 2012). Against this backdrop, the Korean government introduced the Nuri curriculum for Age 5 in the year 2012. Under this new program, kindergartens and childcare centers still remain under the jurisdictions of separate government agencies – Ministry of Education and Ministry of Health and Welfare – but began to use the integrated curriculum that was developed to be taught to all children of age 5 enrolled in both kindergartens and childcare centers.

In 2013, the beneficiaries of Nuri Curriculum were extended to children of age 3 and 4. Under the Nuri Curriculum, all children of ages 3 to 5 now follow the integrated curriculum and early childhood education allowance - for kindergartens - and childcare allowance - for childcare centers – were provided to children from all income brackets. Parents pay the outstanding charges after the allowances have been deducted from the user fees charged.

Table 2-8: Changes in ECCE financing under the Nuri Curriculum

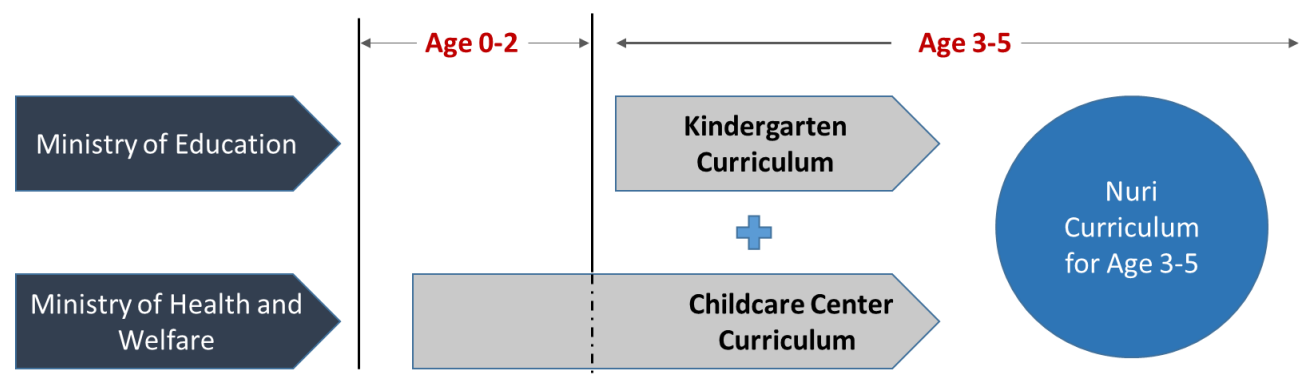
Category	2011	2012	2013 – Present
	Pre-Nuri Curriculum	Nuri Curriculum for Age 5	Nuri Curriculum for Ages 3-5
Recipient of Allowance	Ages 3-5: Children from lower 70% of income bracket enrolled in kindergartens or childcare centers	Age 5: All children enrolled in kindergartens or childcare centers Ages 3-4: Children from lower 70% of income bracket	Ages 3-5: All children enrolled in kindergartens or childcare centers
Amount of Allowance	Age 4-5 (KRW 177,000, USD 151) Age 3 (KRW 197,000, USD 169)	Age 5 (KRW 200,000, USD 171) Age 4 (KRW 177,000, USD 151) Age 3 (KRW 197,000, USD 169)	Age 3-5 (KRW 330,000, USD 221)

Source: Created by the author based on KICCE (2012)

Note: All allowances are paid on a monthly basis.

As shown in Table below, the Nuri Curriculum consists of two curriculum documents – Nuri Curriculum’s Curriculum Manual and Teachers’ Guidelines. The curriculum manual depicts the learning goals and content of the five learning areas – physical activities and health, communication, social relationships, art experience and exploring nature – and teachers’ guidelines places strong emphasis on promoting high quality education through effective teacher-child interaction.

Figure 2-3: The Age Coverage of the Nuri Curriculum



Source: Created by the author based on KICCE (2013)

Nuri Curriculum consists of different domains that are further divided into more detailed learning objectives and behavior markers. Largely, the curriculum encompasses five large segments : 1) developing major physical abilities as well as establishing safe yet healthy daily habits; 2) learning ways to communicate and to use language properly; 3) strengthening self-respect and learning ways to live with others; 4) nurturing interest in art and learning methods to express oneself in creative ways; and 5) learning about the world and developing abilities to solve challenges through mathematics and science (MOEST & MOHW, 2012). Further explanations on the more detailed learning objectives and behavior markers are explained in the Annex. Throughout these segments, the underlying objectives of the Nuri Curriculum is character education, and linkage to primary education (Choi & Lim, 2013). Character education, in the context of Nuri curriculum, refers largely to self-respect and socioemotional skill (Choi & Lim, 2013).

Table 2-9: Learning Content for Each Domain of the Nuri Curriculum for Ages 3 to 5

Domain	Physical Activity & Health	Communication	Experience in Art	Social Relationships	Nature & Discovery
Learning Content	Physical self-awareness	Listening	Discovering beauty	Building self-esteem	
	Motor control & basic exercise	Speaking	Expressing self through art	Understanding others and self-awareness	Promoting inquisitive attitudes
	Participation in physical activities	Reading	Appreciating arts	Cherishing family	Mathematical exploration and inquiry
	Healthy living habits	Writing	-	Living in harmony with neighbors	Scientific exploration and inquiry
	Safety habits	-	-	Stimulating interest in society	-

Source: Created by the author based on MOEST & MOHW (2012); KICCE (2013)

In addition to the Nuri curriculum, there is a document called the Teacher Guidelines which is a complementary curriculum document for the Nuri Curriculum. The behavior sets out behavioral guidelines for teachers to execute throughout their teaching activities. The purpose of these guidelines is to encourage to teachers to abide by the guidelines to serve the purpose of the Nuri curriculum,

which is to provide high quality education and care to all children aged 3 to 5 years enrolled in ECEC centers in an equitable manner. These standards that are used to guide the teachers in classrooms also used as assessment criteria for the quality accreditation. The Nuri Curriculum Teacher Guidelines stipulates the following recommendations:

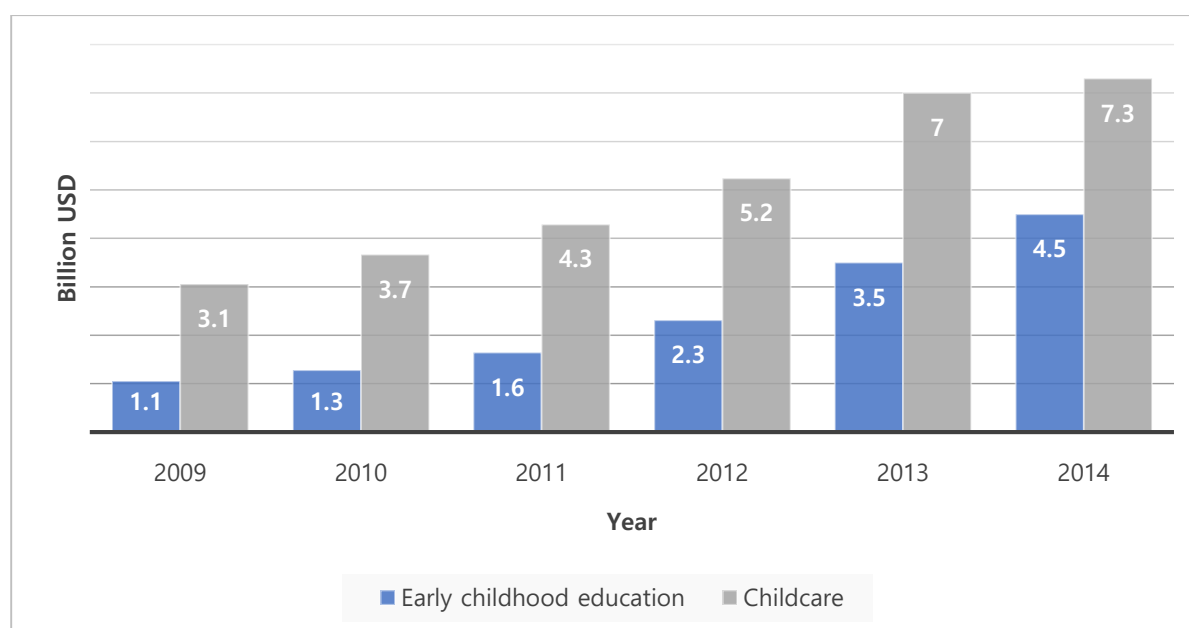
- i) Teachers shall teach children according to the Nuri curriculum for at least three to five hours per day;
- ii) Teachers shall ensure equal distribution of the five domains of the Nuri curriculum, focusing particularly on the development of daily habits and character skills;
- iii) Teachers shall plan children's experiences and activities based on the differing development stages of each child;
- iv) Teachers shall design the activities and contents resorting to a certain level of flexibility to reflect the characteristics of individual classes;
- v) Teachers shall develop activities using both indoor and outdoor spaces;
- vi) Teachers shall operate the curriculum based on yearly, monthly, weekly and daily education and care plans;
- vii) Teachers shall execute the curriculum without any prejudices against individual children, in terms of their gender, religion, physical conditions, family and ethnical background;
- viii) Teachers shall develop diverse parental education programs depending on the characteristics of parents and communities;
- ix) The Nuri curriculum is based on cooperation and participation among families, early childhood education and care institutions and local communities;
- x) The Nuri curriculum takes into account children's disabilities and abilities;
- xi) Teachers shall strive to further improve early childhood education care by participating in teacher meetings, field research, and community training;

- xii) Teachers shall attempt to identify the challenges of the Nuri curriculum through self-assessment and attempt to reflect the improvements in the following semester;
- xiii) Teachers shall reflect the cross-curricular subjects in overall curriculum; and
- xiv) Teachers shall be prepared to pursue higher levels of educational contents and consider the continuity of learning between early childhood and primary education.

2.4. ECEC Financing

Korea's government expenditure in ECEC has been increasing during the recent years, although compared to advanced countries and OECD average, the level of government spending is considered relatively low. Globally, government spending in early childhood education and care has increased across the developed world recognizing that sustainable public financing for this sector is crucial to facilitating equitable access and quality of the services. Public expenditure in ECEC took up about 0.8% of GDP on average in the developed economies, 0.6% of which was allocated to pre-primary schooling. Government spending takes up 83% of total financing provided to pre-primary education and 71% of resources for ECEC among the OECD countries. The numbers go up to about 90% in Finland and Sweden (OECD, 2017). Such differences among countries with respect to public expenditure in ECEC may be attributed to enrolment rates and disparities in the starting age for primary education. It can be said that high public spending in ECEC services in developed nations is associated with high enrolment rate. As mentioned, Korea's public expenditure in ECCE has been growing during recent years. Figure 2.1 shows that public expenditure in ECCE has been growing steadily in Korea during the past few years, focusing on the transition period of pre-Nuri and post-Nuri periods. It can be noted as well that the government spending in ECEC is divided into expenditure in early childhood education and childcare due to different jurisdictions.

Figure 2-4: Changes in Korea's ECCE Budget (2009-2014) (Billion USD)



Source: Created by the KICCE. (2015); Joo (2015)

Table below shows the percentage of ECCE in the total education budget and national income as well as ECCE expenditure as percentage of GDP have been on the increase during the transition periods of before and after the introduction of the Nuri Curriculum.

Table 2-10: Government Expenditure in ECCE in Korea (1 million USD, %)

Total Amount of ECCE budget					
Year	2010	2011	2012	2013	2014
Amount	5504	7138	8239	11436	12528
ECCE as % of education budget					
Year	2010	2011	2012	2013	2014
%	17.14	20.26	21.29	26.97	29.00
ECCE as % of national income					
Year	2010	2011	2012	2013	2014
%	2.26	2.71	2.86	3.78	4.05
ECCE as % of GDP					
Year	2010	2011	2012	2013	2014
%	0.52	0.64	0.71	0.96	1.01

Source: Created by the author based on KICCE. (2015); National Assembly Budget Office (2019)

Note: USD 1 = KRW 1,193

Since 1991, Korea's education began to operate under a decentralized system, where local education is governed by Local Offices of Education (LOEs) headed by Superintendents. The LOEs depend on the central budget for 70.4% of its resources, a majority of which is subsidized in the form of local education grants. Such financial structure is conducive to maintaining financial equity among regions in order to ensure equitable educational development across nation (Yoon, 2015).

Table below shows absolute amounts of each source of Korea's ECCE budget as well as their percentage in the total budget during the transition periods of before and after the introduction of the Nuri Curriculum. The data collected implies that the percentage of central expenditure in the total ECCE budget is growing while private expenditure is decreasing. This reflects the government's continuous efforts to expand public expenditure in financing early childhood care and education. It should also be noted here that local education grant was calculated as part of the central budget as its original source is the central government. Private expenditure includes investment by private entities and household expenditure, although the breakdown of detailed sources and amounts invested from each source are not readily available.

Table 2-11: Composition of Korea's ECCE Budget by Source: 2010-2014

	2010	2011	2012	2013	2014
% of Central Budget	55.2	51.7	58.3	60.7	70.8
% of Local Budget	10.3	11.1	12.4	8.0	7.4
% of Other Sources including Private Expenditure	34.4	37.2	29.2	31.3	21.8
Amount of Central Budget	3041	3690	4806	6946	8867
Amount of Local Budget	569	791	1024	911	927
Amount of Private Expenditure	1894	2658	2409	3579	2734
Amount of Total ECCE Budget	5504	7138	8239	11436	12528

Source: Created by the author based on KICCE. (2014); KICCE. (2015)

Unit: 1 million USD (%)

Note 1: USD 1 = KRW 1,193

Note 2: It should be noted that, in some cases, local budget funding invested in local activities include portions from central budget, but it is difficult to estimate the exact percentage of central budget investment in these activities.

Table below shows the composition of ECCE budget for 2014, indicating that more resources were invested in childcare compared to early childhood education and that the largest proportion of investment among the total ECCE budget was allocated to fund childcare allowances.

Table 2-12: Distribution of Korea's ECCE Budget by Usage (%)

Early Childhood Education (36%)				Childcare (57%)			Other (7%)
Salary	Early Childhood Education Allowance	Curriculum	Operation and Facilities	Salary	Childcare Allowance	Operation, Facilities, Certification, Others	Other
6%	3%	23%	4%	8%	46%	3%	7%
Total (100%)							

Source: Created by the author based on KICCE (2015)

Unit: 1 million KRW

Note 1: Personnel Cost for kindergartens includes salary for salary for regular and contractual personnel (for public kindergartens) and training and welfare cost (for private kindergartens).

Note 2: Childcare allowance (for childcare) includes childhood cash transfer, childhood allowance for ages 0-2 and childhood allowance under the Nuri Curriculum further explained in Table 2.1-3.

In Korea, all children enrolled in ECCE institutions – kindergartens and childcare centers - are eligible to receive early childhood education allowance and childcare allowance respectively that are financed solely by local education grant. Table 2-13 below indicates recent changes that took place in ECCE financing for children of ages 3-5 enrolled in kindergartens or childcare centers. In 2011, before the introduction of the Nuri Curriculum, parents from lower 70% income bracket received i) early childhood education allowance for children (ages 3-5) enrolled in kindergartens or ii) childcare allowances for children enrolled in childcare centers. As shown in the table, with the introduction of Nuri Curriculum, Nuri allowances were provided to parents of all income brackets whose children (age 5) are enrolled in kindergartens or childcare centers. The benefits were extended to children of ages 3-5 from 2013.

Table 2-13: Types of Government Subsidies Provided for ECEC services

Type of subsidy		Beneficiary	Source of Finance
Childcare Cash Transfer (<i>Yang-yuk Sudang</i>)		All children of 0-84 months, not enrolled in kindergartens nor childcare centers	Ministry of Health and Welfare
Childcare Allowance for Children of Ages 0-2 (<i>Yong-Yoo-Ah-Bo-Yuk-ryo</i>)		All children of ages 0-2 enrolled in childcare centers (Ages 3-5 years are automatically subsidized by Nuri curriculum)	Ministry of Health and Welfare
Nuri Allowances	Early Childhood Education Allowance (<i>Yu-ah hakbi</i>)	All children of ages 3-5 enrolled in kindergartens	Local Education Grant (Transferred to Local Offices of Education by the Ministry of Education)
	Childcare Allowance (<i>Bo-yuk-ryo</i>)	All children of ages 3-5 enrolled in childcare centers	

Source: Created by the author based on MOHW (2019b)

Korea's government expenditure for ECCE is composed of funding from the Ministry of Education, Ministry Health and Welfare and Local Offices of Education. Ministry of Education (MOE). MOE transfers local education grants to 17 Local Offices of Education (LOEs) every year in order to finance early childhood education, primary and secondary education. The grant for 2016 was approximately KRW 41 trillion, which increased 4.6% from 2015. The LOEs then distribute the grants among different levels of education and local education projects. Ministry of Health and Welfare (MOHW). MOHW provides Childcare Cash Transfer and Childcare Allowance for children of ages 0-2 that are further explained in Table 2-13.

Local Offices of Education. LOEs have three sources of financing – local education grant (70.4%) – that is funded by MOE and implemented by LOEs, local budget transfer (17.8%) and local government income (11.8%), indicating that local education finance is heavily dependent on transfer from central to local budget. From 2015, LOEs are obligated to allocate local education budget to cover 100% the Nuri allowances (National Assembly Budget Office, 2019). Nuri allowances are

divided into early childhood education allowance and childcare allowance. The fact that local education grant provided by MOE now finances 100% of Nuri allowances means the MOE budget is used to cover childcare, which in principle falls under the jurisdiction of MOHW. Nuri Curriculum was financed by all three sources in the initial stage but starting from 2015 is unilaterally subsidized by local education grant. The transition was made gradually since 2012 when the grant covered all of age 5, part of ages 3-4 years plus all of age 5 in 2013-2014, and all of age 3-5 from 2015 (MOE, 2012). The changing composition of the Nuri Curriculum focusing on the key transition years of 2013 to 2015 is illustrated in Table 2-14.

Table 2-14: Budget Composition for the Nuri Curriculum (2013-2015)

	Central Budget Transfer	Local Budget Transfer	Local Education Grant
2013	11.29%	11.43%	77.24%
2014	7.62%	4.04%	88.34%
2015	0%	0%	100%

Source: Created by the author based on Statistics Korea (2019)
Unit: %, 100 million KRW

The Korean government has been expanding ECCE budget during the past few years, although there remains room to further strengthen adequacy of its ECCE financing. Equity in financing is an important element in Korea's state-provided allowances which benefit children from diverse age groups regardless of income level, region of residence and the type of ECCE institution. Sustainability of ECCE financing is an increasingly important yet challenging issue as public demand for increased government support has been voiced. In particular, with the increasing female participation in the labor market, it is envisioned that demand for affordable and high quality ECEC services, which warrants efforts to ensure sustainable ECEC financing for the future.

Budget Preparation. Korea's ECCE subsidies are mainly financed by local education grant transferred from the MOE budget. In order to understand the budget preparation under Korea's ECCE,

it is useful to understand Korea's national budget formulation process and the local education grant formulation process illustrated in Table 2-15.

Table 2-15: Central Budget Preparation Process

Process	Task	Deadline
Budget Planning (Ministry of Strategy and Finance)	Ministry of Strategy and Finance delivers the guidelines on the national finance management plan to central government Ministries	December 31 of the previous year
	The Ministries submit their budget requests to MOSF	May 31
	MOSF complies the budget requests and drafts the budget proposal	June-August
	MOSF submits the budget proposal to the National Assembly	120 days before the start of fiscal year
Budget Review (The National Assembly)	The Standing Committee in charge of budget conducts preliminary review	The process concludes 30 days before the start of fiscal year (Approximately December 2)
	The Special Committee for budget conducts comprehensive review	
	The plenary session reviews and passes the budget proposal	
Budget Implementation	MOSF allocates budget according to the approved proposal to the Ministries	
	The Ministries re-allocates budget to the affiliated organizations	
	Following the causative acts of expenditure, MOSF allocates the funds	
Settlement and examination of accounts	After budget implementation, Ministries submits settlement reports to MOSF	End of February
	MOSF compiles the settlement reports and submits to the Board of Audit and Inspection	April 10
	The Board of Audit and Inspection reviews the report and sends the results back to MOSF	May 20
	MOSF submits the settlement report to the National Assembly	May 31
	The National Assembly reviews and passes the settlement report	-

Source: Created by the author based on Yun (2015)

The local education grant is formulated according to the Local Education Grant Act. The grant is funded by 20.27% of the domestic taxes. It is divided into general grant and special grant. Local education grant accounts for 60% of the special grant and is disseminated by the Minister of Education. The usage and changes of usage of the local education grant needs to be approved by the Minister of Education (Ministry of Government Legislation, 2015).

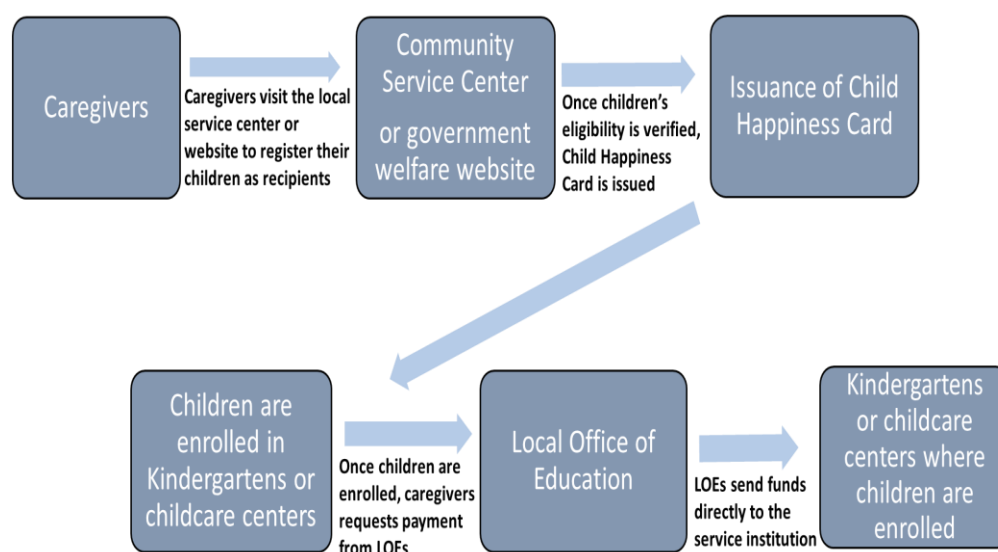
Budget Allocation. Government's central budget for ECCE is allocated to 17 Local Offices

of Education (LOEs) in the form of local education grant, and are distributed by LOEs to fund various ECCE activities and allowances. The largest percentage of government budget for ECCE is disbursed to parents in the form of childcare cash transfer, early childhood education allowance and childcare allowance.

Childcare cash transfer. Parents need to register their children as beneficiaries at a local service center or by visiting a government-run welfare allowance claim website (“bokjiro online shin-chung”). Once their children’s eligibility is verified, the funds are deposited directly into parents’ bank accounts on the 15th of every month (MOHW, 2019b).

Nuri Allowances. Under the Nuri curriculum, early childhood education allowance and childcare allowance are disbursed through Child Happiness Card (“I-hangbok Card”). Parents can visit the local community service center or visit the Welfare Allowance Claim Website in order to register their children as recipients. Once the child’s eligibility is verified, the Child Happiness Card is issued. The card serves as both an identification of the child’s eligibility as well as a debit/credit card to: i) request the payment of allowance; and ii) pay the parents’ share. Once parents register their child at a kindergarten or childcare center, and after the child’s eligibility is validated using the card, parents can request to receive the allowance by swiping their Child’s Happiness Card in the card reader at the service institution. This sends the payment request to the local office of education and the funds are sent directly to the ECCE institution where the child is enrolled. Parents can then pay the parents’ share using the same card or with different means. Payments process can also be conducted via Kindergarten Information System website or Childcare Portal (“I-Sarang”) Website (MOHW, 2019c). This disbursement process is illustrated in the figure below.

Figure 2-5: Allocation for Early Childhood Education Allowance



Source: Created by the author based on (MOHW, 2019c)

Budget Monitoring and Auditing. As mentioned in Section 2.2.1., the portion of ECCE budget that is subsidized by the central government is monitored and audited as part of the central budget management process. The monitoring and auditing of local education grant, which is the sole financing source of the Nuri Curriculum is governed by the Local Education Grant Act. Under this Act, the Minister of Education holds the authority to allocate the local education grant as a special grant. If the local offices of education intend to use the grant for purposes other than previously approved, they need to consult and receive authorization from the Minister of Education. However, in the process of implementation, the local education grant is not subject to monitoring and auditing by the National Assembly or the Board of Audit and Inspection of Korea (Yoon et al., 2015).

Existing innovative financing and partnerships for Integrated ECEC. Growing demand for ECCE services is a shared phenomenon in a number of countries in the Asia including in Korea. Many education systems are exploring alternative funding sources and partnerships to ensure continued affordable access to ECCE. Such alternative funding and partnership measures are understood as “innovative financing mechanisms and partnerships” in the general context. Although the notion of innovative financing and partnership has not been established in Korea yet, this section will identify

the innovative features of Korea's ECCE financing that are unconventional yet effective, which have not yet been explored widely in the international context.

Nuri Allowances – Innovative Financial Partnership. Nuri curriculum provides integrated curriculum for children of ages 3-5 years and unified allowances for both kindergartens and childcare centers that are governed by two different Ministries – Ministry of Education and Ministry of Health and Welfare. From 2015, Nuri allowances are funded 100% with local education grant paid by the Ministry of Education, implying that MOE resources are used to finance facilities under the auspices of MOHW. Such financial arrangement signals a strong innovative financial partnership between the two government agencies as the first step towards integration of the two ECCE systems.

2.5. Quality of Early Childhood Education and Care in Korea

The quality of early childhood education and care in Korea is not systematically defined, although the quality of ECEC holds particular importance for Korea. For economies like Korea which has significantly low fertility rate, high quality early childhood education and care is particularly important as it can help ensure continued employment of working mothers in the labor market, help increase household income particularly to low-income households. Although there are no official definitions of ECEC, the Korean government recognizes the sets of definitions accepted internationally in the ECEC community as shown in the table below.

Table 2-16: Recognized Concept of ECEC Quality in Korean Policy Documents

Structural quality (=Distal features)	● Classroom settings (space, teacher-student ratio) ● Teacher qualifications ● Family situation (parents' working status)
Process quality (=Proximal features)	● Teacher-child interaction ● Program structure and organization ● Parents' understanding and cooperation ● Teachers' satisfaction level and workload

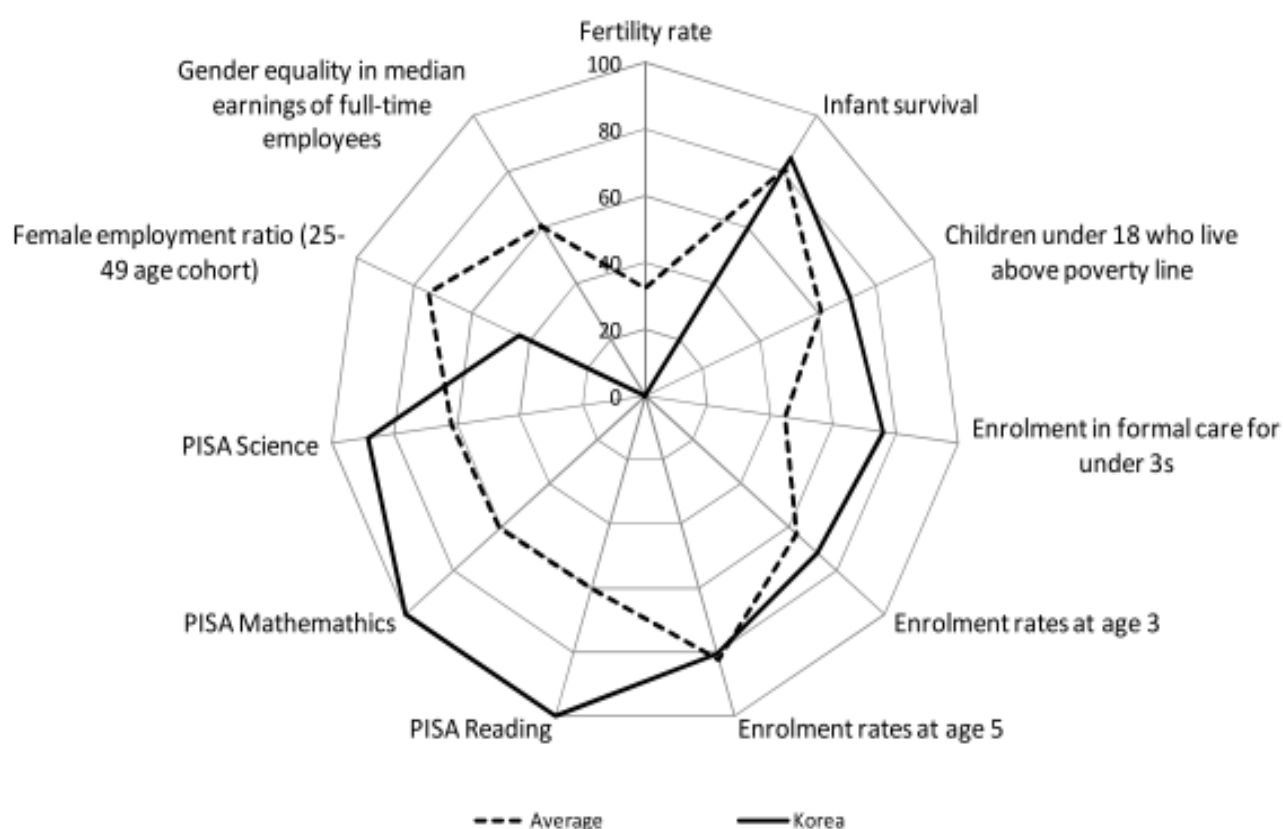
Source: Created by the author based on KICCE (2013); (Jang & Song, 2014)

Korea's ECEC authority has attempted to assess the quality of ECEC in Korea according to the policy levers accepted by the international ECEC community as well as the streams of structural quality and process quality aspects. In 2012, the Korean government and OECD conducted overall analysis of the quality of early childhood education and care in Korea. The report defined structural quality as "input" elements that form the structure of ECEC environment such as the quality of ECEC facilities and community where they belong. Process quality refer to the direct experiences that children build through the programs of ECEC facilities. Such experiences are known to exercise significant impact on the development and health of children. OECD has also suggested five policy levers that can be considered to assess the quality of ECEC (MOEST & KICCE, 2012; Taguma et al., 2012).

- i) Establishing goals and regulations on quality;
- ii) Developing and implementing the curriculum and learning goals;
- iii) Increasing teacher qualifications and training as well as working conditions;
- iv) Participation of families as well as communities; and
- v) Collection of data, research activities and monitoring.

In terms of government policies and relevant indicators related to ECEC, Korea has scored close to or higher than OECD average in infant survival rate, proportion of children living above poverty line, enrolment rate in ECEC facilities of children under the age of 3, and between the ages of 3 and 5, and PISA scores in reading, mathematics and science. However, Korea scored lower than OECD average on fertility rate, women's employment rate, and gender disparities in the wages of regular employees (MOEST & KICCE, 2012; Taguma et al., 2012).

Figure 2-6: An overview of policy outcomes across sectors in Korea



Source: Taguma et al. (2012, 13)

In addition, in terms of staff qualifications, the minimum level of education required in Korea, which is ISCED level 3 – upper secondary education - is largely in line with that of other OECD countries in general. For teaching positions in pre-primary education, the level required is ISCED level 5 – short cycle tertiary education – which is slightly higher qualification than average OECD countries (UNESCO Institute for Statistics, 2012). In terms of staff-child ratio for children aged zero to three years, Korea ranked similar to OECD. However, the staff-child ratio in classrooms for children aged three to six years is below OECD average. This means that in Korea's ECEC institutions, each staff member is responsible for a relatively larger number of children than other countries (Taguma et al., 2012; Choi, 2016).

The Ministry of Health and Welfare imposes a set of operation regulations for all childcare

centers to follow, including child-teacher ratio. The Childcare Centers Operation Guidelines, based on the Implementation Regulations under the Child Care Act, recommends the teacher-child ratio of 1:5 for classrooms of three year-olds and 1:15 for classrooms for four and five year-olds (MOHW, 2018). It can be noted here that the teacher-child ratio, especially for classrooms of four and five year-olds are significantly higher than classrooms for lower ages. Moreover, in comparison with the average ratio reported in a meta-analysis to investigate the classroom characteristics on ECEC classroom quality (1:8.6), these numbers are significantly high (von Suchodoletz et al., 2014).

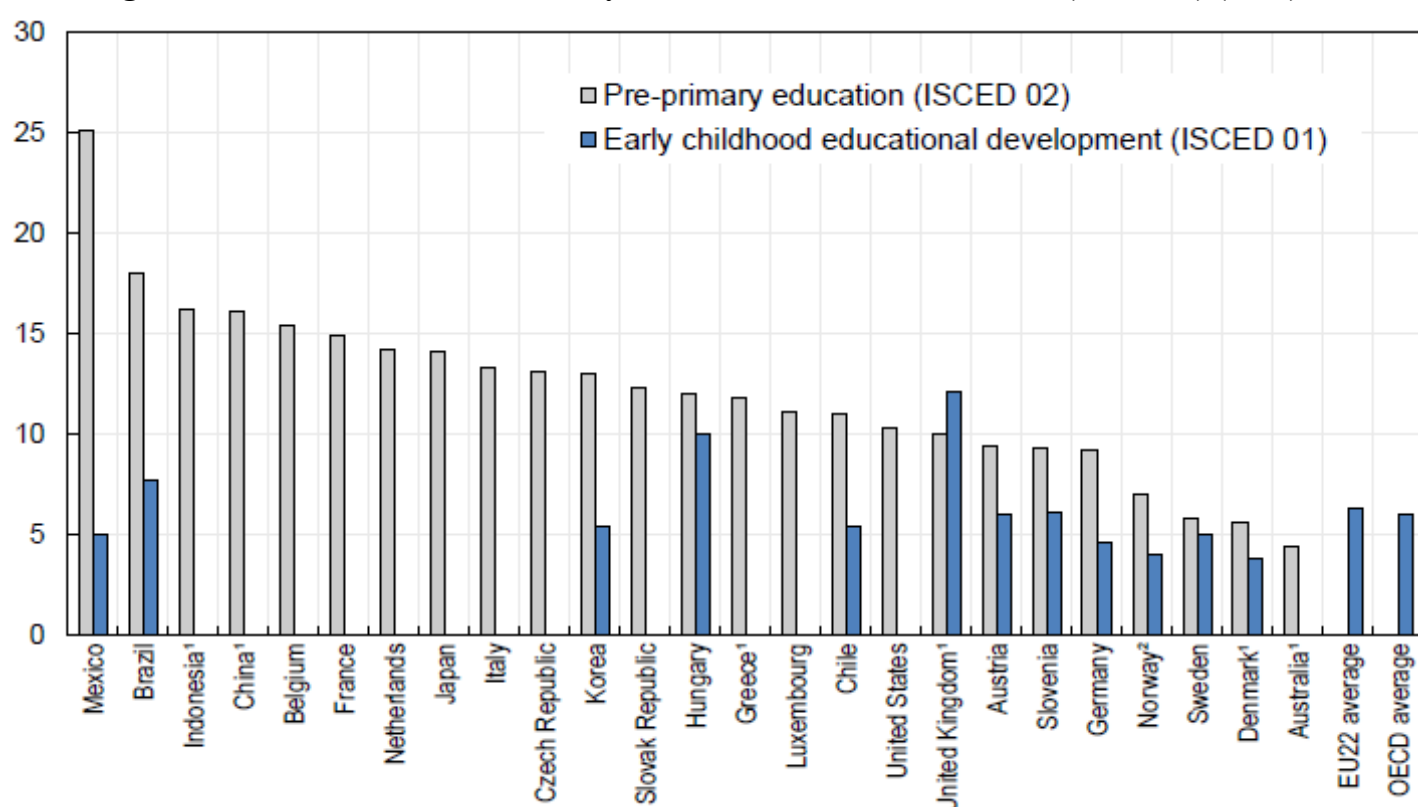
Table 2-17: Implementation Regulation on Child-Teacher Ratio in Korean Childcare Centers

Age range	Below age 1	1 year-olds	2 year-olds	3 year-olds	4 year-olds	5 year-olds and above
Ratio	3:1	5:1	5:1	5:1	15:1	15:1

Source: Created by the author based on MOHW (2018)

Internationally, there exist differences in terms of child-teacher ratio, as shown in the figure below. It can be seen that Korea's child-teacher ratio for younger children categorized as ISCED 01 is at 5:1 which is lower than OECD average which is slightly over 5:1. For older children falling under the category of ISCED 02, Korea's child-teacher ratio falls slightly under 15:1 - as the data also includes teaching assistants – which, from the figure below, appears to be close to average – although the OECD average is not indicated in the figure due to incomplete data. It should be noted, however, some advanced countries recorded significantly lower child-teacher ratio even for older children. For instance, countries like Germany, Norway Sweden, Denmark and Australia reported having the child-teacher ratio slightly or much lower than 10:1.

Figure 2-7: Child-Staff Ratios in Early Childhood Education and Care (ISCED 0) (2015)

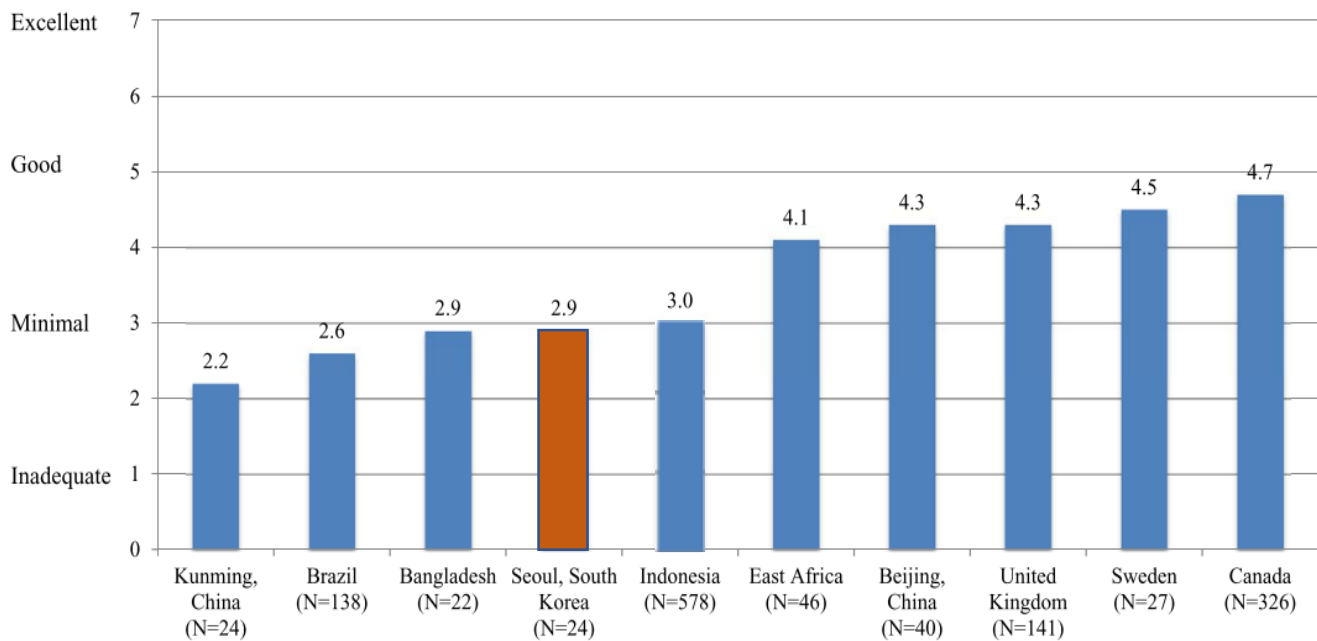


Source: OECD (2018, 42)

Notes: 1. Year of reference is 2014. Countries are ranked in descending order of child-staff ratios in pre-primary education.

Apart from the past research which found relatively unfavorable aspects of Korea's ECEC quality, other studies have also found evidence that pointed to negative status of quality measured on international assessment tools. Vermeer et al. (2016) and Brinkman et al. (2016) concluded, in the comparative study on the quality of ECEC in five geographic regions and 23 countries, that the countries that performed relatively low on the score of Early Childhood Rating System (ERS), the Environment Rating Scales (Harms & Clifford, 1983) were Bangladesh and Korea. Unfortunately, Korea's data was based on a study conducted in 2009 against 24 ECEC centers and Korea scored lower than the mean score of 3 on ERS which is a 7-likert scale assessment (Sheridan et al. 2009; Vermeer et al. 2016; Brinkman et al. 2016).

Figure 2-8: Average Early Childhood Rating System (ERS) Score across Settings



Source: Brinkman (2016, 28)

Note: N is the number of classrooms of ECEC centers observed

In addition, the quality of childcare facilities in Korea was also under question. A series of child abuse cases were reported in certain childcare centers which led to concerns about the overall protection of child rights in childcare facilities (Kim et al., 2018^[2]). Despite the stipulations in the Child Care Act revised in 2005 obliging childcare centers to step up health, nutrition and safety measures, studies show that childcare centers were not complying fully with the policy requirements to ensure child rights. In terms of the types of childcare facilities, it is shown that childcare quality and protection of child rights was more strongly secured in national, public, and corporate childcare centers compared to privately run childcare centers (Yoo, 2012). The current quality assurance measures for childcare centers depend largely on Childcare Guidelines (MOHW & KCPI, 2018).

Academic evidence has been growing with regards to the quality of early childhood education and care in Korea since the 1980s. In the early years, researchers established the groundwork for assessment of early childhood education institutions (Hwang & Lee, 1995) and investigated the impact of the quality of ECEC institutions on the development of children (Ahn, 1994). In the recent

years, the discourse began to include research into more systematic assessment of early childhood education and care services beginning in the 2000s (Lee et al., 2002). In more recent years, research began to study the effect of the quality of early childhood education and care facilities in Korea on the development of children's school readiness, cognitive skills and the acquirement of knowledge based on the Nuri curriculum (Kim, 2013^[8]; Bhang & Chung, 2015). Studies also began to distinguish structural and process aspects of the ECEC quality. Research found that the process quality of early childhood education and care measured by teacher-child interaction has significant positive association with children's school readiness (Bhang & Chung, 2015) and that both structural and process quality had positive impact on children's acquirement of knowledge taught by the Nuri curriculum (Kim, 2013^[8]).

2.6. Teacher-Child Interaction

The role of teacher-child interaction is imperative as it helps develop communication skills of children during the early years during which their linguistic skills grow most rapidly. Children learn to form new knowledge and skills through teacher-child interaction and peer interaction. Children learn new values proactively through cognitive and emotional interactions (Mashburn et al., 2008; Kim, 2013^[8]; Bhang & Chung, 2015). The Nuri curriculum introduced in 2012, clearly reflects increased focus on teacher-child interaction and child's character education among other education objectives (MOE and MOHW, 2012). The Teacher Guidelines which is a complementary curriculum document for the Nuri Curriculum lays out specific behavioral guidelines for teachers to follow. Teachers are encouraged to follow the guidelines for the purpose of providing high quality education and care to all children enrolled in both kindergartens and childcare centers in an equitable manner (MOEST & MOHW 2013b). These guidelines place a strong importance on teacher's interaction with children. Some examples of guidelines encouraging teacher-child interaction are depicted as part of the teacher guidelines to help teachers to initiate effective interactions (see Table A-4 in Annex). In short, teachers are encouraged to initiate effective teacher-child interaction when teaching all domains of the Nuri curriculum as a way to facilitate effective learning and development.

2.7. Quality assessment through Quality Accreditation

In order for high quality early childhood education and care practices to be settled, it is important to establish effective assessment system and set the right directions. Monitoring and evaluating the quality of ECEC institutions is a paramount instrument in improving the quality of the services (Choi, 2016). In order to carry out monitoring and evaluation, it is necessary to study the strengths and weaknesses of the service center and based on the findings, adequate support can be provided to the teachers to eventually benefit the wellbeing of the children (OECD, 2015). Studies shows that monitoring and evaluation activities have contributed to the tangible improvement of the programs and the classroom quality.

Recognizing that quality assurance through such monitoring and evaluating practice can ensure that children's rights are protected and they are provided with high quality education, the Korean government developed Childcare Center Quality Accreditation in 2003, established the legal framework in place in 2004, and executed the pilot program in 2005. Since the year 2006, the Quality Accreditation has been in full swing. The first round of the accreditation ended in 2009 followed by the subsequent rounds from 2010 (Choi & Cho, 2016). The purpose of Childcare Center Quality Accreditation is to provide the status of accredited childcare centers to the facilities that have demonstrated the level of quality that meets the established standards. The accreditation also provides an opportunity for the institutions to self-assess their services and to improve accordingly in the process of accreditation (KCPI, 2018). Such exercise is an important tool to ensure quality particularly in Korea where definition of ECEC quality is not established yet as observed by the OECD. It is recognized that Korea does not currently have a set definition of the quality of ECEC at the national level. However, quality indicators of ECEC have been developed for quality accreditation of ECEC setting, referring to environmental elements, curriculum, teacher-child interactions, health and safety, as well as management (OECD, 2016).

More detailed objectives of this quality accreditation exercise are as follows:

- i) To ensure quality improvement of childcare facilities in order to provide children a safe

childcare environment;

- ii) To improve the quality of childcare center services and to increase professionalism of the head teachers, teachers and staff members;
- iii) To provide adequate information about the service quality of the childcare centers in order to give an opportunity to the parents to make informed decisions about how to choose childcare centers; and
- iv) To facilitate the support and management system of the government over childcare center settings.

Childcare quality accreditation system has contributed to increased quality level of childcare facilities (MOHW & KCPI, 2018). Approximately 80% of all childcare facilities across Korea now possess the status of accreditation and the average score that centers have scored is on the increase. Survey conducted against participating childcare institutions show that the staff members of the centers also recognize that the accreditation process has helped improve their service quality (MOHW & KCPI, 2018). Approximately 90% of the participating childcare centers have responded that they are satisfied with the experience and 94% of the facilities have reported to have seen increased quality after the accreditation procedures have been completed. From policy perspectives, many local governments have begun to link the support and incentives with the status of accreditation of the center. That is centers with the accreditations status are eligible for more favorable support from local governments (MOHW & KCPI, 2018).

The process of childcare center quality accreditation is largely three stages with accompanying procedures before and on the sidelines. First, the quality accreditation is administered by the Korea Childcare Promotion Institute (KCPI) and the three large steps include decision-making on the participation, on-site observation and evaluation. Detailed operation mechanism is demonstrated as follows (KCPI, 2018) in Figure A-1 in Appendix illustrates the largely three stages in acquiring quality accreditation for childcare centers and the institutions that are responsible for carrying out each stage of this process. The process is initiated by the childcare centers by their

application to be evaluated. They can send the application to KCPI. At this stage, childcare centers are encouraged to initiate self-evaluation report. During the first stage of the accreditation, the inspectors revise the basic information of the center as well as the self-evaluation report. Once childcare centers pay the fees, the KCPI confirms the participation of the given childcare center. It is an approximate four month process which results in three different categories of evaluation - accreditation, deferred accreditation and non-accreditation – condoned by the Ministry of Health and Welfare. The threshold for receiving the accreditation status is 75 out of 100 mark in all domains and in total score (KCPI, 2018; Choi & Cho, 2016). The accreditation is valid for three years. The results are disclosed on the government-run website for kindergarten and childcare information (Kindergarten and Childcare Center Information, 2019).

In principle, the domains of quality accreditation is in line with the notions of quality of education in Korea's policy documents. As mentioned in the background, Korea does not have an established set of definitions of ECEC quality but related policy documents has indicated recognized definitions of ECEC quality as below. It can be noted here that Korean policymakers recognize the concept of structural and process quality of ECEC, as well as the importance of teacher-child interaction which is also expressed in Nuri curriculum and teacher guidelines. In order to ensure quality, the Korean government implements childcare quality accreditation. Having been initiated in 2005, the 3rd Quality accreditation focuses on on-site observation and interview and less on documents in order to assess the quality in a more practical way and to reduce burden on the childcare centers to prepare documents. On-site observation is conducted in one day (begins between 8:30-9:30am and ends 16:30-17:30) for the overall facility and 2 classrooms (for centers of 99 children and under) and 3 classrooms (for centers of 100 children and over).

As demonstrated in the table below, in the past the quality accreditation for childcare centers was divided into three different groups depending on the number of children enrolled in the given institution. In general, childcare centers with larger facilities and the number of children were subject to higher number of domains and indicators. However, beginning in the year 2014, the phase 3 pilot program began to impose an integrated set of domains and criteria for all types of childcare center.

During the pilot program of phase 3, childcare centers were allowed to opt for either phase 2 or phase 3 domains and criteria. Going further, the phase 3 integrated quality accreditation proposes the same set of assessments for both kindergartens and childcare centers (MOHW & KCPI, 2018). This is a strong indication that childcare centers are now considered as clearly education institutions that are expected to deliver the same level of education quality as the kindergartens.

Table 2-18: Quality Accreditation for Childcare Centers – Number of Domains and Indicators

Type of classroom by size	Quality accreditation phase 1 criteria (2006-2009)	Quality accreditation phase 2 criteria (2010-2017)	Quality accreditation phase 3 (pilot) criteria (2014-2017)	Quality accreditation phase 3 (integrated) for kindergartens and childcare center (2017-present)
Over 40 children	7 domains, 80 indicators	6 domains, 70 indicators	Integrated criteria 4 domains, 21 indicators	Integrated criteria 4 domains, 21 indicators
Below 39 children	5 domains, 60 indicators	5 domains, 55 indicators		
Children with special needs	7 domains, 85 indicators	6 domains, 75 indicators		
Assessment results	Scores (by domain and total score)	Scores (by domain and total score)	Grade (A, B, C, D) Pass/non-pass	Grade (A, B, C, D) Pass/non-pass

Source: Created by the author based on Choi and Cho (2016)

Note: During the years 2014 to 2017, both phase 2 criteria and phase 3 criteria were able to be used depending on the choice of individual centers

Integrated criteria, designed to ensure equitable access to quality services regardless of the type of childcare institutions aim to adopt changes brought by Nuri system and the demand for higher quality services. Given the increasing importance on teacher-child interaction reflected in the Nuri Curriculum, the Quality accreditation has also become more focused on assessing teacher-child interaction. Table below shows that the domain on curriculum and teacher-child interaction have been merged and moved to the first domain of the quality accreditation system. Considering that the Nuri Curriculum for Ages 3-5 was introduced in 2013, the phase 3 accreditation introduced in 2014 certainly reflects the enhanced importance of the curriculum as well as the importance of teacher-

child interaction which is emphasized in the curriculum.

Table 2-19: Comparison of domains and criteria of childcare center quality accreditation between phase 2 (2010-2017) and phase 3 (2014-present)

Domains	Number of criteria	Domains	Number of criteria
• Childcare environment	11	• Childcare curriculum and teacher-child interaction	31
• Operation and management	12	• Childcare environment and operation	19
• Childcare curriculum	14	• Health and safety	15
• Teacher-child interaction and pedagogy	11	• Staff management	14
• Health and nutrition	12	-	-
• Safety	10	-	-
Total	70	Total	79

Source: Created by the author based on KCPI (2018)

As shown in Table A-8 in the Annex, it is notable here that the number of criteria dedicated to the section of teacher-child interaction has increased in comparison with phase 2. In phase 2, there was 1 domain and 6 criteria governing the methods of teacher-child interaction, while in phase 3, the accreditation allocated 2 domains and 10 criteria to the recommended methodologies for teacher-child interaction (MOHW & KCPI, 2018). In phase 2, under the domain of teacher-child interaction, teachers are encouraged to engage in appropriate verbal interaction with children in individual or group settings, encourage active exchange of positive interaction among peers, and perceive difficulty and problem situations and provide proper assistance. In addition, teachers are advised to initiate interaction as a way to share ideas, while taking into account children's perspectives and considering their interest and demand. Phase 3 includes all of these recommendations and adds the new domain under "teacher role in teacher-child interaction" which indicates increased proportion of teacher-child interaction of the entire accreditation criteria. Quality accreditation carries significant weight in

Korea's childcare context as the results are made public in order to help parents make informed decisions when choosing the ECEC centers for their children. In addition, its importance and impact will grow significantly as the accreditation results are now disclosed in detail the performance of the center by domain and that the participation in accreditation is now mandatory for all childcare centers (MOHW, 2019).

As mentioned above, criteria of childcare quality accreditation are considered to be the indicators for childcare quality in the Korean context; among these criteria, this study will focus on interactions. Within Korea's childcare quality accreditation system, teacher-child interaction is measured along with childcare activities by 10 indicators as below.

1. Children participate in adequate physical activities for the development of large and small muscles;
2. Children participate in diverse language activities that are appropriately designed for their age group;
3. Children are exposed to age-appropriate experiences to develop interest himself/herself, family and social surroundings;
4. Children are given opportunities to experience and participate in artistic activities;
5. Children are exposed to self-led activities to explore the nature around familiar surroundings;
6. Children are given sufficient opportunities to participate in role play and block play in accordance with his/her development level and interest;
7. Teachers build relationships with children that are based on mutual trust;
8. Teachers engage in adequate linguistic exchanges with children in individual or group setting;
9. Teachers motivate children to engage in positive peer-to-peer interaction with other children; and
10. Teachers can predict challenges that children may encounter and problem situations and can provide relevant guidance in response.

From this list, numbers 7 to 10 are more directly related to teacher-child interaction and the constructs that are listed here, including building relationships, linguistic exchanges, positive interaction, and predicting and solving problems. Table below shows that indicators and behavior

markers that are listed under the teacher-child interaction measurement for Korea's childcare quality accreditation are in line with the those of CLASS observation tool which was used to measure teacher-child interaction for this research. Both Korea's quality accreditation and CLASS place strong importance on child initiative in teacher-child interaction, meaningful linguistic exchanges with the teacher based on trust and positive peer-to-peer interaction.

2.8. Assessment of Child Development Outcomes

In Korea, the term assessment and evaluation are both used when it comes to the topic of studying child development outcomes (Choi & Cho, 2016). Assessment refers to collecting data on child behavior and development through observing recording and documenting, whereas evaluation refers to the act of analyzing and giving value to the data collected. Assessment of child development outcome is necessary for several purposes.

- i) Assessing child development can provide useful information about individual differences among children that can help identify strengths and weaknesses of each child in different domains of development;
- ii) Child development outcomes can be parameters to validate whether the objectives of the early childhood education policy have been achieved to verify the areas of improvement for more effective achievement; and
- iii) Results of child outcome assessment can be shared with parents and caregivers so that they are aware of the effects of enrolling their children in ECEC institutions (Choi and Cho, 2016).

In terms of child outcome assessment, currently there is no established child assessment being administered nationally (Moon et al., 2015). Among various outcome indicators, there is lack of study that focused on character education that is emphasized in the Nuri Curriculum. Some academic studies that have been conducted focused more on academic skills and school readiness which captures only

one part of the education objective of Nuri Curriculum. Increasing number of studies show that ages 3 to 5 are a critical stage in life for character development that is closely linked to socioemotional skills, which are crucial in later academic performance (Choi & Lim, 2013; Kautz et al., 2014) and closely linked to teacher-child interaction (Howes et al., 2008). However, there is lack of assessment practices that are focused on socio-emotional skills.

Currently, in Korea's ECEC institutions, children's development outcome assessment is carried out mostly within the centers with no established guidelines from the government (Nah & Kim, 2012). The common methods of assessment used by ECEC teachers are observation, portfolio collection, individual meeting with children, etc. and the results from these exercises are used to support children, improve pedagogies and to share with parents (Choi & Cho, 2016; Han, 2015). However, such exercises are not mandated by the government nor are there set guidelines to follow, leaving the childcare centers to follow unsystematic approach designed by themselves (Han, 2015; Nah & Kim, 2012). The Childcare Centers Operation Guidelines which lays out regulations mandated by the Ministry of Health and Welfare operating all types of childcare centers across the nation do not include guidelines on the child development assessment (MOHW & KCPI, 2018). However, the childcare center accreditation criteria do include a section to look into child development status. Among the four domains of the Childcare Center Quality Accreditation Guidelines, the first domain under "childcare curriculum and teacher-child interaction" allocates one of the six indicators to "assessment". This indicator includes four criteria as follows (MOHW & KCPI, 2018).

- i) Teacher observes children's behaviours in an objective manner and keep records;
- ii) Teacher assess children's developmental characteristics and changes based on the objectives and contents of childcare curriculum;
- iii) Teacher reflects the results of the assessment in the designing of the curriculum and use the assessment data as background information for meetings with parents; and
- iv) Teacher assess the overall implementation of the childcare curriculum in the centre and reflects the results in the next implementation plan.

Although childcare centers are assessed based on their assessment practices for children, the centers are not provided with systematic guidelines on assessment at nation-level; that is, the principles of child assessment are provided but without guidelines to follow (Hah, 2015; Na & Kim, 2012). For instance, the childcare quality accreditation emphasizes observing child behavior and keeping records of them but teachers are not trained on the standards as to what to observe and how to analyze and assess the results of observation (Han 2015). Therefore, childcare centers need to design their own methods and frequency of child assessment and prepare for the child assessment at the timing of the quality accreditation. Currently, childcare centers are utilizing unstandardized observations methods and assessment tools that are often not tested for credibility and validity and are not designed in line with the current curriculum (Han, 2015; Kwak & Nah, 2011). As for portfolio assessment for instance, teachers are simply collecting the work produced by children but without guidelines on exactly what to collect and how to assess the collected work. Due to inconsistent and unsystematic practices, such assessment efforts that teachers do manage to carry out are not able to serve their purposes of evaluating the progress in child development (Lee & Sa, 2004; Oh, 2003). Teachers, at times, feel the shortage of information on the standardized methods of observation, on the type of data that needs to be collected, how to keep records of collected data, and how to utilize the information gathered in order to improve the curriculum and their performance in the classrooms (Lee, 2012).

It should be noted here that the Nuri Curriculum recognizes child assessment to form part of the curriculum itself and mentions that it is important to take account of the child assessment results in teaching and learning (MOEST & MOHW, 2012). Nevertheless, the section on assessment touches upon the general principles without providing concrete guidelines for teachers to follow (Nah & Kim, 2012).

2.9. Teacher Training

Teacher training for childcare teachers in Korea takes place in three different step – pre-service

training, in-service training and certification training (KCPI, 2018). These different layers of teacher training correspond closely with the childcare certifications that teachers need to possess in order to work in childcare settings. There are three different degrees of childcare teacher certification.

Pre-Service Training

(1) The 3rd degree certificate

The 3rd degree certificate, it requires a high school diploma (or higher), accompanied by academic training designated by the Ministry of Health and Welfare. Such academic training consists of courses designated by the Ministry of Health and Welfare demonstrated in the table below.

Table 2-20: Mandatory Courses Required for 3rd Degree Childcare Teacher Certificate

Domain	Courses (Credits)	Number of Courses (Credits)
Foundation of childcare	Child welfare (3), Introduction to childcare (3), Childcare curriculum	3 courses (9 credits) mandatory
Development and instruction	Child development (3), Human behavior and social environment (3), Child life instruction (3), Child counseling (3), Instruction for children with special needs (3), Infant and child care (3), After-school curriculum (2)	7 courses (20 credits) mandatory
Infant and child care	Play instruction (3), Language instruction (2), Music and movements (2), Art (2), Math and science (2), Curriculum and materials development (3), Infant and child care pedagogy (3)	7 courses (17 credits) mandatory
Health, nutrition and safety	Child nursing (2), Child safety management (2), Child nutrition (2)	2 courses (3 credits) elective
Family and community cooperation	Parental education (3), community and society welfare (3), childcare policy (2), childcare operation and management (3), IT education (2)	5 courses (13 credits) mandatory
Childcare practicum	Childcare practicum (2)	1 course (2 credits) mandatory
Total	25 courses (65 credits)	

Source: Created by the author based on Central Portal for Pregnancy and Childcare (2019)

(2) The 2nd degree certificate

The 2nd degree certificate is granted to the 3rd degree certificate holder with 2 years of experience or candidates with college degrees (or higher) with designated credits in childcare in relevant courses approved by the Ministry of Wealth and Welfare as indicated in the Table 2-21 below.

Table 2-21: Mandatory Courses Required for 2nd Degree Childcare Teacher Certificate

Domain	Courses (Credits)	Number of Courses (Credits)
Foundation of childcare	Child welfare, Introduction to childcare, Childcare curriculum, Infant development, Child development	6 courses (18 credits) mandatory
Development and instruction	Child development, Human behavior and social environment, Child life instruction, Child counseling, Instruction for children with special needs	Minimum 1 course (3 credits) elective
Infant and child care	Play instruction, Language instruction, Music , Art, Math, Science, Infant and child care pedagogy, child literature, Child movement, Infant and child program development and assessment	Minimum 6 courses (18 credits) elective
Health, nutrition and safety	Child nursing, Child safety management, Child nutrition, Child health education, Mental health	Minimum 2 courses (3 credits) elective
Family and community cooperation	Parental education, community and society welfare, childcare operation and management, family relations, family welfare	Minimum 1 course (3 credits) elective
Childcare practicum	Childcare practicum (2)	1 course (3 credits) mandatory
Total	17 courses (61 credits)	

Source: Created by the author based on Central Portal for Pregnancy and Childcare (2019)

(2) The 1st degree certificate

The 1st degree certificates are granted to childcare teacher who are 2nd degree certificate holders and have three years of work experience in childcare. In addition, candidates need to have completed the certificate promotion training approved by the Minister of Health and Welfare. Also, this certificate can be granted to 2nd degree certificate holders who have Master's degree (or higher) in childcare with one year of working experience in childcare and have completed the certificate promotion training approved by the Minister of Health and Welfare. In-service childcare teacher training in Korea consists of two streams – General training and promotion training. General training is required for childcare teachers who hold childcare teacher certificates and are currently working in childcare

centers. The training needs to be taken every three years. Promotion training is required for 3rd degree certificate holders with two years or experience in order to be promoted to the 2nd degree certificate holders, or for 2nd degree certificate holders with three years or experience to be promoted to the 1st degree certificate holders. In case teachers need to take functional training in the same year, promotion training will replace the functional training (Central Portal for Pregnancy and Childcare, 2019).

Table 2-22: Courses Required for General and Promotion Training for Childcare Teachers

Domain	Courses	Hours required
Character and knowledge	Childcare teachers and human rights	3
	Capacity building for childcare teachers	3
	Health management for childcare teachers	2
Health and safety	Accident prevention education	3
	Health and sanitation	3
	Prevention of child abuse, sexual harassment and disappearance and post management	3
Disabilities and multi-cultural environment	Understanding multi-cultural environment	2
	Operating classrooms with children with disabilities	2
Childcare activities management	Infant and child observation and recording	3
	Understanding problem behaviors	2
	Utilizing childcare information	2
	Utilizing digital platforms for pedagogy	3
	Understanding character education	3
	Teacher-child interaction for infants (optional)	3
	Teacher-child interaction for children (optional)	3
	Internally developed courses within training institutions	3
Family and community cooperation	Understanding parent-teacher communication	3
	Methods of parent-teacher communication	3
Total	15 courses	40 hours

Source: Created by the author based on Central Portal for Pregnancy and Childcare (2019)

In addition to the general training and promotion training that form the in-service training for childcare teachers, there are separate training sessions for Nuri Curriculum. The training for Nuri Curriculum is designed to help teachers that teach the Nuri Curriculum – hence teachers that work with children of ages three to five years – better understand the contents of each domain and to better implement the curriculum in their classrooms. The training is divided into two parts – i) group training where teachers are obligated to gather offline and receive eight hours of training on the Nuri Curriculum and ii) distance training for those who have completed the group training, where teachers can access the lessons online for approximately eight hours. This is a one-time training and is provided by the support center for childcare in each municipality. Teachers are considered to have passed the training if their evaluation score is higher than 60 out of 100 (Central Support Center for Childcare, 2019).

CHAPTER 3:

LITERATURE REVIEW

3.1. Quality of early childhood care and education

There is a growing volume of research evidencing the importance of quality of early childhood education and care. From the national policy perspectives, as enrollment and the time that children spend in early childhood care and education services increase worldwide, the quality of center-based ECEC has become of stronger importance. In addition, increasing public expenditure in the provision of early childhood education and care and the enhanced accountability of the investment public resources in ECEC has magnified attention to the quality ECEC (Kim, 2013^[8]; Kwon, 2015; Slot et al. 2015). Quality of ECEC is also found to increase children's language and cognitive development higher quality of ECEC is associated with greater language abilities and better short-term memory and attention. Children enrolled in higher quality childcare centers were associated with better language and cognitive test scores at the age of four than other forms of care (Barnett, 2002). In addition, high quality early childhood education and care is beneficial for subsequent performance in schools in various aspects, like language use, emerging academic skills, early literacy and numeracy and socio-emotional skills (Burchinal, et al., 2016; Melhuish et al, 2015; Yoshikawa & Kabay, 2015; OECD, 2018b).

In-depth research and discussion on the quality of center-based early childhood education and care began in the 1980s when the National Association for the Education of Young Children (NAEYC) published its position paper on developmentally appropriate practice (DAP) for early childhood education programs in 1987 (Bredekamp, 1987). This study provided professional classroom guidelines on teaching practices that facilitate development of young children from birth through age 8, which ignited the discourse on the quality of teaching practices in order to enhance child development. The guidelines focused mainly on three core dimensions of classroom practices for young children; provision of appropriate materials and activities; effective teaching; and teacher-

child interactions (Howes et al., 2008). High quality ECEC environment can also play an important role to compensate for the risks that face children from disadvantaged backgrounds by engaging them in developmentally appropriate, stimulating activities and social interactions, highlighting important long-term benefits of investing in ECEC provisions (Heckman, 2006).

Research recognizes that despite the growing attention directed to the quality of early childhood education and care, there is still lack of unified definition to describe the quality of ECEC. This also leads to lack of singular method of evaluation of the quality of early childhood education and care (Mashburn et al., 2008; Vandell & Wolfe, 2000). Nevertheless, there is a trend in recent research on the quality of early childhood education care that categorizes constructs of quality into structural quality and process quality. Structural quality refers to child-teacher ratio, group size, curriculum, education level of teachers, years of experience of teachers, etc. Process quality is largely defined by teacher-child interaction (Slot et al., 2015; Pianta & Hamre, 2009; Vandell & Wolfe, 2000).

3.1.1. Structural quality and process quality

Vandell and Wolfe (2000) argued that the method of measurement of quality is a key issue when it comes to evaluating the research evidence about quality of ECEC. Quality of early childhood education and care has been measured in a number of different ways. Vandell and Wolfe divided the aspects of ECEC quality into structural quality and process quality. Structural quality, as mentioned above, refers to constructs of quality that measure the environmental aspects of center-based early childhood education and care services, including child-teacher ratio, group size, curriculum, education level of teachers, years of experience of teachers and teacher's specialized training related to children.

On the other hand, process quality refer to actual day-to-day experiences that children are exposed to in early childhood education and care settings, including primarily children's interactions with caregivers and peers, that constitute more proximal determinates of child development (Slot et al., 2015; Thomason & La Paro, 2009; Howes et al., 2008). Howes et al. (2008) defined process

quality as children’s direct experiences and interactions with teachers as well as their experiences with the instructional contents that they are exposed to within classroom settings. Interactions between teachers and children within classrooms have been often referred to as “the engine of development” supporting the importance of proximal processes as key to child development and (Bronfenbrenner and Morris 2006). There is a growing amount of research evidence that verify greater impact of process quality on child development and learning than structural quality.

Table 3-1: Indicators of Structural and Process Quality Indicators

Target areas of policy levers to improve quality	System/structural indicators, i.e. the aspects of ECEC that are traditionally regulated and function as preconditions of proxy of process quality	
Standards and governance	Minimum standards (e.g. staff-child ratios, group sizes); financing of ECEC services (whether public/ non-profit or private); physical location of the centre, intensity of the service, registering or licensing of services, class- or playroom composition	Overall staff-child interactions, staff emotional, instructional, and organisation interactions with the children
Workforce development and working conditions	Pre-service qualifications of staff; in-service training of staff; years of work experience; working conditions (i.e. salaries); staff well-being, organisational climate, networking	Overall staff-child interactions, staff emotional, instructional, and organisation interactions with the children Developmental and educational activities
Monitoring and data on quality	Monitoring systems and tools (QRIS)	Overall staff-child interactions, staff emotional, instructional, and organisation interactions with the children

Source: Created by the author based on OECD (2018)

Structural quality provides constructs that are the main objective of statutory quality regulations and national curricula as well as principle factors in the macroeconomic costs of ECEC,

whereas the benefits for individual children and society are primarily dependent on process quality.

Table 3-2: Dimensions of Classroom Quality

	Structural quality	Process quality
Description	• Distal indicators of ECEC quality, referring to infrastructure including physical, inter-personal and material facilities • Traditionally considered easier to regulate	• Proximal quality refers more to children's day to day experience and includes the social, emotional, physical as well as instructional domains of their interactions with teachers and other children (often referred to as peer interactions) while they are participating in the play, activities, or any parts of daily routines
Indicators	• Child-staff ratio • Group size • Pre-service qualifications • In-service training/ professional development • Years of work experience • Presence of accountability/ Quality monitoring and rating improvement systems • (engaging, 2018)	• Teacher-child interaction • Children's interactions with space and materials • Includes interactions among children, interactions among staff as well as with parents
Assessment	• Measurement can often be carried out by a survey and/or interview in the classroom setting or at the system-level ERS (Environment Rating Scales) • ITERS-R • ECERS-R • FCCRS • FCCERS-Revised • ECERS-E	• Direct observation • CLASS • CIS • ORCE • ELLCO • STRS

Source: Created by the author based on OECD (2018)

Mashburn et al. (2008) conceptualized the definitions of quality of early childhood education and care as two broad areas; i) features of the early childhood program infrastructure or design and ii) domains of the early childhood classroom environment that children are direction exposed to as a result of enrollment. When compared to other similar research, the first category of the early childhood program quality described in this study corresponds with structural quality, as it is described as the features of the program that are measured by regulation and financing, including the status of teacher training as well as experience, usage of curricula, group size, child-teacher ratio. And the second category of the quality is in line with process quality because they refer to children's direct experience that they are exposed to within the early childhood program setting, including ways

teachers design routines, execute activities and lesson plans, and create interesting materials, and the level of teacher's interaction with children (Mashburn et al., 2008). It is argued that classroom quality is the strong driver that promotes development in ECEC (Melhuish et al., 2015).

3.1.2. Linkage between structural and process quality

It is argued that it is essential to ensure a positive relationship between structural quality and process quality of early childhood education and care settings, which contributes to the cross-efficiency of both aspects of ECEC (Slot et al., 2015). The general understanding about the linkage is that lower child-teacher ratio, smaller group size and higher teachers' education levels are prerequisites to induce higher process quality levels. And the high process quality levels are believed to contribute to better child learning and development outcomes.

From policy perspectives, the constructs of structural quality of early childhood education and care have received more attention in the efforts to improve the quality of ECEC programs and ultimately to enhance children's development and learning (Early et al., 2007). For instance, in many country contexts, raising the level of teacher qualifications is considered one of the policy efforts to improve quality of education. As such, structural quality standards – space for children, number of adults in the classroom, etc.) are considered to be relatively easier to regulate and observe as opposed to process quality as teacher-child interaction that is harder to monitor (OECD, 2018b; Early et al., 2007).

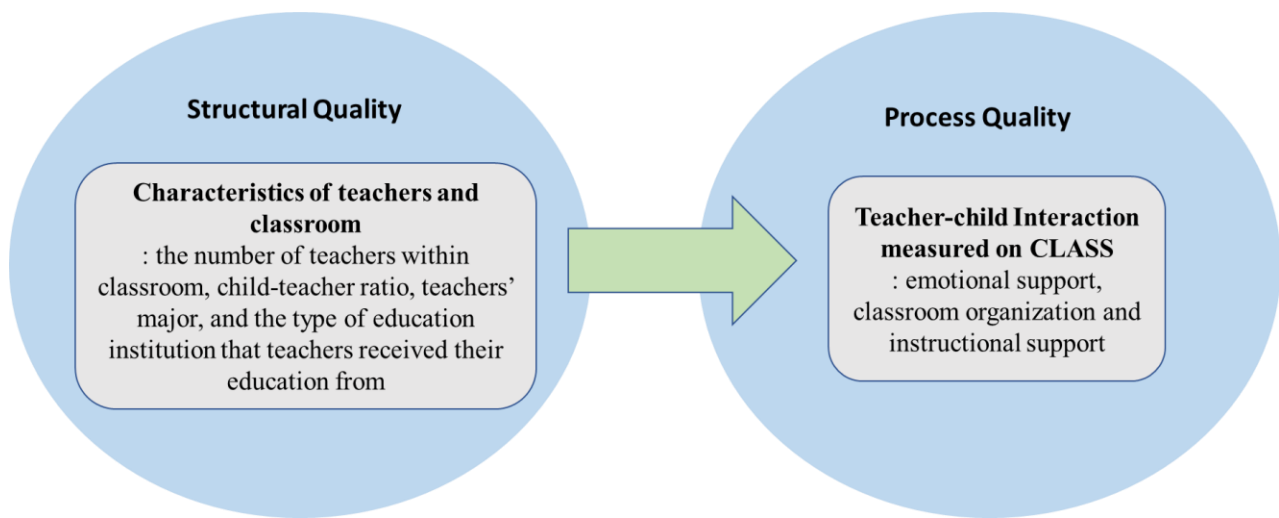
Despite the evidence importance and benefits of the linkage between structural quality and process quality, related research that investigated the relations between the two domains of quality produced inconsistent or mixed results. One explanation for such results is that the association between structural quality and process quality appears to be inconsistent and weak as that the variance of the structural quality is greatly reduced due to strong statutory regulations. That is, so-called 'iron-triangle' of the structural quality – child-teacher ratio, group size, and teachers' formal pre-service education are the three variables that are most commonly used to measure the level of structural

quality although they produce less variance across different settings as they are well-regulated. Therefore, a fair analysis of association between the relatively well-regulated structural variables of quality and less regulated variables of process quality may be hindered due to differing magnitude of variance among the two sets of variables (Slot et al., 2015; Love et al., 2003; Phillipsen et al., 1997).

Against this backdrop, some research used other structural elements as variables in order to see the linkage between structural and process quality. More specifically, more studies are including in-service professional development as a domain of structural quality (Slot et al., 2015), which is also considered as variable in the format of frequency of in-service professional development received on teacher-child interaction. For the domains of the process qualities in these studies investigating the association between the two types of ECEC quality, the use of programs of planned educational activities of children, including cooperative work, and age-specific literacy, mathematical and scientific learning activities are used as elements of process quality and drivers of child learning and development outcomes (Sylva et al., 2007).

In the Korean context, Kwon (2015) studied the association between structural elements of classroom and process quality of classroom targeting 24 childcare centers and 88 teachers in classrooms for children of ages 3 to 5 years. The childcare centers were recruited with a view of balanced coverage across different types of centers including national, public, private, and employer-supported childcare centers. By measures of structural quality, Kwon used the number of teachers within classroom, child-teacher ratio, teachers' major, and the type of education institution that teachers received their education from. For the measure of process quality, the study used Classroom Assessment Scoring System (CLASS) and assessed teacher-child interaction and saw the effect of domains of structural quality on each of the three domains of teacher-child interaction measured by CLASS; emotional support, classroom organization and instructional support.

Figure 3-1: Analytical framework of the effect of structural quality on process quality

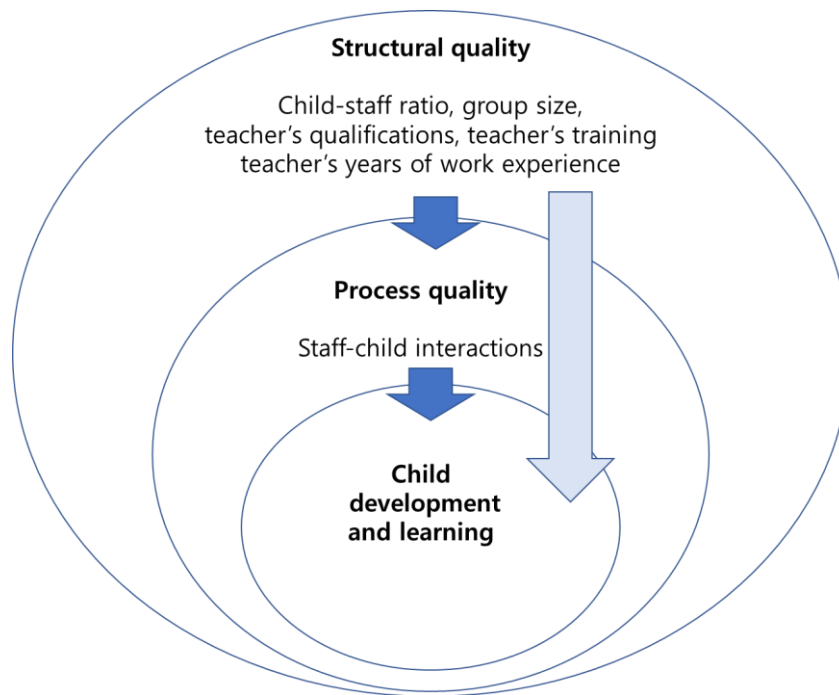


Source: Created by the author based on Kwon (2015)

Kwon found that higher number of teachers within classrooms had significant positive association with the level of teacher-child interaction. Such positive association was present across all three domains of interactions; emotional support, classroom organization and instructional support. The study also found that the level of teacher-child interaction score measured on CLASS was significantly higher in classrooms with lower child-teacher ratio. The study divided the classrooms between ones that have a ratio higher than 10:1 and ones that have a ratio lower than 10:1. Such results regarding the positive association between lower child-teacher ratio and teacher-child interactions score was similar across all sub-domains of interaction. With regards to teachers' major, Kwon divided teachers between those who majored in disciplines related to early childhood education and care and those who majored in disciplines unrelated to ECEC. The results show that teachers who majored in ECEC-related disciplines scored higher than non-ECEC majors in all three domains of teacher-child interaction. In terms of the type of education institutions where teachers received their education from, the results show that teachers who received their education from two-year colleges and four-year universities scored higher in teacher-child interaction compared to teachers who received their education from online educational institutions or early childhood care education centers. Overall, the results of Kwon's research show that selected domains of structural quality had significant effect on the selected aspect of process quality. That is, the number of teachers in classroom, child-teacher ratio,

and teacher's educational background have significant influence on the level of teacher-child interaction.

Figure 3-2: The Association among Structural Quality, Process Quality and Child Development



Source: Created by the author based on OECD (2018b)

There is another stream of studies that looked into the association between the elements of structural quality and those of process quality but focusing more on the aspect of teacher-child interactions considered as the main variable for the process quality, which is also the focus of this research. Several studies saw the association among child-teacher ratio, class size, and factors of process quality measured by teacher-child interactions in a few different countries. The studies generally found that classrooms with smaller child-teacher ratio and smaller class sizes were associated with high level of teacher-child interactions that were measured based on warm and supportive caregiving (Burchinal et al., 2002; Phillipsen et al., 1997).

On the other hand, there are also studies that found weaker association or no significant

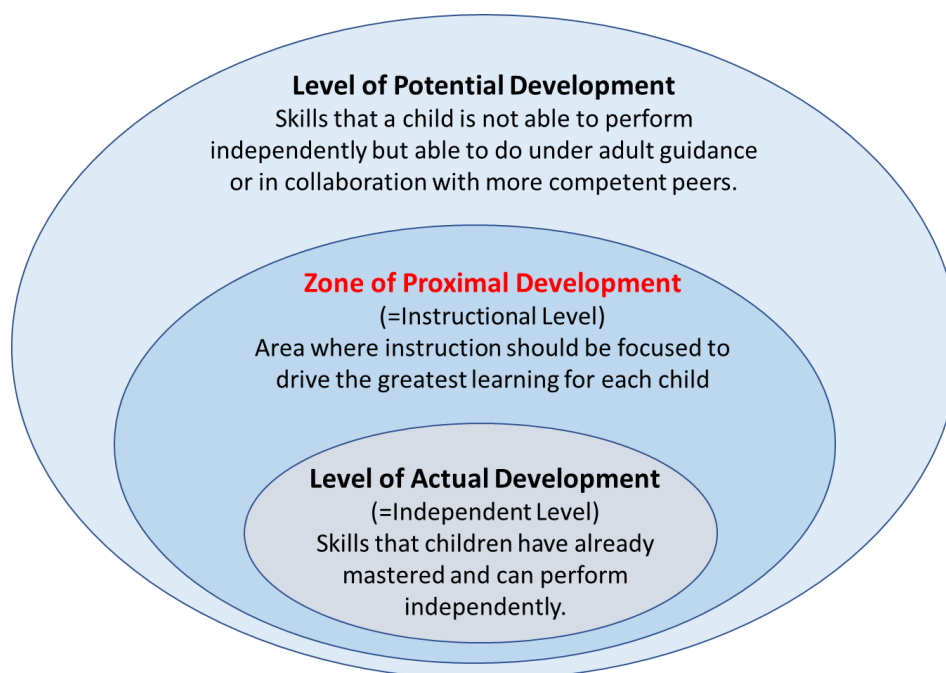
relations between process quality and child-teacher ratio (or no association at all between child-teacher ratio and process quality. Some analyses that used group size as the measure of structural quality and saw its effect on process quality and also found weaker or no significant linkage (Phillipsen et al., 1997).

3.1.3. Teacher-child interaction

As mentioned above, teacher-child interaction is the principle aspect of the teacher-child interaction within center-based early childhood education and care settings. The theoretical importance of teacher-child interaction

According to Vygotsky (1978), children's cognitive and social development work together. He developed the concept of Zone of Proximal Development (ZPD) where children can learn new skills with the help of adults or capable peer who can act as a scaffold to others. In ZPD, the active role of adults is required. Adults can observe children and assess what is in each child's ZPD and plan curriculum to support the child's holistic development and emerging capabilities.

Figure 3-3: Zone of Proximal Development in Vygotsky (1978)



Source: Created by Author based on Vygotsky (1978)

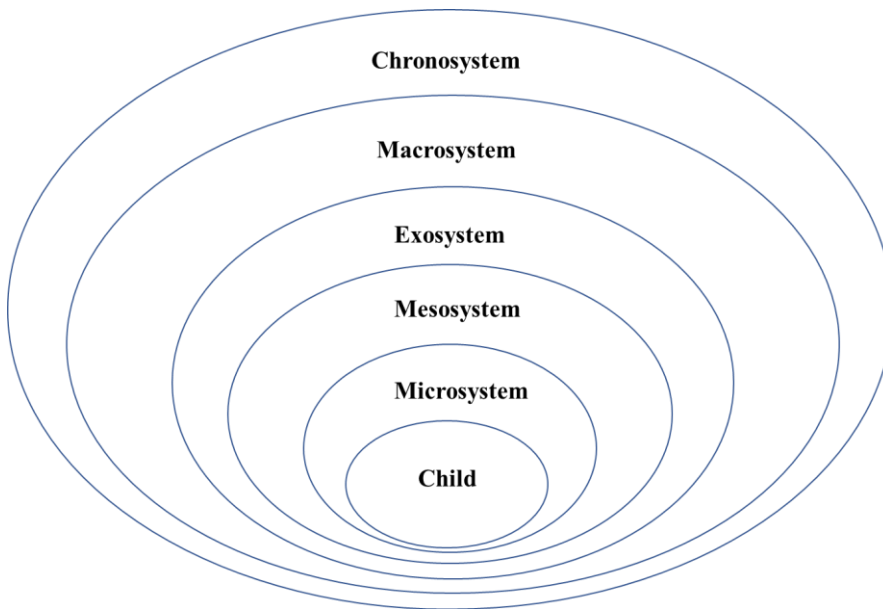
According to Bronfenbrenner, human development takes place through different layers, starting from microsystem, mesosystems and chronosystem. Each of these systems depend on the contextual characteristics of a child's life and provides diversity of sources of growth (Bronfenbrenner, 1994). That is, as we are exposed to different systems, we are given opportunities to access more social knowledge and increased possibilities for learning to solve problems and experience dimensions of self-exploration. In microsystem, proximal processes operate to produce development while child interacts with family and caregivers (Bronfenbrenner, 1994). As it consists of the child's immediate environment, this system governs the child's most intimate learning, offering a reference point with the world. The role of the family and the caring relations between the child and parents is critical in this system and can have significant impact on the child's healthy personality. For instance, the child's attachment behavior to the parents can help child build their trust-building experiences (Swick & Williams, 2006).

In the mesosystem, children are exposed to opportunities to make connections, for instance with the community. Children are exposed to adults beyond their parents who also engage with them. Therefore, it is important that children are exposed to caring and loving adults outside of the family circle. Typically, the mesosystem involves interactions among family, schools, and peer groups. For some children it could also involve church, camps or workplace in some societies although not as common in other societies (Bronfenbrenner, 1994).

The exosystem refers to an extension of the mesosystem which embraces other social structures that are both formal and informal. It may not necessarily include children themselves but include the immediate surroundings where the child is found. This system may include the main structure and institutions of the society, embracing the world of learning, neighborhood, the mass media and agencies of governments, etc. The macrosystem is different from other systems in a fundamental way. It refers not to the specific context of a particular person but more to general prototypes that exist in the culture or in the sub-culture. Some elements of the macrosystem can exist in the laws, regulations and rules of the society, although most of the macrosystems are informal and rather implicit. Lastly, the chronosystem is composed of the environmental events as well as societal

and historical transitions that take place throughout a child's life (Bronfenbrenner, 1994).

Figure 3-4: Bronfenbrenner's Ecological Models of Human Development



Source: Created by the author based on Bronfenbrenner (1994)

Based on the theoretical background explaining the importance of the adult's role in the zone of proximal development in Vygotsky (1978) and mesosystem of Bronfenbrenner (1994), the role of teachers' engagement in children's learning is significant. In both theories, the engaging and supportive role of adults is emphasized which is line with early research on effective teacher-child interactions. The Study of Early Child care and Youth Development (SECCYD) by the National Institute of Child Health and Human Development (NICHD) was a landmark study that studied children's experiences in center-based early childhood settings and elementary school classrooms across the United States (NICHD, 2006). The objective of this study was to identify the aspects of learning environments and classroom settings that were most influential for children's learning. One of the major element of this research was focused on the quality of how teachers interact with children. The assessment tool that was used for this study was Observation Record of the Caregiving Environment (ORCE), which was the precursor to the CLASS. The purpose of this tool is to find the

factors in early environments and classrooms that are most impactful to children's development (NICHD, 2006). The study found that the role of teachers' responsive support and language stimulation efforts was meaningful in facilitating young children's development. Also, children could establish trust with the caregivers through consistent emotional support, preparing them for later academic and socio-emotional development.

Following this landmark study by NICHD, a number of studies followed, contributing to the identification of critical elements that need to be considered for teacher-child interaction (Howes et al., 2008; Mashburn et al., 2008; Curby et al., 2009; Hamre et al., 2013; Burchinal et al., 2014). Much of these studies support the three main domains that constitute Classroom Assessment Scoring System (CLASS) which is the observation tool used in this study. Emotional support is one area that is consistently emphasized in most above-mentioned studies. This domain refers to the manners in which teachers help children develop warm and emotionally supportive relationships and experience enjoyment about learning while feeling comfortable in the classroom. Children that experience positive emotional support are likely to develop better socio-emotional and academic outcomes compared to children from classrooms with lower level of emotional support from teachers (Mashburn et al., 2008; Curby et al., 2009; Burchinal et al., 2014). These children are also more likely to experience less conflict with teachers and show fewer problematic behaviors. The above-mentioned studies have found that teachers' emotional support can positively predict children's working memory and cognitive flexibility. More specifically, when children learn in classrooms with high level of emotional support, children show stronger cognitive control and executive functioning (Hamre et al. 2013).

Classroom organization is another domain that has shown positive impact on child development outcomes. (Burchinal et al., 2014). Burchinal et al. (2014) found that children can develop stronger social skills when they learn in classrooms where teachers provide them with clear instructions, organized activities as well as interesting materials. The study argues that higher levels of classroom organization can promote children's language and literacy skills, including listening comprehension and early writing skills. In addition, well-organized classrooms can also promote

expressive and receptive language development for children (Curby & Chavez, 2013).

Lastly, instructional support refers to the manners in which teachers provide support to students for their cognitive development and language attainment. This domain does not focus so much on the content itself of the curriculum or activities but rather on the ways that teachers support children's learning. Children in classrooms where teachers provide higher level of instructional support display better behaviors and less problematic behaviors (Hamre et al., 2013; Burchinal et al. 2014). Hamre et al. (2013) and Burchinal et al. (2014) found that teachers' level of instructional support is associated with children's language and literacy skills, indicating that ensuring teachers' effective instructional support in early education classrooms holds strong importance.

3.1.4. Assessment of teacher-child interaction

In order for high quality early childhood education and care practices to be settled, it is important to establish effective assessment system and set the right directions. Assessing the quality of ECEC institutions is a paramount instrument in improving the quality of the services (Choi, 2016). In order to carry out effective assessment, it is necessary to study the strengths and weaknesses of the service center and based on the findings, adequate support can be provided to the teachers to eventually benefit the wellbeing of the children (OECD, 2015). Assessment activities have contributed to the tangible improvement of the programs and the classroom quality. The argument on the need for assessment of ECEC quality is based first on the importance of ensuring the quality of ECEC. The need to assess the quality of ECEC for the purpose of maximizing the benefits of the high quality ECEC received increasing attention along with empirical studies that found compelling evidence that quality ECEC can create significant differences in child development outcomes (Sylva et al., 2006).

Based on growing importance of quality manifested by its influence on child developments, quality assessment of ECEC began to receive more attention. That is, along with stronger attention on ensuring high quality ECEC, quality assessment is increasingly considered an important tool to improve quality and ensure largest benefits to children (OECD, 2015; Taguma et al., 2012). In the

international setting, there are a few quality assessment tools as the Early Childhood Environment Rating Scale's revised (ECERS), which is used principally to measure environmental aspects of ECEC quality. ECERS is designed to assessment early childhood setting that involves group programs for children of ages 2 to 5 years. Its indicators represent what good quality early childhood programs should look like in seven main areas; space and furnishing, personal care routines, language and reasoning, activities, interaction program structure, and parents and staff (Clifford et al., 2010, 3). The total number of items consist of 43 indicators. ECERS scale sees ECEC environment as a broad sense and guides the observers to assess the arrangement of both indoor and outdoor space, the materials, and activities that are offered to children, the supervision and teacher-child interactions that take place in classrooms. The scale also considers the schedule of the day, including the routines and activities as well (Clifford et al., 2010, 5). The assessment also looks at support that is offered to parents and staff members of the ECEC center. Although there is a set of indicators allocated for interaction, the majority of indicators are measures of ECEC environment which makes ECERS a popular assessment tool for structural aspects of ECEC setting (Sylva et al., 2006; Clifford et al., 2010).

The Classroom Assessment Scoring System (CLASS) is another assessment tool that is internationally used to assess the quality of ECEC, focusing primarily on teacher-child interactions (Sylva et al., 2006; Pianta et al., 2008). CLASS is designed for classroom assessment through classroom observations. It focuses on three main teacher-child interaction domains and is based on 7-point Likert scale.

The first domain of the CLASS observation instrument is emotional support which measures teachers' positive relationships with children and teachers' tendency to provide social and emotional interactions in the classrooms (Pianta et al., 2008). This domain is divided into four sub-domains. First, positive climate measures four behavior markers of teachers; i) how teacher manages physical proximity, shared activities, peer assistance and matched affect and social conversation with children; ii) how teacher initiates positive affect through smiling laughter and enthusiasm; iii) how teacher carries out positive communication; iv) how teacher shows respect to children. Negative climate is an indicator to detect teachers four negative behavior markers; i) negative affect such as irritability,

showing anger and intimidating voice, provoking aggression, and allowing negativity; ii) punitive actions, imposing physical punishment; iii) sarcasm accompanying humiliation; iv) severe level of negativity involving victimization, and physical punishment. The third indicator of emotional support is teacher sensitivity that has four behavior markers. They measure i) awareness to see how a teacher expects problems and plans proactively while noticing a lack of understanding from children; ii) responsiveness to see how a teacher acknowledges children's emotions, provides support and individualized help; iii) abilities to address problems to see how a teacher helps children in a timely manner to solve challenges; iv) child comfort to see the level of comfort that children feel in seeking support, participating freely in activities and taking risks. The last indicator in emotional support is regard for student perspectives that also have four behavior markers. This indicator measures i) flexibility and student focus to assess how teacher embraces children's ideas, ii) encouragement for autonomy to see how much responsibility a teacher gives to students; iii) student expression and iv) restriction of movement to see how much movement teacher allows for students.

A child's emotional interaction in relationships with teachers in classrooms is increasingly recognized as a parameter of important student outcome which may be governed by standards that are similar to those of academic achievement (Blair, 2002; Pianta & Hamre, 2009). Children that are highly motivated and more connected to others are more likely to establish positive development outcomes in both social and academic areas (Hamre & Pianta, 2001). Here, teachers' capabilities to support emotional functioning in the classrooms are pivotal to any standardization of effective classroom practices. There are largely two broad theories that provide much of the groundwork on the emotional support domain in CLASS. First is attachment theory and the second is self-determination theory (Connell & Wellborn, 1991; Skinner & Belmont, 1993). It is argued by the attachment theory that children become more independent and are more motivated to take risks in their undertakings when they are aware that there is help available from adults when they need it and have access to emotional support. Self-determination theory argues that children become more motivated to learn when they can feel that they have adults' support which helps them feel more positive and autonomous (Roeser et al., 2000). In addition, children that feel the support from the teachers are more likely to follow the goals valued by teachers, by engaging more actively in academic

activities. The emotional support domain – as well as its indicators including positive classroom climate, teacher sensitivity, and the regard for student perspectives - which forms one of the three principle pillars of the CLASS observation tool builds upon these two theories (Wentzel, 2002; Pianta & Hamre, 2009).

The second domain of CLASS is classroom organization which measures whether teacher maintains well-managed classrooms that provide children with frequent and engaging learning activities (Pianta et al., 2008). This domain has three indicators including behavior monitoring, productivity as well as formats of instructional learning. The first indicator – behavior managing – has four behavior markers that measure i) clear behavior expectations to see whether teacher has well-articulated instructions and clarity, ii) proactiveness to see whether teacher expects problems, low activity, iii) management of misbehavior to see teacher is capable of effective reduction of problematic behaviors, focus on the positive and effective behavior managing and iv) student behavior to see whether there is aggression and defiance in the classroom. The second indicator of classroom organization domain is productivity which has 4 behavior markers including i) maximizing learning time to see whether teacher provides activities followed by choice for the next activities, ii) routines to see if students know what to do with clear instructions and with little wandering, iii) transitions to see whether between-activity transitions are brief, explicit with learning opportunities, iv) preparation to see if the teaching materials are ready and accessible and that teacher knows the lessons well (Pianta et al., 2008, 44). The last indicator – instructional learning formats – includes 4 behavior markers; i) effective facilitation to assess teacher involvement, effective questioning, expanding children's involvement, ii) variety of modalities and materials to assess the range of auditory and visual opportunities as well as hands-on opportunities, iii) student interest to see whether teacher can encourage students' active participation and attention, iv) clarify of learning objectives to assess teachers' ability to give clear statements for learning (Pianta et al., 2008, 61).

Classroom organization is the domain that adds the element of structure and process to teacher-child interaction. Teacher-child interaction can have increased value for child development when it takes place through processes relevant to the organization and management of children's

behavior and attention in the classroom (Emmer & Stough, 2001; Pianta & Hamre, 2008, 44). The importance of ensuring adequate level of classroom organization for the purpose of increasing teacher-child interaction comes from evidence about the importance of children's self-regulatory skills and studies (Blair, 2002). In addition, regular classroom practices are known to contribute to improving children's self-regulatory competencies (Pianta & Hamre, 2009). These research findings reinforce the argument that teachers' ability to ensure classroom organization forms an important part of an effective learning environment for children, with direct linkage to children's social and academic development outcomes. That is, in classrooms where teachers can utilize more effective behavior management tactics and maintain more organized routines can encourage students to participate more actively in classrooms. And when there are less problematic behavior and higher level of participation in learning in the classroom, children in that classroom will naturally learn more (Pianta & Hamre, 2009).

The last domain of CLASS observation tool is instructional support that assesses whether teachers teach children to think, while providing ongoing feedback and support as well as facilitating language development (Pianta et al., 2008). This domain consists of 3 indicators; concept development, quality of feedback and language modeling. The indicator of concept development consists of the following 4 behavior markers; i) analysis and reasoning to see whether teacher asks children why and/or how questions and helps with problem solving and prediction/experimentation; ii) creating to see teacher helps children with brainstorming, planning and producing, iii) integration to see if teacher helps children to connect concepts and integrate them with previous knowledge; and iv) connection to the real world to relate new information and knowledge to students' lives. The second indicator – quality of feedback – also consists of 4 behavior markers; i) scaffolding to see if teachers give adequate hints and assistance for children to reach answers, ii) feedback loops to see if teachers engage in continued exchanges of thoughts with questions; iii) promoting thought process to see if teachers ask children to articulate their thoughts and actions; iv) encouragement along with affirmation to see if teachers express recognition and reinforcement. Lastly, the instructional support domain includes language modeling indicator which consists of 5 behavior markers. These markers assess teachers' engagement in i) frequent conversation to see if teachers encourage active responding

and child-to-child conversation; ii) open questions to see if teachers encourage children to respond with more than one word; iii) repetition to see if teachers repeat and extend children's answers; iv) self-and parallel talk to see if teachers map their own actions with language and v) advanced language to see if teachers engage in conversation with diverse words.

The concept of instructional support began to receive increasing attention in the recent years along with stronger emphasis placed on the educational environment (Galton, 2002). That is, the environment and the teaching strategies through which children learn can influence the level of their learning. The theoretical background that was employed to build the concept of instructional support domain of the CLASS framework is primarily based on the research on children's cognitive and linguistic development (Pianta & Hamre, 2009). Children's cognitive development and linguistic abilities can be shaped depending heavily on the adults who are in the position to provide opportunities for children to practice their existing abilities and to scaffold more complicated skills. Also important to children's later academic achievement is ensuring development of meta-cognitive skills which refer to children's awareness and understanding of his or her thinking mechanism (Veenman & Spaans, 2005). The domain of instructional support in the CLASS framework places importance on the learning content of the curriculum and activities but also on the mechanisms in which teachers carry out these mechanisms in order to support children's cognitive and linguistic development more effectively (Pianta & Hamre, 2009).

In assessing teacher-child interaction in ECEC classroom settings, the most widely used method is observational measure (Pianta et al., 2008; Bryant, 2010). Table A-12 provides a summary compiled by Bryant (2010) of the 11 most widely used classroom observation tools including CLASS, along with their data collection method, targeted age range and domains observed. Different observation tools cover slightly different domains. Some tools focus more on frequent and warm interactions between the teacher and children while others focus more on the language used and expanding children's knowledge through extension and responsiveness, while there are tools that focus more on whether there is a variety of activities that promote children's reasoning and problem solving abilities. Some researchers attest that a heavier emphasis should be placed on measures

that only focus on assessing teacher-child interactions and less on physical characteristics of the classrooms (Pianta et al., 2005). On the other hand, other research put more emphasis on language and literacy preparations (Dickinson, 2002). More recently, there is also research that link specific elements of quality to specific child outcomes (Burchinal et al., 2014). Therefore, it is important to choose the instrument that best captures the specific domains of the classroom quality that need to be assessed. That is, it is necessary to first reflect on the purpose of the assessment. A measure that looks closely at the classroom's environmental features for language and literacy development for children would be most apt for assessing a policy effect focusing on improving children's early literacy development, for instance. Assessment instruments based on observational measures consist of multiple independently scored individual items that can be averaged into a combined quality score. Scores of individual items can also be grouped together under subscale scores. The subscales of a typical observational measure are created by authors conceptually to enable generation of independent subscale score (Bryant, 2010).

In addition, the targeted age range as well as validity and reliability results also need to be considered (Bryant, 2010). In terms of age applicability, it is one element that can narrow down a choice of which assessment measure to use. A majority of the assessment tools mentioned in Table A-11 are designed for preschool-aged children and some of them are intended for infants and toddlers. Validity looks at whether the target construct is well captured in the assessment. Each assessment tool mentioned in Table A-11 are shown to have adequate validity and to demonstrate high level of correlation to other measures of the same construct. The level of reliability of each instrument seems to vary. Typically, studies have employed double-coding for approximately 85% of individual assessment items that are either same or different by one point (Bryant, 2010). When it comes to 7-point Likert scales, some of these studies have employed a standard of higher than 85% agreement rate (Epstein, 1999). In reality, the Cohen's Kappa statistic is increasingly considered as a preferred measure of reliability but the standard of reliability may differ depending on the usage of the information produced (Bryant, 2010). There is no single rule that prescribes a certain percentage of observations that need to be double coded to ensure inter-rater reliability but typically every 10th visit can be double coded.

3.2. Child development outcomes

3.2.1. Cognitive and non-cognitive skills

Among the strands of children's development outcomes, the importance of children's non-cognitive skills is receiving growing attention. The strong impact of non-cognitive skills on schooling performance of children and adolescents as well as predicting occupational attainment and wages through higher productivity are well documented (Heckman & Masterov, 2007; Heckman, 2006). Studies found that early interventions through high-quality childcare centers contributed more to boosting children's non-cognitive skills, in particular social development in childhood (Schweinhart et al., 2005).

Table 3-2: Comparison between cognitive skills and Non-cognitive skills

	Cognitive Skills	Non-cognitive skills
Description of skills	• Fluid intelligence (the rate at which people learn) • Crystallized intelligence (acquired knowledge)	• Character skills • Personality traits • <u>Socio-emotional skills</u> • <u>Communication skills</u> • <u>Motivations</u> • Adaptability
General method of assessment	IQ tests Standardized achievement tests	Self-reported surveys or observer reports

Source: Created by the author based on Heckman and Rubinstein (2001); Heckman et al., Urzua (2006); Heckman (2012); Heckman and Kautz (2013, 8)

3.2.2. Child Outcome Assessment – Child Initiative Scale

Oh (2004) explored diverse meanings of child initiative based on past studies and developed self-

initiative scale that is relevant to be assessed by teachers in the Korean context. Among diverse conceptualized notions as skills to be developed during early childhood, the study stressed the importance of children's "self-initiative" that can be interpreted as 'initiative-ness', 'proactivity', 'self-leadership', 'self-empowerment'. These traits are in line with elements that should be nurtured based on both western and eastern philosophies. Self-initiative is a crucial element that ensures children's future academic and social development and should be developed in early childhood education settings. Seo (2016) emphasized the importance of "self-initiative" referring to self-initiative as abilities to understand the society's values and rules and to lead one's life proactively, which is usually developed in the ages between 3 and 6. Seo then analyzed the effect of teacher's temperament – measured on EAS (emotionality, activity, sociability) (BUSS and PLOMIN 1984) on children's self-initiative (Seo, 2016). The study found that only teacher's emotionality had meaningful effect on all three aspects of children's self-initiative. That is, teacher's negative temperament decreased the level of children's emotional skills, communication skills and motivation to achieve.

3.3. The effect of teacher-child interaction on child development outcomes

3.3.1. Evidence from international studies

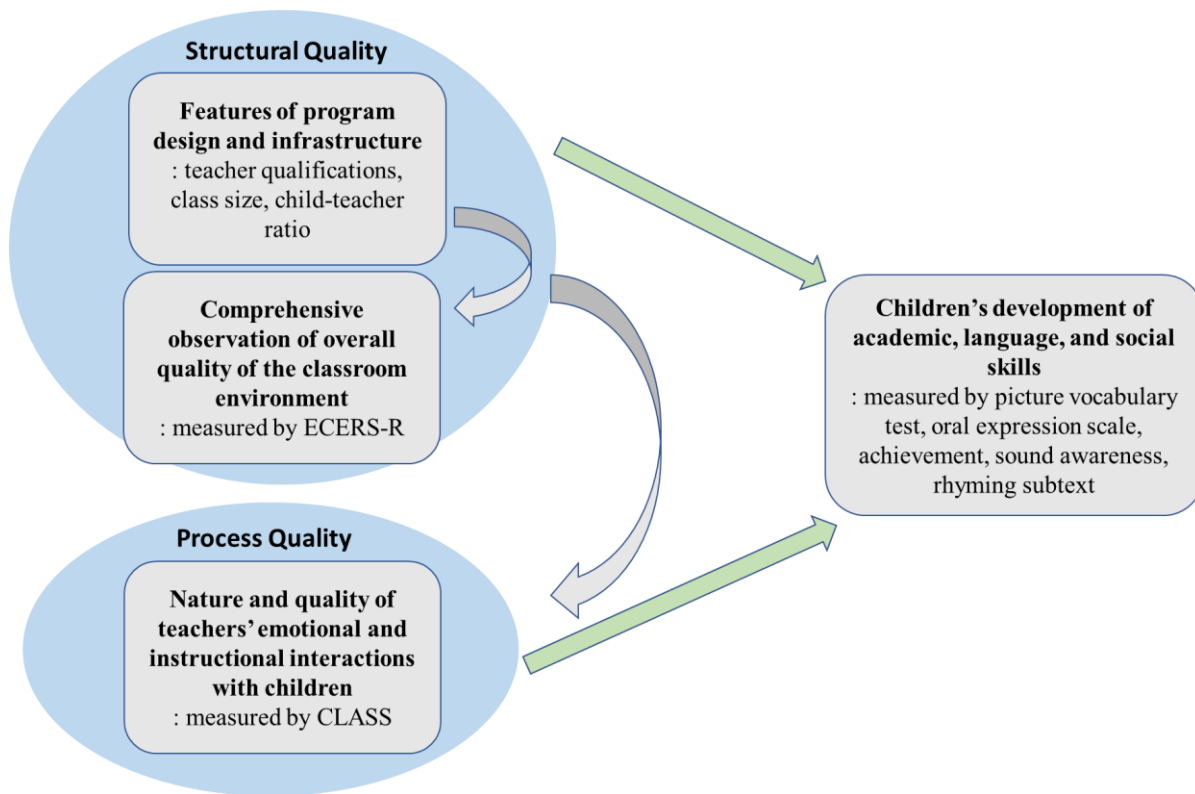
Previous studies demonstrate that process quality has significant impact on child's learning. Among the elements that constitute process quality, teacher-child interaction is considered a key instrument through which children obtain knowledge.

Mashburn et al. (2008) recognized the importance of ensuring quality of early childhood education and care services given the significant amount of government investment into such services and conducted analysis to investigate the service quality has improved, as a way to inform the direction for policies. In investigating the quality of ECEC centers, the study saw the importance of children's direct experiences while they are enrolled in programs. This includes the ways that teachers

organize children's routines, preparing interesting materials for children, and the qualities of teacher-child interactions. However, this study also recognized the potential effect of structural features of the ECEC program such as program infrastructure or design and aspects of the classroom environment.

Therefore, the study measured the quality of ECEC centers using two different measures. First, in order to measure the structural aspects of the classroom quality, the study used the Early Childhood Environment Rating Scale's revised (ECERS-R) version (Harms & Clifford, 1983). The ECERS-R includes 36 items to measure dimensions of the ECEC program focusing mostly on structural aspects of the classroom. The measures of the quality of ECEC service are then calculated as the average of the total of 36 items that are assessed on 7-likert scale. Given the importance of interactions as a significant domain of the program quality, this study employed a second measure that focuses exclusively on the interactions between teachers and children measured by Classroom Assessment Scoring System (CLASS; Pianta et al., 2008). CLASS is an instrument that measures quality of ECEC service centers focusing on teacher-child interactions that take place within classrooms. CLASS is also a 7-likert scale scoring system with 1 or 2 indicating low, 3,4, or 5 indicating mid-range, and 6 or 8 indicating high quality, and measures emotional support, classroom organization and instructional support. As measures of child development, the study investigated children's academic and language skills. The study sampled 2,439 participants from 4-year-olds in public prekindergarten, more specifically, children that are enrolled in 671 preschool classrooms in 11 different states. Results of the show that relevant policies, program design and professional development activities that enhance teacher-child interaction skills can also improve children's school readiness.

Figure 3-5: Analytical framework for ECEC quality and child development



Source: Created by the author based on Mashburn et al. (2008)

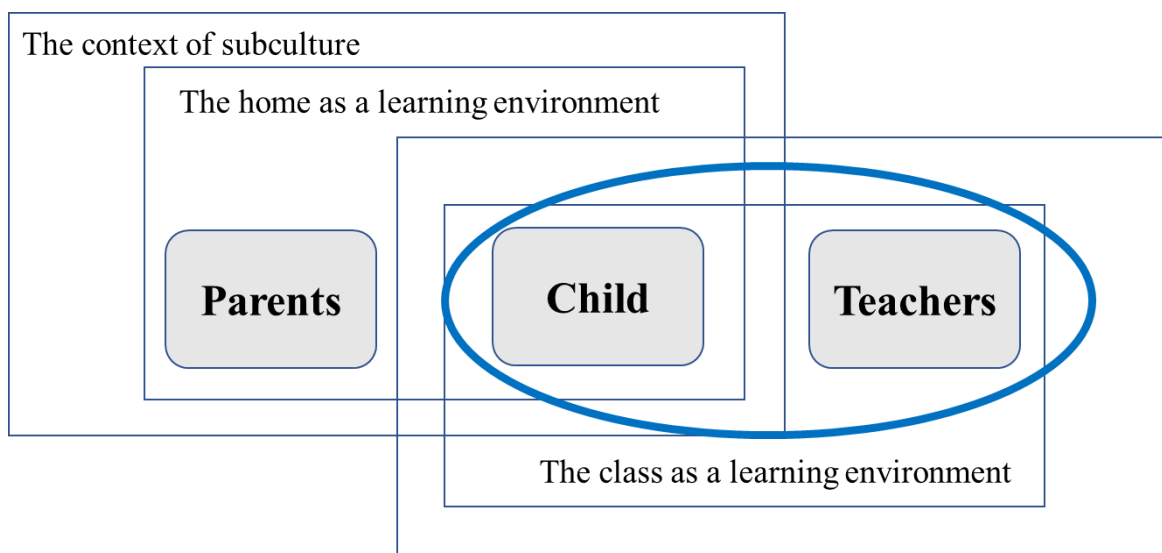
As results, research of Mashburn et al. (2008) produced largely five sets of findings. First, the structural quality dimensions of classrooms, such as small group sizes and child-teacher ratio did not show direct associations with children's and learning, but may help generate conditions in classrooms where higher quality interactions can produce more positive influence on child development. Second, teacher factors did not show significant relations with child development, but can have direct impact on emotional association between teachers and children within classroom, thereby indirectly yielding effect on children's development. Third, classroom quality measured by Early Childhood Environment Rating Scale (ECERS-R) showed positive relations with children's language skills . Fourth, the quality of pedagogical interactions measured on Classroom Assessment Scoring System (CLASS) showed association with all five measuring instruments of academic and language development of children. Third, teachers' education level (classified by teachers that have a bachelor's degree) had positive association with children's social competence development. Fifth,

quality of emotional interaction between teachers and children measured by CLASS was positively associated with children's social competence and negatively associated with children's tendency to develop problematic behaviors.

Hows et al. (2008) argued that the process quality measured by teacher-child interaction was significantly associated with the children's language abilities and teacher-child interactions were associated with literacy outcomes. Results also showed that stronger relationships with teachers were associated with slightly larger increases in the number of letters that children recognized and teachers' rating of language and literacy abilities.

Based on Bronfenbrenner's ecological model (Bronfenbrenner, 1979), Hirsto (2001) suggested a systemic view of a child's learning environment. Once a child enters a microsystem, they become part of an environment, they face a new adult the teacher, who may become a significant other. They are confronted with face-to-face interaction and meets a new set of social norms.

Figure 3-6: Hirsto's Analytical framework for Teacher-Child Interaction

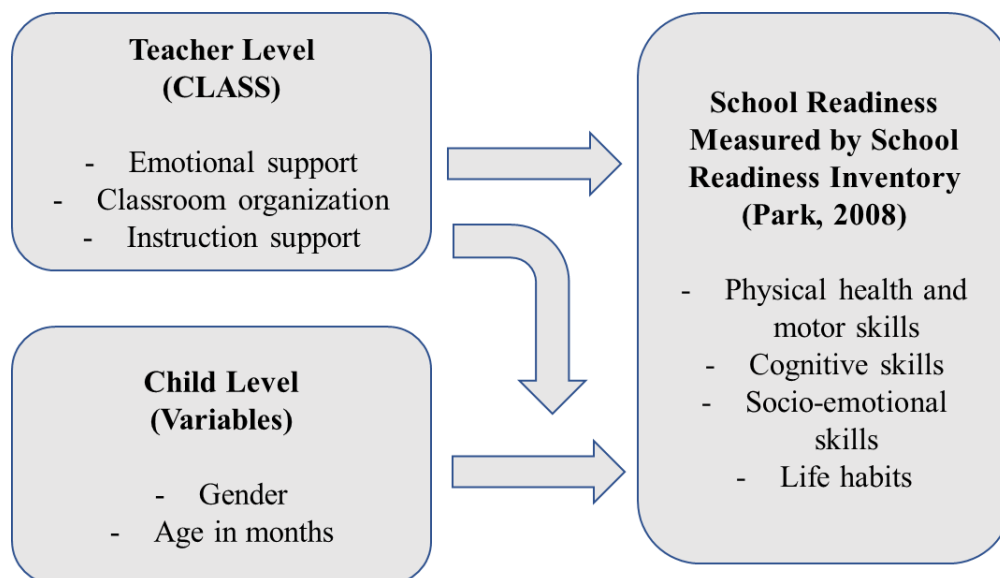


Source: Created by the author based on Hirsto (2001)

3.3.2. Evidence from the Korean studies

Bhang and Chung (2015) analyzed the effects of gender and age of children and kindergarten teachers' teaching behaviors on children's learning and development. The teachers' teaching behaviors were measured on CLASS observation tool, which means the teaching behaviors of teachers were measured by teacher-child interaction. The study first conducted Delphi assessment which verified validity of CLASS tool to be used in Korea. In order to measure children's learning and development, Bhang used a Korean-developed school readiness scale (Park & Chung, 2008). Then she conducted the study for 31 kindergartens teachers and 372 children.

Figure 3-7: Analytical framework for the effect of teacher/child characteristics on child's school readiness



Source: Created by the author based on Bhang & Chung (2015)

The results produced, using two-level multilevel linear modeling, showed that children's school readiness was explained by both individual and teacher level differences. Gender and age were statistically significant variables for explaining school readiness, but its impact reduced when the teacher level was high. However, teacher variables, class variables, and parents working status were not considered.

CHAPTER 4:

METHOD

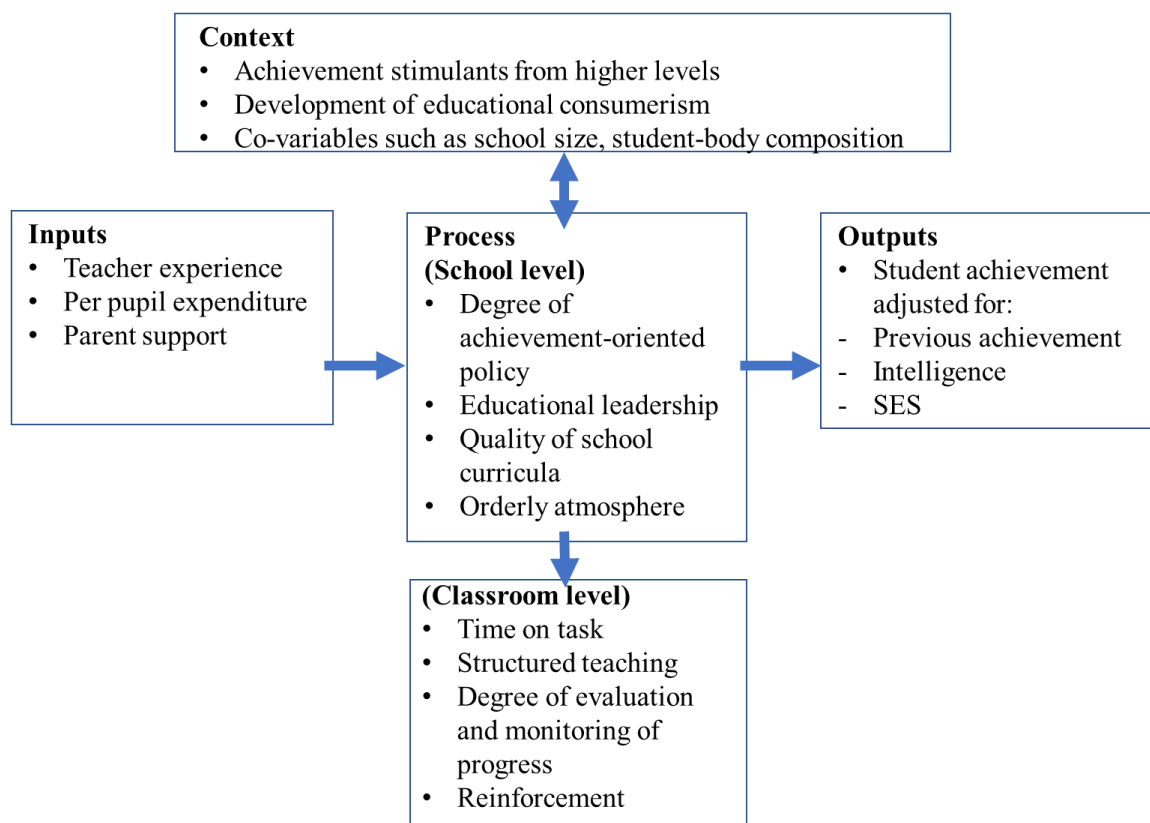
4.1. Analytical Framework

The principle purpose of this study is to measure the quality of classrooms in Korea's employer-supported childcare centers, focusing on teacher-child interaction and analyzing its effect on child development outcomes measured by self-initiative score. This statement may seem as if the quality of classroom is the sole measure of quality of education which constitutes input and that child development is the outcome. Nevertheless, this study builds on the notion that quality of education encompasses both input and outcome as central dimensions of quality. In search of the quality measures of education for the beginning of the 21st century, Scheerens (Scheerens, 2005) developed a conceptual framework for quality of education with a view to define and improve education quality. Initially, Scheerens assumed that quality of education is determined by input and outcome of education and the process between the input and outcome had previously been considered as a black box without much exposure to assessment. However, his study sheds light on the stage of process, proposing three stages to the dimension of education quality – input, process and outcome. The process is considered an important stage that transforms input to outcomes. In efforts to describe the processes with regards to which process elements are most influential in enhancement of outcomes, this framework took a more articulated form. The model is more often than not used as a framework to describe the outcomes of research investigating school effectiveness. In this study, this framework is used to conceptualize domains of quality of education in the stages of input, process and outcome. This conceptualization is important as the dominating narrative in the discourse of quality of education is largely focused on the input dimension.

Figures 4.1 depicts Scheerens education quality framework which encompasses three dimensions; inputs, process and outcomes. In this framework, outcomes form one of the basic criteria for educational quality. In order to select variables and indicators to assess process and context, it is

important to identify factors that have been proven to show correlation with relatively high level of outcomes (Scheerens, 2005). This statement provides an important foundation for this study as one of the objectives of this research is to identify factors that influence child development outcomes. In addition, this input-process-outcome framework considers outcomes as one of the determinants of quality of education. Nevertheless, it should be noted here that “process” mentioned here is not identical in its meaning with the “process” that was used for “process quality”. The term “process” used in Scheeren’s study refers to a particular stage in the larger education system, whereas the term “process” used for process quality refers to a series of daily experiences that are experienced by children in individual classrooms – in particular in their interaction with teachers. In this sense, this study – as opposed to Scheeren’s study shown in Figure 4-1 below - can be considered a micro-level quality analysis at individual classroom level and the input-process-outcome elements can be translated respectively into teacher/classroom/child characteristics (input), teacher-child interaction (process) and child development outcomes (outcome).

Figure 4-1: Scheeren’s Conceptual Framework for Educational Quality



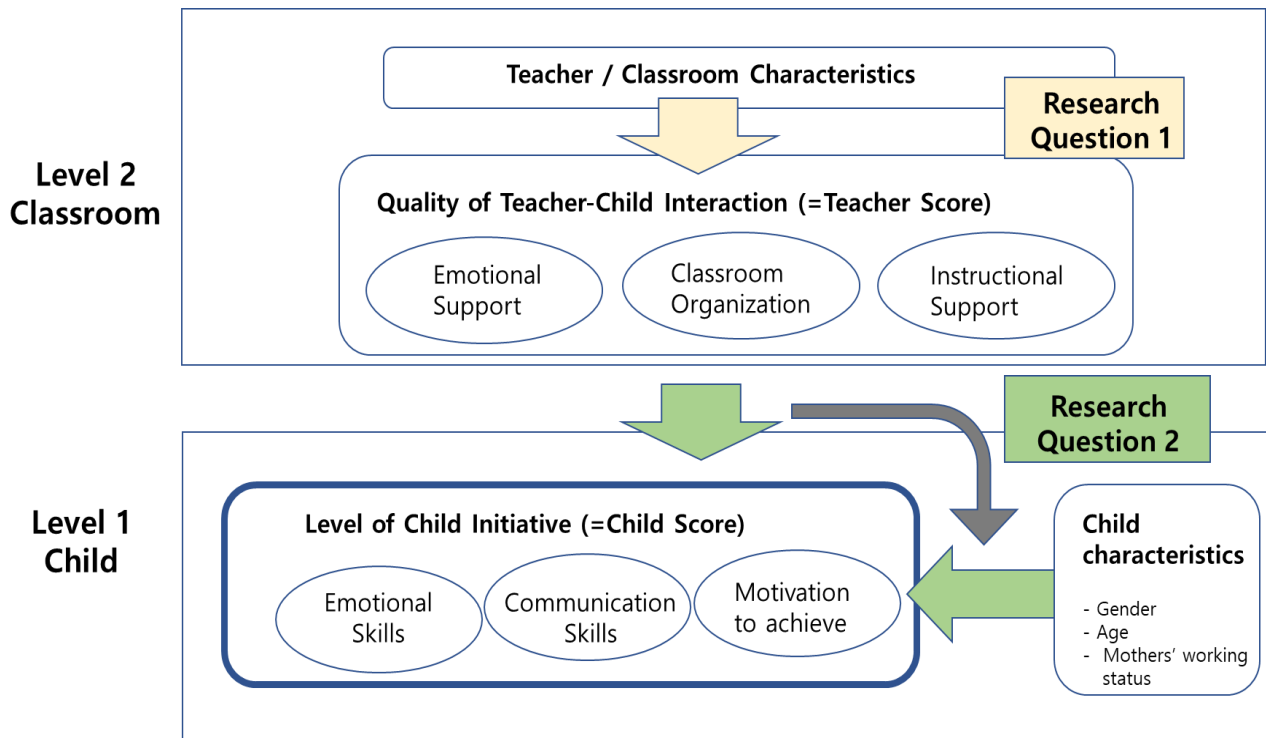
Source: Created by the author based on Scheerens (2005)

In addition to Scheeren's framework linking input and outcome into a single framework for assessing quality, a cross-country analysis about ECEC quality reports that many countries are beginning to include child development outcomes in the elements that form ECEC quality (OECD, 2011). The study found that a great number of countries monitor child development or outcomes using different sets of instruments. A majority of countries employ either an internal evaluation or a combination of external and internal evaluations. Monitoring instruments that are commonly used are rating scales, observations, checklists, and portfolios for internal evaluation. For external evaluation, tools including inspections, checklists and questionnaires are used. Standardized testing is also used in some countries – in Ireland, standardized tests are used for kindergartens and in Finland, it is used for external evaluation in childcare centers.

Within the context of Korea, there is growing volume of research that studied the spectrum of input, process and outcome of early childhood education and care by looking at the association between the quality of teaching and quality of learning. Bhang and Chung (2015) conducted a study within the Korean context to verify the effect of teacher-child interaction measured on CLASS on children's development outcomes on school readiness. Bhang also considered child characteristics – age and gender – as variables that can affect child development outcomes. Given the nested nature of the samples – a group of children belonging to the same classrooms – hierarchical model was used in order to see the separately the effect of level 2 variables (teacher-child interaction) and level 1 variables (child gender and age) (Bhang & Chung, 2015).

As such, and as previously mentioned in the objectives of the study, the purpose of this study is to assess the quality of ECEC in Korea from both input, process and outcome sides. This study will attempt to verify the effect of teacher/classroom characteristics (input) on teacher-child interaction process), the effect of teacher-child interaction (process) on child development outcomes (outcome), as well the effect of teacher/classroom/child characteristics (input) on child development outcomes (outcome). Given the hierarchical nature of the samples – children nested in classrooms – this study also employs multi-level modeling as shown in Figure 4-2.

Figure 4-2: Analytical Framework of the Study



Source: Created by the author based on Bhang and Chung (2015)

To evaluate the quality of teacher-child interaction, classroom assessment scoring system (CLASS) will be used and to evaluate the child development outcomes, self-initiative score will be used. As classroom characteristics, structural quality elements such as classroom size and child-teacher ratio were used. For teacher characteristics, teacher age, education, experience and frequency of training (per year) were included and for child characteristics, child gender, age and parents' working status – whether one parent works or two parents work – were included.

4.2. Hypotheses

The hypotheses that will guide this research are constructed based on previous studies and in accordance with the research questions introduced in section 1.3 as well as the objectives of the study

presented in section 1.4. To answer Research Question 1 and the three sub-research questions, the following three hypotheses are formulated:

Hypothesis 1-1. The level of children's character skills measured in child initiative score are higher for girls and older children, and for children whose mothers are not employed.

Hypothesis 1-2. Aggregate teacher-child interaction score significantly increases the children's character skills measured in child initiative score; when measured separately, each of three domains of teacher-child interaction has significant positive effect on child outcomes.

Hypothesis 1-3. When teacher's interaction score is higher, the differences in child initiative score caused by child individual characteristics become mitigated.

With regards to Hypothesis 1-1, there is relatively less amount of research about the effect of child gender and age on their level of development outcomes, although the exiting research provide ample evidence to support this hypothesis. Children's gender (when child is a girl) and age along with teachers' education, experience and training have shown positive effect on children's learning outcomes. Bhang and Chung (2015) analyzed the effect of child gender and age in months on child's level of school readiness. The results show that girls scored higher than boys in all domains of school readiness; physical health and motor development, cognitive development and general knowledge, socio-emotional development and life habit and attitude. Such result about the effect of child gender is supported by Park (2008) which found that girls score higher than boys in terms of school readiness (Park, 2008) and Seo (2016) who argued that children's learning outcomes in self-initiative scale were higher for girls; on average, girls scored significantly higher than boys in all three domains of self-initiative (Seo 2016). These results provide important evidence for this hypothesis as the elements of school readiness also includes socio-emotional development which forms part of the self-initiative

scale.

In terms of the effect of child age, this study hypothesizes that older children score higher on self-initiative score based on similar research that analyzed the effect of child age on their development outcomes. Bhang and Chung (2015) found that children with higher age scored higher in school readiness. Children's age was measured in months and children with higher months in age scored higher in all four domains of school readiness, the result that is also supported by Kang and Hwang (2013) who revealed that children with higher months in age showed better school readiness (Kang & Hwang 2013).

Maternal employment in children's early years can generate negative impact on child development. Ruhm (Ruhm, 2004) and Brooks-Gunn (Brooks-Gunn et al., 2002) reported negative effect of maternal employment on child's cognitive development and Baydar and Brooks-Gunn (Baydar & Brooks-Gunn, 1991) and Belsky and Eggebeen (Belsky & Eggebeen, 1991) revealed negative impact of maternal employment on child's emotional development and behavior. In the light of such research, this study hypothesizes that maternal employment has negative effect on child's self-initiative score which measures both cognitive and non-cognitive development of children.

As for Hypothesis 1-2, a large number of studies provide evidence for this hypothesis. Positive association between the level of teacher-child interaction and child development outcomes can provide solid evidence for this hypothesis. Evidence shows that early social interactions between children and their social context yield influence on children's development process (Rimm-Kaufman et al., 2005; Bronfenbrenner & Morris, 2006). In line with this evidence, interactions between teachers and children in center-based ECEC settings serves as a proximal environment that can affect children's development. High-quality teacher-child interactions can affect children's behavioral, socio-emotional and academic outcomes, stressing the importance of the quality of teacher-child interaction in ECEC services (von Suchodoletz et al., 2014).

Mashburn et al., (2008) found that teacher-child interaction measured by the CLASS was positively associated with development of children's academic and language skills during Pre-K, which corresponds largely with this study's target age; from age 3 to 6. The study measured

comprehensive measure the association between classroom quality (measured by ECERS-R) and children's linguistic skills by the time they finish Pre-K. Results showed that the total ECERS-R score was positively associated with linguistic skills. In the model which measured the quality of classrooms with CLASS, quality of emotional support did not show significant association with child development outcomes but the level of instructional support was strongly associated with all factors of children's development.

According to Bhang and Chung (2015), teacher-child interaction had significant positive effect on children's development outcomes. In this study, quality of teacher-child interaction was measured on CLASS and child's development outcomes were measured on school readiness scale. Results show that all three domains of CLASS teacher-child interaction – emotional support, classroom organization and instruction support – had positive association with child development outcomes measured by school readiness (Bhang & Chung, 2015, 13).

Byun (2017) argued that teachers' level of interactions with children has positive effect on the level of children's peer initiative. In this study, teacher-child interaction was measured by CLASS and children's development outcomes were measured by peer initiative. Peer initiative, which refers to leadership and motivation in engaging in activities and social interactions, was evaluated by children's teachers using the Peer Initiative Scale developed for preschoolers by Byun and Sung (2017). Peer initiative is considered an important skill in interacting in harmonious way with other peers in group settings. The study found that higher levels of teacher-child interaction contributes to children's stronger peer initiative, enabling them to take more initiative and interaction more socially with other peers. In particular, higher levels of teacher's emotional support for children and classroom organization showed significant impact on promoting children's harmonious peer initiative skills.

In terms of Hypothesis 1-3, this study expects to find different impact of child characteristics on child's socio-emotional skills depending on the level of teachers' interaction skills. Bhang and Chung (2015) found that when teachers' interaction score increases, it decreased the effect size of child gender and age on child outcomes. That is, the impact of child characteristics on child's development can be mitigated when the quality of teacher-interaction is high in classrooms. As

mentioned in Hypothesis 2.1, this study hypothesized that maternal employment during children's early years can bring negative impact on child development (Ruhm, 2004; Brooks-Gunn et al., 2002). However, given the strong positive effect of high quality teacher-child interaction on children's socio-emotional development as well as the extended hours that the sampled children spend in employer-supported childcare centers – that are known to have the longest operating hours of at least 12 hours per day – this study hypothesizes that the effect size of all child characteristics on their development outcomes decrease when teachers perform better in terms of interacting with children in classrooms.

To answer Research Question 2 and the three sub-research questions, the following three hypotheses are formulated:

Hypothesis 2-1. The current quality of teacher-child interaction in Korea's childcare centers has increased in the recent years compared to that observed in the past studies.

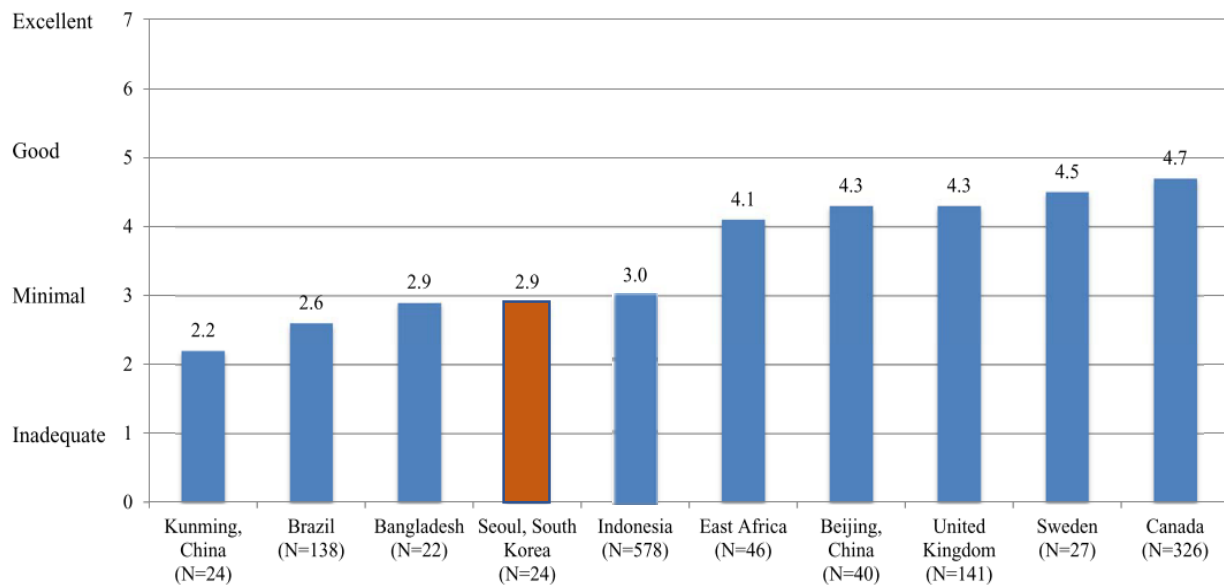
Hypothesis 2-2. Teacher-child interaction score is higher in classrooms of teachers with higher education level and more frequent training but it not significantly associated with teachers' experience or age.

Hypothesis 2-3. Teacher-child interaction score is higher in classrooms where child-teacher ratio is low and the overall classroom size measured by the total number of students in classroom is small.

As shown in Hypothesis 2-1, this study anticipates that the current quality of teacher-child interaction in Korea's childcare centers has increased during the recent years compared to that observed in the past studies. This hypothesis compares the quality of teacher-child interaction in classrooms targeted for this study with that of three past studies conducted in Korea's ECEC setting; Bhang & Chung (2015), Kwon (2015) and Byun (2017). All three past studies used CLASS as the observation method. Observations in Bhang & Chung (2015) were conducted in the kindergarten's in

Korea's metropolitan area in 2014. Kwon (2015)'s observations were conducted in childcare centers in Korea's metropolitan area in 2014. Byun (2017) conducted observations in kindergartens and childcare centers in three different provinces in Korea in 2015. The observations for this study was conducted in the middle of 2017, which creates the difference of approximately 2 to 3 years of time gap compared to the past studies. During those 2 to 3 years, the focus on teacher-child interaction has increased most evidently indicated in the pilot implementation of quality accreditation phase 3 in which the number of indicators on teacher-child interaction increased from 6 to 10. This period also witnessed a transition into integrated quality accreditation for kindergartens and childcare centers, signaling the same level of quality of services that is expected to be provided at both kindergartens and childcare centers. In addition, this study anticipates that relative standing of the current quality of ECEC in Korea, in comparison with that of international studies, has increased in the recent years. As mentioned in section 2.5, relative evaluation of Korea's ECEC quality was considered low in the past international comparative analysis (Sheridan, 2009; Brinkman, 2016). However, given that the Korean data used of this international comparison was from a period prior to the introduction of the Nuri Curriculum and the revised quality accreditation with stronger focus on teacher-child interaction, this study presumes that the quality of teacher performance has increased after the implementation of the new curriculum and relevant policies.

Figure 2-9: Average Early Childhood Rating System (ERS) Score across Settings



Source: Brinkman (2016, 28)

Note: N is the number of classrooms of ECEC centers observed

With regards to Hypothesis 2-2, this study presumes that teachers with higher education level, longer work experience and more frequent training score higher on teacher-child interaction, but teachers' age does not have meaningful influence on interaction. Previous studies support that teacher-child interaction is an integral element that constitutes quality of early childhood education and care services (OECD, 2018a; Slot et al., 2015). Ensuring effective teacher-child interaction, therefore, is an important task in the efforts to improve ECEC quality. This study attempts to identify the factors that are conducive to increasing the level of teacher-child interaction as measured on Class Assessment Scoring System (CLASS) observation tool. Among possible factors that can predict higher teacher-child interaction score, research question 1.1 investigates the effect of teacher characteristics on their teacher-child interaction score. Teacher's age, years of education, years of work experience, and frequency of training were included as variables to measure teacher characteristics.

Studies show that teachers with adequate qualifications are better equipped to engage

children and stimulate their ideas in the learning process (NIEER, 2006; OECD, 2006). Well-educated teachers are also better positioned to provide warm and stimulating staff-child interactions with greater vocabularies and increased ability to solve problems in classrooms, contributing to long-lasting positive effect on children (OECD, 2011). Mashburn et al. (2008) argued teachers with a bachelor's degree had positive association with higher teacher-child interaction score, particularly in instructional support domain. Burchinal et al. (2002) provided evidence that education level of teaching staff - more specifically, holding a bachelor's degree – is the strongest predictor of the process and environmental quality of early childhood education and care settings (Burchinal et al., 2002). Similar results were demonstrated by Faour (2010) who argued that in developed countries, holding university degrees had meaningful influence on the teachers' greater use of child-centered pedagogical practices and language-stimulation method (Faour, 2010). In the light of such previous studies, this study hypothesizes that teacher education level has positive effect on their interaction score.

The level of teacher's education is evidenced to be an important predictor of their abilities to interact with children in classrooms. Nevertheless, qualifications alone may be insufficient to ensure quality of education they can provide. A number of studies show that ECEC teachers' pre-service education levels – regardless of how high they are – may not be the sole guarantor of high quality interactions and pedagogical practices and that online professional development can play the role of providing the additional knowledge and skills with new insights in specific (OECD, 2014b; Burchinal et al., 2002; OECD, 2006). In addition, continued professional development is crucial to guide ECEC staff with the latest trends in effective teaching practices and updates in the curriculum content. Professional development that is specialized in specific areas have stronger impact on process quality dimensions, including stable, sensitive and stimulating interactions, and teachers' skills to foster stimulating learning environments (Assel et al., 2007; Sylva et al., 2006; OECD, 2006; Shonkoff & Richter, 2012). In this sense, these findings provide important evidence for this hypothesis. Research

also shows that professional development shows higher effectiveness when it is targeted to teachers' needs and focused on specific content and practice. These research results support the hypothesis that teacher's interaction score is higher for teachers that are exposed to higher frequency of training. And this study collected data on the frequency of teachers' training that is designed specially on the topic of interaction which is likely yield stronger effect based on previous studies.

There is lack of research on the effect of teachers' age on their interaction skills. Even in the study by Kwon (2015) that looked into the association between teachers' characteristics such as education background and their performance in teacher-child interaction, teachers' age was not considered as one of the variables. This study presumes that teacher age is often not considered as a variable to represent teacher characteristics as its effect on their preperformance is more often not proven to be significant. Therefore, this study hypothesizes that teacher age is not associated with their performance in teacher-child interaction.

There is less volume of research with regards to the effect of teachers' work experience on the level of teacher-child interaction in classrooms of children aged 3 to 6 years. Studies that saw the effect of teacher's work experience on their interaction score demonstrated mixed results; a majority of studies found positive association or no relation. In Germany and the US, studies found positive correlation between teacher's work experience and teacher-child interaction. On the other hand, in different studies, teachers' longer work experiences meant lower quality teacher-child interaction in different studies in the US or no correlation was shown between work experience and interaction score in China and yet another study in the US (Pianta et al., 2005; Hu et al., 2016). Studies that conducted cross-country analysis have shown similar patterns of mixed results among the countries, which was confirmed by another meta-analysis that produced similar results (OECD, 2018b). OECD (2018a) found that longer work experiences did not show meaningful association with the combined score of interaction. Based on these previous research findings, this study postulates that years of teachers' work experiences does not have meaningful effect on teacher-child interaction score.

As mentioned above, Hypothesis 2-3 presumes that teacher-child interaction score is higher in classrooms where child-teacher ratio is low and the overall classroom size measured by the total number of students in classroom is small. This study elected child-teacher ratio and the total number of students as parameters of classroom characteristics as the sampled childcare centers are entirely from the same type of childcare center- employer-supported childcare centers – and they are under strict operational regulations which minimizes the physical differences among the centers in terms of size of the premises, structure of the classrooms, etc. Child-teacher ratio and group size are both included as variables as they each constitute a meaningful variable on its own. Although it may seem that these two factors are highly related, studies show that these two variables can produce different impact on classroom quality (Bowne et al., 2017). In addition, child-teacher ratio and group size are the most primarily used variables in order to assess the structural quality or ECEC (Slot et al., 2015; OECD, 2018b). And a meta-analysis of relevant studies shows that that a number of studies have attempted to identify independent effect sizes of child-teacher ratio and group size on teacher-child interaction (OECD, 2018b). In addition, due to their independent effect on the classroom dynamics, statutory regulations also set separate standards to regulate each of these two construct, including by the regulations laid out by the Korean quality accreditation system. Therefore, this study will also attempt to investigate independent effects of these two structural quality variables on teacher-child interaction.

Previous studies found that lower child-teacher ratio had positive effect on teacher-child interaction score in classrooms for children of 3 to 6. A study in the US found that a small number of children per teacher was associated with more responsive, warm positive teacher-child interaction (Burchinal et al., 2002). A study by Mashburn et al. (2008) aimed at measuring the effect of high classroom quality on child outcomes and used as one of the variables child-teacher ratio. In particular, the study saw whether the classrooms followed the NAEYC (National Association for the Education of Young Children)'s child–adult ratio recommendations or not (Mashburn et al., 2008). NAEYC recommends that not more than seven preschoolers are allocated per adult. The study found that ECERS and ITES scores showed strong tendency to record .35 to .36 points higher the classrooms were compliant with the child-teacher ratio recommendations of the NAEYC than if they were not.

In Studies in China and Portugal, smaller child-teacher ratio and smaller class size were predictors of better teacher-child interaction as well as higher overall process quality (Philips. et al., 2000; Hu et al., 2016).

In terms of class size, Mashburn et al. (2008) also found that classrooms with smaller group sizes and lower child-to-teacher ratios tend to have higher overall quality (measured on ECERS), higher emotional support (measured on CLASS) as well as higher instructional support (measured on CLASS). In addition, the study found that small class sizes and lower child-teacher ratios can create environment where high quality social and instructional interactions can produce stronger positive effect on children's development, which will be discussed in more detail in hypothesis 2.2 (Mashburn et al., 2008).

A meta-analysis that studied the effect of structural process characteristics of classrooms – child-teacher ratio and group size – revealed that both variables had positive correlation with teacher-child interaction score (OECD, 2018b). The analysis compared results from ten different studies in order to see the association between child-teacher ratios and positive teacher-child interactions. The results show that quality of teacher-child interactions was meaningfully higher in classrooms that had lower number of children per ECEC staff.

In the Korean context, Kwon (2015) found that teacher-child interaction score measured on CLASS was significantly higher in classrooms with lower child-teacher ratio. The study divided the classrooms between ones that have a ratio higher than 10:1 and ones that have a ratio lower than 10:1. The results show that classrooms with a child-teacher ratio lower than 10:1 showed significantly higher teacher-child interaction score in general as well as for all sub-domains of interaction; emotional support, classroom organization and instructional support (Kwon, 2015).

Based on these previous research findings, this study hypothesizes that smaller child-teacher ratio and smaller classroom size have positive association with teacher-child interaction.

4.3. Models

In other similar research that studied the effect of teacher-child interaction on child outcome did not investigate the factors that can predict the teachers' interaction score. However, this study will attempt to do so although the sample size at teacher-level is small ($N=41$). Nevertheless, there are studies (Harrell, 2001; Austin & Steyer, 2015) that suggest subjects per variable (SPV) between 2 to 10. As the number of independent variables for teacher's interaction is relatively small, this allows the analysis of possible predictors for teacher's interaction score.

4.3.1. Hierarchical Linear Model (HLM)

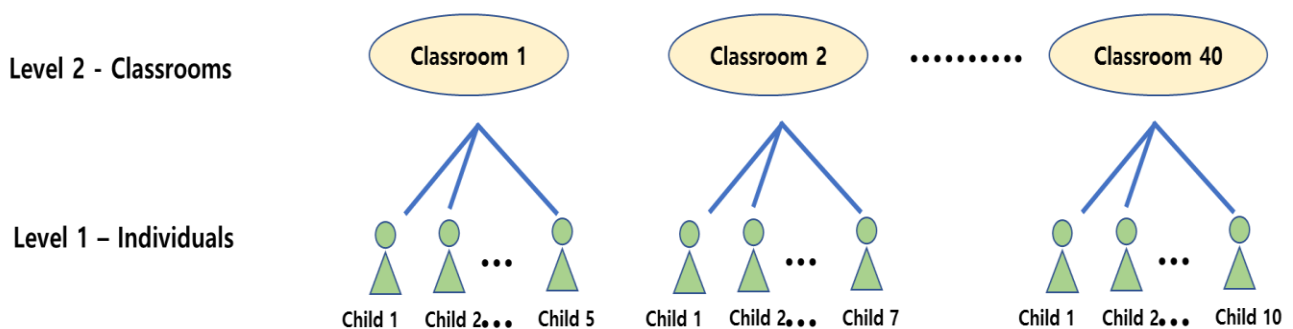
Research questions 1.1, 1.2 and 1.3 require the usage of multilevel model (MLM) as they involve variables at both individual level (level-1) - including gender, age and parents working status that only affect individual children – as well as classroom level (level-2) including both classroom characteristics and teacher characteristics that influence all children nested in one classroom. MLM is often referred to as hierarchical linear model (HLM) as well. As this study will use the Hierarchical Linear Modeling 7 (HLM : Raudenbush et al., 2000) to conduct multilevel analysis, it will also use the term HLM to refer to the model itself for consistency. For research questions 2.1 and 2.2, multiple regression can be used – as these questions only deal with variables at level-2.

Behavioral and social data often take the form of nested structure. For instance, samples can be nested within some organizational unit including classroom or a division (two-level HLM). These organizational units in turn can be nested within a higher level of organization such as school or a company (three-level HLM). Each of the levels in this structure is represented by a different model for that particular sub-model and each sub-model represents the structural relations that take place at that level as well as the residual variability at that level. Each of the level-1 coefficients that are defined in the level-1 models then become outcome variables in the level-2 model (Raudenbush et al., 2011).

This study analyzed the effect of teacher-child interaction on children's self-initiative observed and assessed in 41 childcare center classrooms. Past studies (Bhang & Chung, 2015; Kim,

2013^[8]; Mashburn et al., 2008) demonstrate that child outcome in center-based ECCE setting is influenced by not only child-level characteristics such as gender and age but also classroom-level characteristics including teacher characteristics as teacher-child interaction, teacher age and experience. In terms of classroom level characteristics, it should be noted that children that belong to the same classroom are exposed to the same level of teacher-child interaction and identical child-teacher ratio and teacher variables. This means children that belong to the same classroom are exposed to the same classroom-level characteristics. Such nested nature of the data is not entirely in line with the fundamental assumption of OLS (Ordinary Least Squares) that all samples need to be independent from one another. In addition, as child outcome is influenced by both classroom-level characteristics and individual child-level characteristics, it is meaningful to see how much variance in child outcome is within-level variance and how much is between-level variance. This will allow an analysis of whether teacher- child interaction has differing level of effect size depending on each observed classroom (Kang, 2017). Failure to consider hierarchical nature leads to unreliable estimation of the effectiveness of variables at different levels (Raudenbush et al., 2000).

Figure 4-3: Diagram depicting two-level hierarchical linear model (HLM)



Source: Created by author based on Raudenbush et al. (2000)

Given the hierarchical nature of collected data illustrated in Figure 4.1, a two-level HLM will be employed to consider the effect of both child-level variables (level 1) and classroom-level variables – including teacher-child interaction - on child outcome. As mentioned above, Hierarchical Linear

Modeling 7 (HLM : Raudenbush et al., 2000) software will be used to run the multilevel models in order to examine the effects of individual student characteristics, classroom and teacher variables on child learning outcomes measured by self-initiative scale, which include emotional skills, communication skills and motivation to achieve.

4.3.2. Empirical Models

In order to run the analyses, the following variables were created for child-level, teacher-level and classroom-level variables as shown in table 4.1.

Table 4-1: Variables Inserted for Level-1 and Level-2

Variables	Description
<i>Child-level variables (level-1)</i>	
GENDER	Gender of children: boys = 0, girls = 1
AGE	Age of children measured in months
MWORK	Mother's working status: mother does not work = 0, mother works = 1
SELFALL	Averaged aggregate self-initiative score: range = 1~5
EMOSKILL	Emotional skills domain score of self-initiative: range = 1~5
COMSKILL	Communication skills domain score of self-initiative: range = 1~5
MOTIV	Motivation domain score of self-initiative: range = 1~5
<i>Teacher-level variables (level-2)</i>	
TAGE	Teachers' age
TEDU	Teachers' education level: two- or three-year college = 0, bachelor's or higher = 1
TEXP	Teacher's experience in years
TRAINING	Number of training received per year on teacher-child interaction
INTERALL	Averaged aggregate teacher-child interaction score: range = 1~7
EMOSPT	Emotional support domain score of teacher-child interaction: range = 1~7
CORGAN	Classroom organization domain score of teacher-child interaction: range = 1~7
INSTRUSPT	Instructional support domain score of teacher-child interaction: range = 1~7
<i>Classroom-level variables (level-2)</i>	
RATIO	Ratio of teachers vs. children in observed classrooms
STUCLASS	Total number of children present in observed classrooms

Source: Created by author based on collected data

First of all, for every classroom that was observed for the analysis, one lead teacher was observed per classroom to assess teacher-child interaction within that classroom, which allows both the classroom variables – total number of children present in classroom (group size) and child-teacher

ratio – and teacher variables – teacher age, education, training, and teacher-child interaction score – to be assessed at the same level (level 2). Therefore, teacher variables and classroom variables are treated as level 2 variables in the analysis and child characteristics and child initiative score are treated as level 1 variables. Child-level variables include first child characteristics.

Child gender was coded 0 for boys and 1 for girls. Child age was calculated in months in order to capture the progress in child development outcomes in order to capture the monthly variance in child development outcomes. Parents' working status was coded 0 when only one parents of the child works and 2 when both parents of the child work. Child development outcomes – measured on self-initiative scale are divided into 3 different domains – emotional skills (EMOSKILL), communication skills (COMSKILL) and motivation (MOTIV) and the aggregate self-initiative score which is the average score of all three domains are coded as SELFALL. Self-initiative scale is a 5-likert scale tool and therefore scores from each domain as well as the aggregate score take the range from 1 to 5.

Teacher-level variables include general teacher characteristics including teacher age (in years) and years of teacher education and the yearly frequency of the training they receive specifically on teacher-child interaction. In addition, teacher-level variables include teacher-child interaction score of the lead teacher in the classroom that is measured by the researcher (observer) using CLASS observation tool. The teacher-child interaction score on CLASS is divided into scores from three different domains – emotional support (EMOSPT), classroom organization (CORGAN) and instructional support (INSTRUSPT). Then the aggregate score is calculated by averaging the three scores. CLASS observation tool is a 7-point Likert scale and therefore scores from each domain as well as the aggregate score take the range from 1 to 5. In terms of teacher experience, teachers were divided into three different groups. Such groupings were made based on Korea's ECEC policy context. In group 1, teachers have joined the workforce in or after the year 2013 when the Nuri curriculum was initiated for children aged 3 to 5 years enrolled in ECEC centers (0.1 to 4 years); teachers in group 2 began to teacher in or after the year 2010 when the second phase of Childcare Quality accreditation was introduced (5 to 7 years); in group 3, teachers have begun to teach ahead of these

two points in time (8 to 11 years).

Lastly, classroom-level variables include child-teacher ratio observed each classroom (RATIO) and the total number of children present in the observed classroom (STUCLASS). Even though RATIO is calculated based on STUCLASS, both variables are included as separate variables as they both hold meaningful meaning for the study. There are a number of studies that also used both child-teacher ratio and group size – the two most commonly used proxies for structural quality of ECEC. These studies tried to see the impact of each of these structural variables on teacher-child interaction (Mashburn et al. 2008; Vermeer et al. 2016; Howes et al. 2008) which in cases showed differentiated impact.

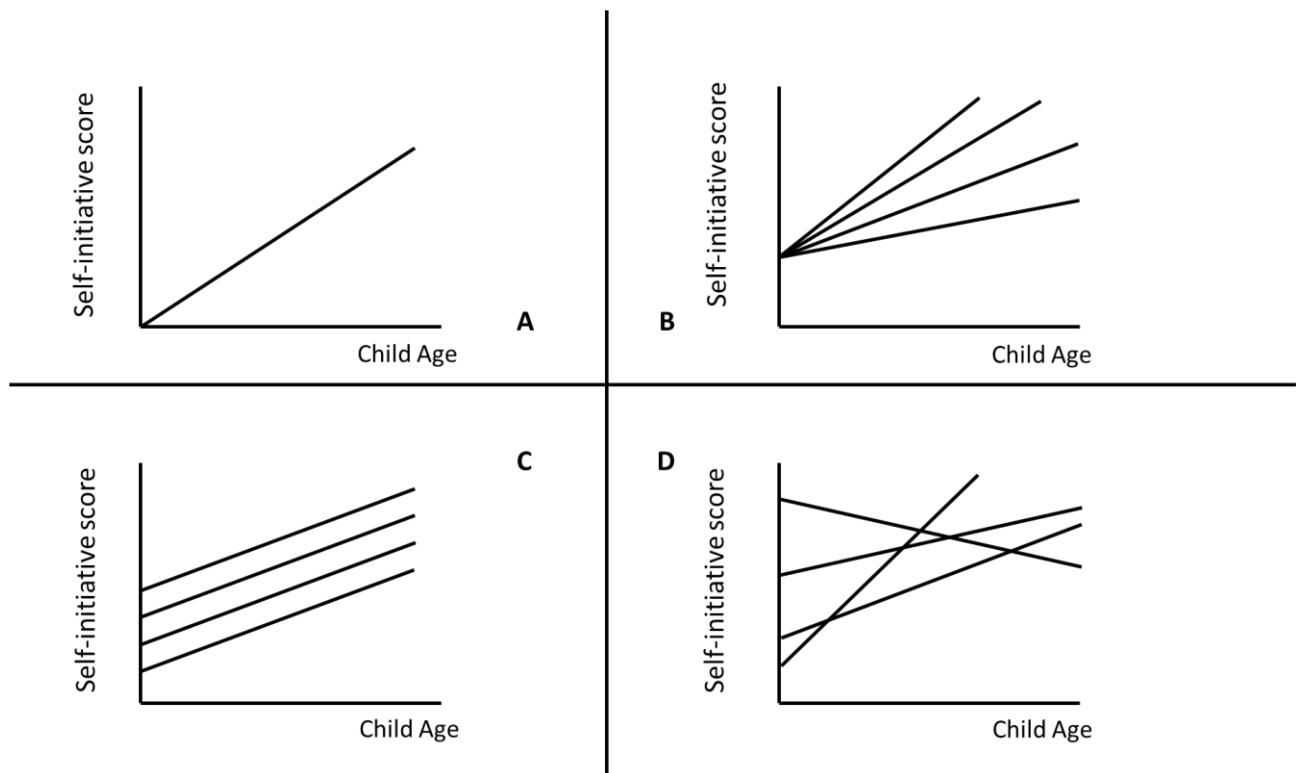
With regards to the teacher and classroom-level variables, it should be noted that the all sample classrooms were selected from employer-supported childcare centers located in metropolitan area of South Korea (Seoul and Kyunggi Province). Employer-supported childcare centers are governed by Child care Act and are established according to a set of regulations in terms of facilities (Park et al. 2015). The Ministry of Health and Welfare has set out detailed guidelines that regulate the physical establishments and sanitation guidelines of the employer-childcare in terms of size of facilities and mandatory requirements (Kim et al., 2014^[6]; MOHW, 2018). Research also shows that the variance of the structural quality, including the physical establishment, is controlled by strong statutory regulations and can show reduced variance (Love et al., 2003; Slot et al., 2015). Therefore, not all constructs of structural quality will be used as variables for this study, especially physical aspects of the centers that are not commonly used constructs in literature concerning the structural quality of early childhood education and care. Rather, this study will focus primarily on the effect of selected aspects of structural quality such as child-teacher ratio and group size that still show meaningful variances among centers and classrooms based on collected data.

First, multiple regression will be used to answer research questions 1.1 and 1.2 using the equation (1) below to see the effect of teacher characteristics and classroom characteristics on the level of teacher-child interaction score (Y_j).

$$Y_j = \beta_{00} + \beta_{01} * TAGE + \beta_{02} * TEDU + \beta_{03} * TEXP + \beta_{04} * TRAINING + \beta_{05} * INTERALL + \beta_{06} * RATIO \text{ or } STUCLASS + r_{ij}.$$

Second, as HLM will be used for research questions 2.1, 2.2 and 2.3, it is necessary to see the distribution of individual level variance and group level variance. One key advantage of HLM is that this model allows the separation of variances into within-level and between-level variables (Raudenbush & Bryk, 2002). The purpose of separating the variances is to see the true size of variances at each level. The most commonly used method to identify if clear between-level effect exist in the outcome of interest is calculating interclass correlation (ICC), which can verify the size of between-level effect which will be explained later. However, this section will first explain four different scenarios that are possible results of how between-level variables can affect individual samples nested in groups. By assuming a linear relationship between any independent variables and the outcome of interest, there are four possible interpretations of the results as shown below, when separate regression are estimated equations for each classroom. In Sub-figure A in Figure 4-4, the individual effect of age on child initiative score is similar across every classroom observed, and there is only one regression line with one intercept and one slope. Sub-figure B in Figure 4-4 shows a situation where all children in every classroom demonstrated the identical level of self-initiative score but the effect of age on self-initiative score was different depending on each classroom. In this case, the researcher may take interest in the classroom-level variables that may have caused the differences in the slope of each classroom. In Sub-figure C in Figure 4-4, the average self-initiative score for each classroom (intercepts) may vary but the effect of age (slope) on self-initiative score is similar across all classrooms. In such case, the intercepts represent the classroom characteristics and the specific characteristic which may have caused the variances then becomes the focus of interest. In Sub-figure D in Figure 4-4, both the average self-initiative score (intercept) and the average effect of age on self-initiative score (slope) vary owing to level-2 variables, the case of which both intercept and slope become the foci of interest.

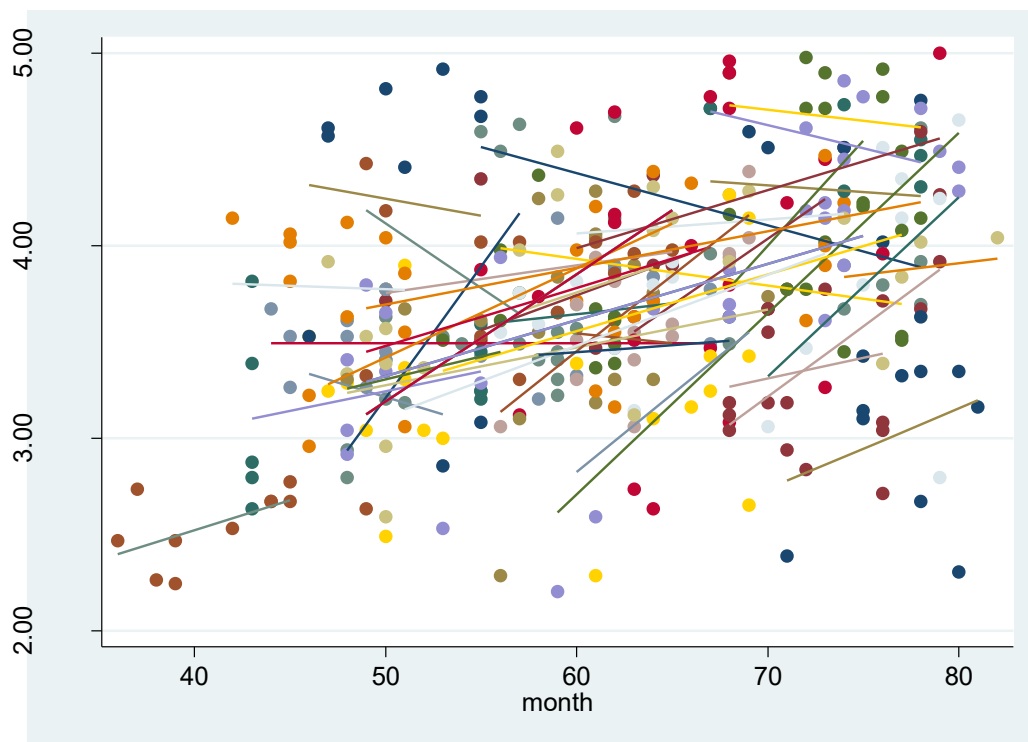
Figure 4-4: Two-way Hierarchical Structures



Source: Created by the author based on Raudenbush & Bryk (2002); Todd et al. (2005)

Similarly, figure below shows the regression results of one independent variable (child age) and child initiative score for this study, each line representing the effect of child age (level-1 variable) on child initiative within each individual classroom. The results show that both the intercept and slope for each classroom are different, suggesting that classrooms differ in both the average self-initiative score and the average effect of age on self-initiative score. Judging from this figure, it can be verified that HLM is a good model for this research as the between-level variances in both intercept and slope were present.

Figure 4-5: Two-way Scatterplot of Child age and Self-initiative score



Source: Created by the author based on estimations

As mentioned earlier, research questions 1.1 and 1.2 will be analysed using multiple regression as they only involve level-2 variables of teacher and classroom characteristics. For research questions 2.1, 2.2 and 2.3, HLM will be used for analysis. To run HLM analysis there are several steps to follow within the process. First, a null model is run in order to see the distribution of within-level variance and between-level variance; null model analysis can provide the sizes of variances from which intraclass correlation (ICC) can be calculated. Following the null model, different sub-models are then run to complete the HLM analysis as shown in the following section. The following models 1 to 5 were built in order to test the predictability of level 1 and level 2 variables. Preliminary analyses were conducted in order to verify the significance or random effects of the error terms, only those that showed significant random effects were included in the final models. In the empirical model, error terms were initially inserted in all level 2 models assuming that the level 1 variables – gender, month and mother’s working status - have effect on the dependent variable that vary between classrooms.

Once this model was run, error terms that did not demonstrate significant random effect between classrooms were removed from the model. A similar procedure was conducted for models 3 and 4. The final model used as a result of this process is shown below;

Level-1 Model

$$SELFALL_{ij} = \beta_{0j} + \beta_{1j}*(GENDER_{ij}) + \beta_{2j}*(MONTH_{ij}) + \beta_{3j}*(MWORK_{ij}) + r_{ij}$$

Level-2 Model

$$\beta_{0j} = \gamma_{00} + \gamma_{01}*(INTERALL_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20} + u_{2j}$$

$$\beta_{3j} = \gamma_{30}$$

Mixed Model

$$\begin{aligned} SELFALL_{ij} = & \gamma_{00} + \gamma_{01}*INTERALL_j \\ & + \gamma_{10}*GENDER_{ij} \\ & + \gamma_{20}*MONTH_{ij} \\ & + \gamma_{30}*MWORK_{ij} \\ & + u_{0j} + u_{2j}*MONTH_{ij} + r_{ij} \end{aligned}$$

HLM Models

Table 4-2: Empirical models for multilevel analysis

Models	Independent Variable		Dependent Variable
	Level 1	Level 2	
Model 1 (Null model)	None	None	Child outcomes
Model 2	Gender, age,	None	
Model 3	Gender, age	Teacher-child interaction (intercept)	
Model 4	Gender, age	Teacher-child interaction (intercept + coefficient)	

Source: Created by the author based on Bhang & Chung (2015)

Model 1

In the context of this research the purpose of the null model is to determine the proportion of variance in child outcomes – measured by self-initiative scale - that is caused by child-level differences and by classroom-level differences. As mentioned earlier, in a two-level HLM analysis, it is possible to divide the total variance in child outcome into within-classroom variance (level-1, child-level differences) and between-classroom variance (level 2, classroom-level differences). Such division can be illustrated in equations (1) and (2), which are constructed to run the null model with no independent variables at the student and school levels, in order to see only the variances.

$$Y_{ij} = \beta_{0j} + r_{ij} \dots\dots\dots(1)$$

Equation (1) is a within-classroom model, where Y_{ij} is the self-initiative score of child i in classroom j . β_{0j} is the mean self-initiative score of children in classroom j and r_{ij} is a random error term of child i in school j that is normally distributed with mean of 0 and variance of σ_r^2 .

$$\beta_{0j} = \gamma_{00j} + u_{0j} \dots\dots\dots(2)$$

Equation (2) is a between-classroom equation, where γ_{00j} is the grand mean of self-initiative score of all classrooms and u_{0j} is an error term of classroom j .

$$Y_{ij} = \gamma_{00j} + u_{0j} + r_{ij} \dots\dots\dots(3)$$

$$u_j \sim N(0, \sigma_u^2)$$

$$r_{ij} \sim N(0, \sigma_r^2)$$

Equation (3) is an aggregate model of models (1) and (2), implying that a child's self-initiative score is an aggregation of (i) grand mean of self-initiative, (ii) between-classroom differences in self-initiative score and (iii) within-classroom differences in self-initiative score among children in a given classroom. With only the child-level outcome inserted as dependent variable, the null model similar to one-way ANOVA with random effects, providing information on variances of within and

between classrooms. Equation (3) has an equivalent purpose as one-way ANOVA with random effects and the equation to illustrate variance of Y_{ij} - child's self-initiative score - is as below.

$$\text{Var}(Y_{ij}) = \sigma^2 + \tau \dots\dots\dots (4)$$

Equation (4) shows that variance of Y_{ij} can be divided into two parts - σ^2 which is variance at classroom level and τ which is variance at individual level.

Intraclass Correlation (ICC) Calculation

As mentioned above, the purpose of the null model is to determine the proportion of variance in child outcome that caused by child-level differences and by classroom-level differences. By running the null model and using the equation below, intraclass correlation coefficient (ICC) can be calculated using the equation below - where σ_u^2 refers to the between-group variance, σ_r^2 refers to within-group variance - to see if children's self-initiative score showed differences not only between individual children but also between different classrooms.

$$\text{ICC} = \frac{\sigma_u^2}{\sigma_u^2 + \sigma_r^2}$$

Model 2

The purpose of Model 2 is to examine the effect of child-level characteristics on children's self-initiative outcomes. In order to see how much child-level variables - gender, age and their parents' working status - explain the variance in their learning outcomes, child-level variables are inserted in level-1 equation. First child-level variables – gender, age (in months) and parents working status – were inserted level-1 equation. The null model attempted to estimate the self-initiative score by using only the intercept as a variable that could take on different values depending on the classrooms. Model 1 tries to predict self-initiative score by using both random intercept (β_{0j}) and

random slopes (β_{1j} , β_{2j} and β_{3j}) by inserting child characteristics are inserted at level-1 equation. At first, all error terms were inserted to assume that the effects of child gender, age and parents' working status vary between classrooms. Then, the model removed the error terms for variables that did not show significant variance between classrooms. Out of several models tested, only the final models are presented in the study.

In running hierarchical linear modeling, there is an option to center the variables as opposed to using raw scores. This study will use the mean centering approach as it is the most frequently applied scaling measure in many empirical analyses and it offers important statistical benefits, which is useful in estimating the model (Paccagnella, 2006). In traditional (one-level) regression model, there is only one mean – the overall mean or grand mean) that can be used for centering; whereas in multilevel regression, there can be two different means involved – group mean and grand mean. Centering around the grand mean allows the analysis to interpret the intercept as an expected outcome for a child in classroom j who averages at the overall mean across all children in the sample in all the explanatory variables. In other words, grand mean centering is a simple transformation of original scores and does not change the model except the values of some parameters. On the other hand, as group mean changes among groups, group-mean centered scores are no longer the simple functions of parameters compared to the model using raw scores; the two models are no longer equivalent and analyses may produce different results using group means as level-2 predictors (Paccagnella, 2006; Myers et al., 2010). In this study, grand mean centering was used for all variables that were entered in the HLM analyses as potential predictors as there was no prior assumption with regard to the individual's samples' relative group standing with the dependent variable and as grand mean centering produces results that are more similar to the model using the raw scores than group mean centering (Enders & Tofighi, 2007; Lee & Stankov, 2017).

Level-1 Equation

$$SELFALL_{ij} = \beta_{0j} + \beta_{1j}*(GENDER_{ij}) + \beta_{2j}*(MONTH_{ij}) + \beta_{3j}*(MWORK_{ij}) + r_{ij}$$

Level-2 Model

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + u_{2j}$$

$$\beta_{3j} = \gamma_{30} + u_{3j}$$

Mixed Model

$$SELFALL_{ij} = \gamma_{00}$$

$$+ \gamma_{10}*GENDER_{ij}$$

$$+ \gamma_{20}*MONTH_{ij}$$

$$+ \gamma_{30}*MWORK_{ij}$$

$$+ u_{0j} + u_{1j}*GENDER_{ij} + u_{2j}*MONTH_{ij} + u_{3j}*MWORK_{ij} + r_{ij}$$

$$u_j \sim N(0, \sigma_u^2)$$

$$r_{ij} \sim N(0, \sigma_r^2)$$

In order to see the random effects of each coefficient, level-2 equations need to be created for each effect. β_{0j} is an equation to examine the random effect of intercept, and β_{1j} , β_{2j} and β_{3j} are equations to verify the random effects of gender, age in months and parents' working status.

Model 3

Model 2 assumed that the effects of child gender, age and parents' working status do not vary

between classrooms. There exists sufficient amount of evidence that girls, as opposed to boys, and older children, as opposed to younger children have largely positive effect on child development outcomes. However, since there is little empirical evidence on the effect of parents' working status on children's development, model 3 was run to verify if this factor has varying effect on child outcome across different classrooms. At first, all error terms were inserted to assume that the effects of child gender, age and parents' working status vary between classrooms. Then, the model removed the error terms for variables that did not show significant variance between classrooms. Out of several models tested, only the final models are presented in the study. Model 3 was run in order to verify the effect of teacher-child interaction on child's socio-emotional skills measured in child initiative score, assuming that teacher-child interaction only affects the intercept of level-1 model. The final model is shown below:

Level-1 Model

$$SELFALL_{ij} = \beta_{0j} + \beta_{1j}*(GENDER_{ij}) + \beta_{2j}*(MONTH_{ij}) + \beta_{3j}*(MWORK_{ij}) + r_{ij}$$

Level-2 Model

$$\beta_{0j} = \gamma_{00} + \gamma_{01}*(INTERALL_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20} + u_{2j}$$

$$\beta_{3j} = \gamma_{30}$$

Mixed Model

$$\begin{aligned} SELFALL_{ij} = & \gamma_{00} + \gamma_{01}*INTERALL_j \\ & + \gamma_{10}*GENDER_{ij} \\ & + \gamma_{20}*MONTH_{ij} \\ & + \gamma_{30}*MWORK_{ij} \\ & + u_{0j} + u_{2j}*MONTH_{ij} + r_{ij} \end{aligned}$$

$$u_j \sim N(0, \sigma_u^2)$$

$$r_{ij} \sim N(0, \sigma_r^2)$$

Model 4

Model 4 was run in order to verify the interaction effect between level-1 and level-2 variables. That is, this model investigates whether the effect size of teacher-child interaction on child development outcomes varies depending on child age, gender, and mother's working status. At first, all error terms were inserted to assume that the effects of child gender, age and parents' working status vary between classrooms. Then, the model removed the error terms for variables that did not show significant variance between classrooms. Out of several models tested, only the final models are presented in the study.

Level-1 Model

$$SELFALL_{ij} = \beta_{0j} + \beta_{1j}*(GENDER_{ij}) + \beta_{2j}*(MONTH_{ij}) + \beta_{3j}*(MWORK_{ij}) + r_{ij}$$

Level-2 Model

$$\beta_{0j} = \gamma_{00} + \gamma_{01}*(INTERALL_j) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}*(INTERALL_j) + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}*(INTERALL_j) + u_{2j}$$

$$\beta_{3j} = \gamma_{30} + \gamma_{31}*(INTERALL_j) + u_{3j}$$

GENDER MONTH MWORK have been centered around the grand mean.

Mixed Model

$$\begin{aligned} SELFALL_{ij} = & \gamma_{00} + \gamma_{01}*INTERALL_j \\ & + \gamma_{10}*GENDER_{ij} + \gamma_{11}*INTERALL_j*GENDER_{ij} \\ & + \gamma_{20}*MONTH_{ij} + \gamma_{21}*INTERALL_j*MONTH_{ij} \\ & + \gamma_{30}*MWORK_{ij} + \gamma_{31}*INTERALL_j*MWORK_{ij} \\ & + u_{0j} + u_{1j}*GENDER_{ij} + u_{2j}*MONTH_{ij} + u_{3j}*MWORK_{ij} + r_{ij} \end{aligned}$$

$$u_j \sim N(0, \sigma_u^2)$$

$$r_{ij} \sim N(0, \sigma_r^2)$$

4.3.3. Model fit

In reporting HLM analysis results, this study examined proportion of variance explained at level 1 and level 2, in order to verify whether a higher-level model with additional variables were able to explain larger proportion of the variance than the previous model (Garson, 2013). In general, it is considered that proportion of variance explained are within the reasonable range when they are higher than 10% after addition of a level 2 prediction (Lee & Stankov, 2018). The equation below is used to examine the reduction in variances as predictor variables are added;

$$R^2 = (\tau \text{ baseline} - \tau \text{ conditional}) / \tau \text{ baseline}$$

This study also conducted Likelihood Ratio Test (LRT) using deviance statistics to report model fit (Raudenbush et al., 2011). The likelihood of models is proportional to the possibility to obtain the observed data for individuals of the sample if those models were true. Higher levels of likelihood indicate better fit of the model to the data. The critical value for the test is 5% level which constitutes the evidence of between-classroom variation (Fiona Steele, 2019; Ejakaitl et al. 2016). The equation for LRT is shown below, where L_0 is the likelihood values of the model that precedes and L_1 is the values of the current model being tested.

$$LRT = -2\log\left(\frac{L_0}{L_1}\right)$$

4.4. Data

4.4.1. Data Collection

Primary data was collected through classroom observations and surveys for teachers (see Appendix II for questionnaires) which were conducted in a total of 41 classrooms (of children from 36 to 82 months) from 31 employer-supported childcare centers in metropolitan area of Korea - Seoul and Gyeonggi Province. The observations were conducted from July to August in 2017. Given that

Korea's ECEC classrooms are usually formed in early March of each year, such timing was selected to ensure that children have spent at least 4 months in the classroom with their lead teacher, allowing the teacher's engagement with children to have impact on children's outcomes (Bhang & Chung, 2015). The childcare centers were recruited through snowball sampling (see section 4.4.2). Once the centers were recruited, the time of visit and the classroom to be observed were decided through communication with the head teacher. First, a pre-survey and preliminary observations were conducted in 5 classrooms in order to gauge the approximate time spent for each session and to decide when would be the most ideal time to visit the centers, as well as to make necessary adjustments to the questionnaire. Once necessary adjustments have been made, each of the 41 classroom was visited once for approximately two hours after receiving the consent from the parents, and was observed and assessed using the Classroom Assessment Scoring System (CLASS). The CLASS observation tool can only be used by certified observers. In order to be certified, one needs to receive two-day training provided across different states of the United States administered by the designated training institution called Teachstone. After attending the two-day training in small groups, participants are given two months and three chances to be tested on their ability to code reliably before being given certifications. Once the certificate has been issued, classroom were observed using 4 cycles of 30 minute session where observer is supposed to conduct observation for 20 minutes and record the observation for 10 minutes (Pianta et al., 2008). The observation tool requires 5 to 10% of all observations be double-coded with a second observer. Therefore, 5 out of 41 classrooms were double-coded with another certified CLASS observer after observation sessions during the pre-survey to ensure inter-rater reliability.

4.4.2. Snowball Sampling

Snowball sampling is a sampling method that is being used with increasing frequency to study hard-to-reach groups. Snowball sampling involves selecting samples using referrals by insiders within the population to be studied. Sample that have been selected on a certain characteristic are asked to make

referral to other samples that share same characteristic (Biernacki & Waldorf, 1981; Goodman et al., 2015).

Previous studies that involved observations in Korean early childhood education and care centers demonstrate challenges in securing samples due to difficulties in finding centers that are willing to allow access to their classrooms (Bhang & Chung, 2015; Kwon, 2015). In order to address such sampling challenges, snowball sampling was used in this study. Once a center agreed to classroom observation and survey, the center was then asked to make referrals to other centers that are also employer-supported childcare centers within metropolitan area.

4.4.2. Participants

All childcare centers recruited for this study were contracted-out childcare centers whose facilities and environments are managed by the government as well as the contracting companies that specialize in operating childcare centers for workplaces, making their physical characteristics well controlled under set provisions (Kim et al., 2014^[6]; MOHW, 2018). Classrooms that are officially assigned for children aged three to five years for the targets of this study, the age range that also corresponds to children that learn the Nuri Curriculum for Ages 3 to 5. However, as shown in section 4.4.3, the age range of children were 36 to 82 months. In Korea, the recommended age to enter primary school is age six or seven (Ministry of Government Legislation, 2019). However, the law allows parents to advance or defer their children's entrance by a year depending on a child's individual development status, meaning children can enter the primary school at ages five to eight. In order to adjust the entry age, parents need to notify the municipality office of their request. At childcare centers, children over age five years old are assigned to classrooms designated for five year-olds, explaining the larger diversity of ages observed in the samples of this study.

All selected childcare centers were contracted-out centers that are operated by foundations specializing in providing childcare services. Researchers advocate a minimum of 30 groups for multilevel modeling (Busing, 1993; Maas & Hox, 2005) so 41 classrooms is a valid number for usage

of multilevel model. In case there were more than one teacher in a classroom, only the lead teacher was observed.

In each classroom, ten children were randomly selected as default but in centers that had less than ten children in a classroom for children between 36 to 82 months, all children were selected. As a result, the number of children in each classroom varied from 5 to 10. In HLM analyses, various group sizes can be used and a relatively small group size can be acceptable particularly when intraclass correlation is high (Bhang & Chung, 2015; Bliese, 1998).

4.4.3. Descriptive Statistics

Table 4.3. shown below illustrates characteristics of teachers, classrooms and children that participated in this study.

Table 4-3: Child and Classroom Variables

Variables	Mean	SD	Min	Max
Child-level variables	(N = 375)			
Gender				
Boys (= 0)	205			
Girls (= 1)	170			
Age (in months)	62.05	10.48	36	82
Mother's working status				
Non-working mother (=0)	84			
Working mother (=1)	291			
Child initiative score				
Total score (1~5)	3.75	0.57	2.27	4.78
1. Emotional skills	3.73	0.56	2.28	4.89
2. Communication skills	3.80	0.66	2.00	4.82
3. Motivation	3.73	0.60	2.30	4.90
Classroom-level variables	(N = 41)			
Classroom size				
Number of children in class	15.12	6.63	5.00	31.00
Child-teacher ratio	7.90	2.34	4.50	13.00
Teacher characteristics	(N = 41)			
Teacher age	27.12	3.24	23.00	37.00
Teacher has BA (=1)	0.78	0.78	0.00	1.00
Teacher experience in years	5.23	2.70	0.80	11.00
Teacher training # per year	2.93	2.81	0.00	12.00

Teacher-child interaction score					
	Total score (1~7)	5.34	0.63	3.94	6.44
	1. Emotional support	5.59	0.76	4.00	7
	2. Classroom organization	5.85	0.75	4.33	7
	3. Instructional support	4.59	1.03	3.00	6.33

Source: Created by the author based on collected data

Descriptive statistics for child-level variables show that children's age ranged between 36 to 82 months. The target of this study was children over the age of 3 up to pre-primary level. In Korea, the average age of entering primary school is 7. Among 375 children studied, 205 were boys and 170 were girls. And the number of children whose parents both work was three times larger than children of whom only one parent works. Average aggregate self-initiative score was 3.71 out of the total score of 5. Slight differences were noted among the three domains, with the communication skills representing slightly higher score at 3.77 and motivation score recording slightly lower score at 3.67. Motivation score also showed slightly larger deviation from 1.95 to 5, compared to other domains. Classroom-level characteristics show that classroom size showed great variation, with total number of children in class varying from 5 to 31, and the child-teacher ratio ranging from 4 to 13. Teacher age ranged from 23 to 37 years old, averaging at 27. Teacher experience varied from approximately 10 months to 11 years averaging at around 5 years, and the number of training per year varied greatly from 0 to 12 times per year, averaging at around 3 times per year. Aggregate teacher-child interaction score averaged at 5.52 averaging from 3.94 to 6.61. Among the three domains, instructional support score was relatively lower than other domains and varied by larger margins from 3 to 6.67.

In analyzing the correlations among variables as in the table below, this study referred to Cohen's (1988) guidance for meaningful effect sizes in social science research, <.05 of common variance shared between two variables is considered to be significant.

Table 4-4: Bivariate correlations between teacher-child interaction and child initiative

	1	2	3	4	5	6	7	8	9	10
1. Teacher age	-									
2. Teacher education	-0.05	-								
3. Teacher experience	0.55*	-0.09	-							
4. Training	-0.20*	-0.14*	-0.28*	-						
5. Emotional support	0.21*	-0.08	-0.18*	0.15*	-					

6. Classroom organization	0.17*	-0.04	-0.20	0.20*	0.44*	-				
7. Instructional support	-0.16*	0.20*	-0.02*	0.22*	0.53*	0.43*	-			
8. Emotional skills	-0.01	0.08	-0.13*	0.17*	0.42*	0.21*	0.33*	-		
9. Communication	0.04	0.02	-0.15*	0.05*	0.40*	0.17*	0.30*	0.77*	-	
10. Motivation	-0.05	0.06	-0.16*	0.11*	0.41*	0.17*	0.30*	0.79*	0.87*	-

Source: Created by the author based on estimation

The table above shows bivariate correlations between each domain of classroom quality measured on classroom assessment scoring system (CLASS), child development outcomes measured on Child Initiative Scale as well as teacher/child/classroom characteristics. Indicators of classroom quality includes indicators that all sub-domains of teacher-child interaction and all sub-domains of child initiative show correlation with one another that is significant at .05 level or higher.

4.5. Tools

4.5.1. Classroom Assessment Scoring System (CLASS)

As explained in Table A-11, there are several different tools to measure quality of ECEC classrooms focusing on process quality. This study has employed CLASS observation tool given its strongest focus on constructs of teacher-child interaction as well as its international usage which will allow for comparison of the data collected from this study with other international data.

In order to measure teacher-child interaction in childcare center classrooms, Classroom Assessment Scoring System (Pianta et al., 2008) was used. CLASS is an instrument for observation to assess classroom quality of education settings by measuring teacher-child interaction. CLASS can be used to assess classroom quality of different levels of education starting from ECEC settings for infants (birth to 18 months), toddlers (15 to 36 months), Pre-K (3 to 5 years), K-3 (5 to 8 years), upper elementary (4th to 6th grade) and secondary school (7th to 12th grade). For this research, CLASS Pre-K will be used as its age range best matches the target age of this study. Table 4-5 illustrates the domains and indicators that are used within CLASS to measure teacher-child interaction.

Table 4-5: Classroom Assessment Scoring System (CLASS)

Domain	Concept	Indicators
Emotional Support	Positive relationships among teachers and children, teachers' abilities to support social and emotional functioning in the classroom	Positive climate • 4 behavior markers - Relationships : physical proximity, shared activities, peer assistance, matched affect and social conversation - Positive affect : smiling, laughter, enthusiasm - Positive communication : verbal affection, physical affection, positive expectations - Respect : eye contact, warm calm voice, respectful language, cooperation and/or sharing
		Negative climate • 4 behavior markers - Negative affect : irritability, anger, harsh voice, peer aggression, disconnected or escalating negativity - Punitive control : yelling, threats, physical control, harsh punishment - Sarcasm/disrespect : sarcastic voice/statement, teasing, humiliation - Severe negativity : victimization, bullying, physical punishment
		Teacher sensitivity • 4 behavior markers - Awareness : anticipates problems and plans appropriately, notices lack of understanding and/or difficulties - Responsiveness : acknowledges emotions, provides comfort and assistance, provides individualized support - Addresses problems : helps in an effective and timely manner, helps resolve problems - Student comfort : seeks support and guidance, freely participates, takes risks
		Regard for student perspectives • 4 behavior markers - Flexibility and student focus : shows flexibility, incorporates students' ideas, follows students' lead - Support for autonomy and leadership : allows choice, allows student to lead lessons, gives student responsibility - Student expression - Restriction of movement : allows movement, is not rigid
Classroom Organization	Well-managed classrooms that provide	Behavior Management • 4 behavior markers

	children with frequent, engaging learning activities	- Clear behavior expectations : clear expectations, consistency, clarity of rules - Proactive : anticipates problem behavior or escalation, low reactivity, monitors - Redirection of misbehavior : effective reduction of misbehavior, attention to the positive, efficient redirection - Student behavior : frequent compliance little aggression and defiance
		Productivity • 4 behavior markers - Maximizing learning time : provision of activities, choice when finished, few disruptions, effective completion of managerial tasks, pacing - Routines : students know what to do, clear instructions, little wandering - Transitions : brief, explicit follow-through, learning opportunities within - Preparation : materials ready and accessible, knows lessons
		Instructional Learning Formats • 4 behavior markers - Effective facilitation : teacher involvement, effective questioning, expanding children's involvement - Variety of modalities and materials Range of auditory, visual, and movement opportunities, interesting and creative materials, hands-on opportunities - Student interest : active participation, listening, focused attention - Clarity of learning objectives : advanced organizers, summaries, reorientation statements
Instructional Support	Interactions that teach children to think, provide ongoing feedback and support, and facilitate language development	Concept Development • 4 behavior markers - Analysis and reasoning : why and/or how questions, problem solving, prediction/experimentation, classification/comparison, evaluation - Creating: brainstorming, planning, producing - Integration: connects concepts, integrates with previous knowledge - Connections to the real world : real-world applications, related to students' lives
		Quality of Feedback • 4 behavior markers - Scaffolding: hints, assistance - Feedback loops: back-and-forth exchanges, persistence by teacher, follow-up questions

		- Promoting thought processes: asks students to explain thinking, queries responses and actions - Encouragement and affirmation : recognition, reinforcement, student persistence
		Language Modeling • 5 behavior markers - Frequent conversation : back-and-forth exchanges, contingent responding, peer conversations - Open-ended questions : questions require more than a one-word response students respond - Repetition and extension : repeats, extends/elaborates - Self- and parallel talk : maps own actions with language, maps student action with language - Advanced language : variety of words, connected to familiar words and/or ideas

Source: Created by the author based on Pianta et al. (2008, 22-75)

As shown in table 4-5, CLASS measures teacher-child interaction in three main domains – that are further divided into ten indicators that can be scored on a 7-point Likert scale. In order to score each of the indicators, four behavior markers are used to guide the selection of the score for each indicator. These domains, indicators and behaviors markers are developed based on development theory revealing that teacher-child interactions are the principal mechanism of children’s development and learning (Greenberg et al., 2001; Pianta & Hamre 2009). The dimensions of CLASS are exclusively designed assess teacher-child interactions in classrooms, rather than to measure materials, physical environment and curriculum. Rather, the purpose of CLASS is to measure what teachers do using such materials and environment with children (Mashburn et al., 2008). CLASS is developed for direct observations of classrooms or by watching recorded videos. This study will use direct classroom observation using the CLASS scoring sheets. Direct observation has advantages as a tool to measure quality of classroom (Pianta & Hamre, 2009; Klette & Blikstad-Balas, 2018).

Observations

The CLASS provides a methodology to observe and label teacher-child interactions, which is a measurable approach to define teacher-child interaction. CLASS is designed to be used for classroom

observations by certified observers. CLASS observations should ideally start at the beginning of the day and continue for a set period of time – at minimum two hours – to observe the experience on a typical day in a classroom. The observation process requires the observer to see, without disruption, activities in the classroom during a period of approximately 20 minutes while note-taking, followed by a period to code. Observers are recommended to conduct four to six cycles of this observation and coding. During the observations, it is important to observe the interactions between teachers and children based on the indicators defined by the CLASS tool (Teachstone, 2019).

The CLASS observation tool can only be used by certified observers. In order to be certified, one needs to receive two-day training provided across different states of the United States administered by the designated training institution called Teachstone. After attending the two-day training in small groups, participants are given two months and three chances to be tested on their ability to code reliably before being given certifications.

4.5.2. Children's Child initiative

Child's child initiative scale (Oh, 2004) was used to measure child's learning outcomes. This scale was developed for children to be assessed by teachers who are currently working with children to be assessed and incorporates the elements of both child's child initiative and socioemotional development. Although this scale was developed before the Nuri Curriculum was developed, the domains of the scale capture very well the elements of the character education which is one of core objectives of the curriculum. As shown in Table 4-6, the scale measures emotional skills, communication skills and motivation by scoring 49 indicators on 5-point Likert scale. Each domain represents different concepts and measures several indicators that are considered key parameters to assess children in the given domain.

Table 4-6: Child's Child initiative Scale (Oh, 2004)

Domain	Concept	Indicators
Emotional skills (18 questions)	Skills to understand and empathize with others' emotions, control emotions, maintain harmonious relationship	Emotional awareness
		Self-control
		Empathy
		Inter-personal skills

Communication/social skills (11 questions)	Skills to interact well with others as a member of the society	Linguistic skills
		Expression and delivery
		Sense of humor
Motivation to achieve (20 questions)	Determination to accomplish tasks and to feel fulfilled by resolving challenges	Positive self-esteem
		Sense of autonomy
		Sense of empowerment
		Patience
Total	3 domains	Creativity
		49 questions

Source: Created the author based on Oh (2004)

Oh (2004) recognized that despite the importance of child initiative development in early childhood education and care, there is lack of structured approach to facilitate its development. In response, she developed and applied child initiative development program for the overarching goal of facilitating social skills of children and to investigate the effect of child initiative development. Reliability of the tools used in the study was tested by Cronbach's alpha (Cronbach, 1951), which is a measure of internal consistency to examine credibility of a summative rating scale as shown in Tables 4-7 and 4-8.

Table 4-7: Reliability of Classroom Assessment Scoring System (CLASS: Pianta et al., 2008)

Variable	Number of questions	Cronbach's α	Pianta et al.
Teacher-Child Interaction	Emotional support (4)	0.72	0.88
	Classroom organization (3)		
	Instructional support (3)		

Source: Created by the author based on estimation

Table 4-8: Reliability of Child Initiative Scale (Oh, 2004)

Variable	Number of questions	Cronbach's α	Oh (2004)
Child Initiative	Emotional control (18)	0.93	0.95
	Communication skills (11)		
	Motivation to achieve (20)		

Source: Created by the author

Results of the reliability test show that Cronbach α for teacher-child interaction assessed by Classroom Assessment Scoring System recorded 0.72 and Cronbach's α for children's child initiative scale was measured at 0.93. For most social research situations, coefficient level of 0.70 or higher is

considered to be acceptable (Bruin, 2006).

CHAPTER 5:

RESULTS

5.1. Predictors of Child Development Outcomes

5.1.1. The Effect of Child Characteristics on Child Development Outcomes

In order to test the hypotheses for research questions 1.1, 1.2 and 1.3, hierarchical linear modeling (HLM) was employed using HLM version 7.3 (Raudenbush et al., 2011). HLM models were developed for both level 1 and level 2 variables to identify the best predictors of children's child initiative score. The HLM analyses were used due to the nested nature of children within classrooms – children from the same classroom are exposed to the same level of teacher-child interaction and class size of the classrooms they belong to. HLM also allows the identification of relative predictability of variables affecting children's child initiative score at both within classroom level (level 1) and between classroom level (level 2). In analyzing the results of HLM analyses, final estimations of the fixed effects were analyzed with robust standard errors. First, results of HLM models 1 and 2 are reported below to answer the research question 1.1.

HLM Model 1

As the initial step of running the HLM, the null model is run in order to verify the size of between-group and within-group variances. Table 5-1 shows the results of running the null model, which illustrate the variance of variables at both classroom and child levels.

Table 5-1: Results of the Model 1 (null model) and Intraclass Correlation (ICC)

Child initiative score	Total child score	Emotional skills	Communication skills	Motivation
Between classrooms	0.14	0.13	0.16	0.14
Within classrooms	0.22	0.25	0.30	0.26
Intraclass correlation (ICC)	0.39	0.35	0.35	0.35

Source: Created by the author based on HLM estimations

With these results, ICC was calculated to see if children's child initiative score showed differences not only between individual children but also between different classrooms. ICC calculations demonstrate that among the three domains of child initiative score, between-group variance explained about 35% of for each domain and 39% of the total child initiative score. It is difficult to say whether there is a universal standard for the appropriate cut-off point for ICCs but studies provide a range of cut-offs that can be considered. As ICC values for education studies are generally in the range of 0.10 to 0.25 (Hedges & Hedberg, 2007; Shieh, 2015), these figures justify the use of multilevel model for this research.

HLM Model 2

Results from Model 2 show that child gender and child age are statistically meaningful predictors of child's socio-emotional skills. In terms of child gender, girls showed tendency to score higher than boys; girls' score was on average 0.21 higher than that of boys for aggregate child initiative score, 0.30 higher for emotional skills, 0.16 higher for communication skills and 0.17 higher for motivation score, showing that girls score particularly higher than boys in emotional skills.

As for child age, older children tend to score higher than younger children. As child age increase by 1 month, their socio-emotional skills measured in child initiative score increased 0.02 for aggregate child initiative score, emotional skills and communication, and 0.03 for motivation.

Mother's working status did not show statistically significant effect on children's child initiative score, implying that children's emotional skills, communication skills and motivation scores remained similar regardless of whether or not mother is employed.

Table 5-2: The Effect of Child Characteristics on Child Outcomes

	Outcome	Child characteristic	Coefficient	Standard Error	t Statistic	p- Value
Child Initiative Score (Socio-emotional skills)	Child initiative (Total score)	Intercept	3.72***	0.05	71.73	<0.001
		Child gender	0.21***	0.04	4.88	<0.001
		Child age	0.02***	0.00	5.07	<0.001
		Mother's working status	-0.03	0.06	-0.42	0.68
	Emotional skills (Domain 1)	Intercept	3.73***	0.05	69.18	<0.001
		Child gender	0.30***	0.05	6.34	<0.001
		Child age	0.02***	0.00	4.39	<0.001
		Mother's working status	-0.04	0.07	-0.52	0.60
	Communication skills (Domain 2)	Intercept	3.80***	0.06	64.82	<0.001
		Child gender	0.16***	0.05	2.3.10	0.00
		Child age	0.02***	0.01	4.22	<0.001
		Mother's working status	-0.03	0.07	-0.46	0.65
	Motivation (Domain 3)	Intercept	3.67***	0.05	74.36	<0.001
		Child gender	0.17***	0.05	3.23	0.00
		Child age	0.03***	0.00	5.20	<0.001
		Mother's working status	-0.02	0.07	-0.34	0.74

Source: Created by the author based on HLM analysis

N = 375 (Level 1), 41 (Level 2)

*** p<0.01, ** p<0.05, * p<0.1

For HLM analyses, proportion of variance explained of each model forms an important part of the results to be reported. Table below shows that, compared to Model 1, child characteristics explained 21% of child's aggregate child initiative score, 20% of emotional skills, 16% of communication and 18% of motivation score. These percentages that are well above 10% indicate that the variables that were added in this model – in this case, level-1 child characteristics variables - were able to explain significant larger variance in the dependent variable compared to the null model.

As mentioned in Section 4.3, this study conducted Likelihood Ratio (LR) test in order to verify the model fit. Results show that all models produced chi-square statistics that are significant

at 5% level.

Table 5-3: Proportion of variance explained by child’s gender, age and parents working status

		Total child initiative	Emotional skills	Communication skills	Motivation
Proportion of variance explained	Between classroom	0.44	0.35	0.43	0.59
	Within classroom	0.21	0.20	0.16	0.18
Likelihood ratio test	Deviance	568.30	560.96	560.96	658.57
	Degrees of freedom	9	9	2	2
	χ^2 statistic	69.37	69.37	7.33	90.27
	<i>P</i> -value	<0.001	<0.001	0.025	<0.001

Source: Created by the author based on HLM analysis

The likelihood ratio (chi-square) test statistic comparing the null model and model 2 is 69.37 on 9 d.f. ($p < 0.001$). This means there is evidence that the influence of child characteristics on child development outcomes is significant.

5.1.2. The effect of teacher-child interaction on child development outcomes

This section presents the results from the analyses run to answer the research question 1.2 that probes into the extent to which classroom quality predicts children’s socio-emotional skills. Prior to conducting the analyses to verify the association between the classroom quality and child development outcomes, this section first presents the general snapshot of the classroom quality of the observed classrooms focusing on teacher-child interaction, in comparison with other international studies.

Teacher-child interaction - often referred to as teacher-child interaction or teachers’ interaction skills throughout this study – was measured by CLASS (Classroom Assessment Scoring System) which assesses teachers’ emotional support, classroom organization and instructional support.

Currently, there are three studies using CLASS within the Korean context, and a number of international studies that have produced parallel data in different country contexts. Figures below serve to locate where the quality of the childcare center classrooms observed for this study stand among international studies as well as the three Korean studies that used the same quality scale. International studies used for comparison were conducted in ten different countries and range from years 2010 to 2017. The number of participants and the approximate age range are indicated in Table A-11 in the Annex. This section to follow discusses the results of the analyses conducted in order to see the effect of classroom quality on child development outcomes.

Model 3

Model 3 results show that teachers' performance score has significant positive association with child's socio-emotional skills measured by child initiative score ($\beta = .03$, $p < .01$). The association was also significant between teacher-child interaction score and all three separate domains of child initiative score. As teacher's interaction score increased by 1 unit, children's initiative score increased by 0.31 in aggregate child initiative score ($p < .01$), 0.32 for emotional skills ($p < .01$), 0.30 for communication skills ($p < .01$), and 0.27 for motivation score ($p < .01$).

Table 5-4: The Effect of Teacher-child interaction (Total Score) on Child Initiative Score

Outcome	Child characteristic	Coefficient	Standard Error	t statistic	p- Value
Child initiative score(total score)					
Level 1					
	Intercept	3.74***	0.04	90.92	<0.001
	Child gender	0.21***	0.05	6.34	<0.001
	Child age	0.02***	0.00	3.76	<0.001
	Mother's work	-0.03	0.07	-0.45	0.61
Level 2					
	Teacher-child interaction	0.31***	0.07	4.81	<0.001
Emotional skills (Domain 1)					
Level 1					
	Intercept	3.74***	0.04	92.03	<0.001
	Child gender	0.30***	0.05	6.32	<0.001
	Child age	0.02***	0.00	3.42	0.00
	Mother's work	-0.04	0.07	-0.58	0.57
Level 2					
	Teacher-child interaction	0.32***	0.07	4.44	<0.001
Communication skills (Domain 2)					
Level 1					
	Intercept	3.80***	0.05	79.55	<0.001
	Child gender	0.15**	0.08	2.91	0.01
	Child age	0.02***	0.05	3.86	<0.001
	Mother's work	-0.03	0.07	-0.51	0.60
Level 2					
	Teacher-child interaction	0.30***	0.09	3.65	0.00
Motivation (Domain 3)					
Level 1					
	Intercept	3.69***	0.04	89.86	<0.001
	Child gender	0.17**	0.05	3.20	0.01
	Child age	0.02***	0.00	4.59	<0.001
	Mother's work	-0.03	0.07	-0.04	0.66
Level 2					
	Teacher-child interaction	0.27***	0.09	3.11	0.00

Source: Created by the author based on HLM analysis

N = 375 (Level 1), 41 (Level 2)

*** p<0.01, ** p<0.05, * p<0.1

As explained above, it is important to calculate the proportion of variance explained of each model in order to verify whether large portion of variance in the dependent variable – child initiative

score – has been explained by adding additional variables. Table below shows that, teacher's performance explained 33% of child's total child initiative score, 25% of emotional skills, 27% of communication skills, and 33% of motivation score, indicating that adding level-2 variables could explain significantly larger variance in the dependent variable compared to the previous model and that model 3 was a relevant model to verify the effect of level-2 predictors of child initiative score.

As mentioned in Section 4.3, this study conducted likelihood ratio (LR) test in order to verify the model fit. Results below show that all models run produced chi-square statistics that are significant at 5% level.

Table 5-5: Proportion of variance explained by model 3

		Total child initiative	Emotional skills	Communication skills	Motivation
Proportion of variance explained	Between classroom	0.33	0.25	0.27	0.33
	Within classroom	0.06	0.18	0.08	0.14
Likelihood ratio test	Deviance	511.180035	351.60	560.968298	658.577559
	Degrees of freedom	4	3	3	3
	χ^2 statistic	12.25	159.58	81.06	159.58
	P-value	0.015	<0.001	<0.001	<0.001

Source: Created by author based on HLM analysis

As the purpose of model 3 is to analyze the effect of teacher score on child outcomes, this model was extended and run separately for each domain of teacher score to see its effect on each domain of child initiative score. Results show that teachers' emotional support score has significant positive association with the aggregate child initiative score as well as all three domains of child's socio-emotional skills measured by child initiative score – emotional skills ($\beta = .24$, $p < .01$), communication skills ($\beta = .26$, $p < .01$) and motivation ($\beta = .24$, $p < .01$). The size of coefficients show that teachers' emotional support had stronger association with children's communication skills than the other two domains – as teacher score in emotional support increased by 1 point, child communication score increased by 0.26 points.

Table 5-6: The Effect of Teacher-child interaction (Emotional Support) on Child Initiative Score

Outcome	Child characteristic	Coefficient	Standard Error	t statistic	p-value
Child initiative score (total score)					
Level 1					
	Intercept	3.74***	0.04	102.97	<0.001
	Child gender	0.21***	0.05	4.61	<0.001
	Child age	0.02***	0.00	3.97	<0.001
	Mother's work	-0.04	0.06	-0.70	0.48
Level 2					
	Teacher's emotional support	0.22***	0.04	5.58	<0.001
Emotional skills (Domain 1)					
Level 1					
	Intercept	3.74***	0.04	97.62	<0.001
	Child gender	0.29***	0.05	6.22	<0.001
	Child age	0.01***	0.00	3.00	0.005
	Mother's work	-0.04	0.06	-0.70	0.52
Level 2					
	Teacher's emotional support	0.24***	0.04	5.24	<0.001
Communication skills (Domain 2)					
Level 1					
	Intercept	3.80***	0.04	82.08	<0.001
	Child gender	0.15**	0.08	2.91	0.01
	Child age	0.02***	0.05	3.86	<0.001
	Mother's work	-0.03	0.07	-0.51	0.60
Level 2					
	Teacher's emotional support	0.26***	0.05	5.22	0.00
Motivation (Domain 3)					
Level 1					
	Intercept	3.68***	0.05	78.46	<0.001
	Child gender	0.16***	0.05	3.06	0.002
	Child age	0.02***	0.00	3.99	<0.001
	Mother's work	-0.05	0.06	-0.89	0.37
Level 2					
	Teacher's emotional support	0.24***	0.05	4.17	0.00

Source: Created by the author based on HLM analysis

N = 375 (Level 1), 41 (Level 2)

*** p<0.01, ** p<0.05, * p<0.1

Table below demonstrates the variance explained of each model to see the portion of variance

in the dependent variable – each domain of child initiative - has been explained by adding emotional support score of teachers. Results shows that, teacher’s emotional support explained 20% of child’s total child initiative score, 46% of emotional skills, 52% of communication skills, and 66% of motivation score, indicating that adding teacher’s emotional support score could explain significantly larger variance in the dependent variables compared to the previous model and that model 3 was a relevant model to verify the effect of teacher’s emotional support score on each domain of child initiative score. As mentioned in Section 4.3, this study conducted likelihood ratio (LR) test in order to verify the model fit. Results below show that all models run produced chi-square statistics that are significant at 5% level.

Table 5-7: Proportion of Variance Explained by Model 3 with Emotional Support Score as Level-2 Variable

		Total child initiative	Emotional skills	Communication skills	Motivation
Proportion of variance explained	Between classroom	0.20	0.46	0.52	0.66
	Within classroom	0.33	0.21	0.20	0.14
Likelihood ratio test	Deviance	490.38	542.77	633.50	559.41
	Degrees of freedom	7	9	9	9
	χ^2 statistic	16.68	68.86	51.68	71.29
	P-value	0.019	<0.001	<0.001	<0.001

Source: Created by author based on HLM analysis

Sub-analysis of Model 3 to see the association between teachers’ classroom organization score with children’s child initiative score produced the following results. Teacher’s score in the domain of classroom organization showed positive association with child’s overall child initiative score ($\beta = .12, p < .05$). However, the effect size was smaller compared to other domains of teacher score.

Table 5-8: The Effect of Teacher-child interaction (Classroom Organization) on Child Initiative

Outcome	Child characteristic	Coefficient	Standard Error	t statistic	p- Value
Child initiative score(total score)					
Level 1					
	Intercept	3.72***	0.05	82.39	<0.001
	Child gender	0.21***	0.04	4.72	<0.001
	Child age	0.02***	0.00	4.60	<0.001
	Mother's work	-0.00	0.06	-0.15	0.88
Level 2					
	Teacher classroom organization score	0.12**	0.05	2.39	0.022
Emotional skills (Domain 1)					
Level 1					
	Intercept	3.72***	0.05	70.52	<0.001
	Child gender	0.30***	0.05	6.32	<0.001
	Child age	0.02***	0.00	3.42	0.00
	Mother's work	-0.04	0.07	-0.58	0.57
Level 2					
	Teacher classroom organization score	0.15**	0.08	2.08	0.044
Communication skills (Domain 2)					
Level 1					
	Intercept	3.79***	0.05	70.39	<0.001
	Child gender	0.13***	0.06	2.19	0.034
	Child age	0.22***	0.00	4.07	<0.001
	Mother's work	-0.031	0.07	-0.19	0.846
Level 2					
	Teacher classroom organization score	0.13***	0.06	2.20	0.00
Motivation (Domain 3)					
Level 1					
	Intercept	3.67***	0.04	87.53	<0.001
	Child gender	0.16**	0.05	2.98	0.01
	Child age	0.02***	0.00	4.89	<0.001
	Mother's work	-0.02	0.07	-0.29	0.77
Level 2					
	Teacher classroom organization	0.10*	0.09	3.11	0.05

Source: Created by the author based on HLM analysis

N = 375 (Level 1), 41 (Level 2)

*** p<0.01, ** p<0.05, * p<0.1

Table 5-7 above also shows that teacher's classroom organization score was also positively associated with separate domains of child initiative score. First, it demonstrated positive association with child's emotional skills ($\beta = .15$, $p < .05$), with likelihood ratio test showing chi-square statistic significant at 5% level. However, communication skills ($\beta = .13$, $p < .05$) and motivation ($\beta = .10$, $p < .1$) showed weaker association with teacher's classroom organization scores.

Table 5-8 below demonstrates the variance explained of each model to see the portion of variance in the dependent variable – each domain of child initiative - has been explained by adding emotional support score of teachers. Results shows that, teacher's emotional support explained 20% of child's total child initiative score, 46% of emotional skills, 52% of communication skills, and 66% of motivation score, indicating that adding teacher's emotional support score could explain significantly larger variance in the dependent variables compared to the previous model and that model 3 was a relevant model to verify the effect of teacher's emotional support score on each domain of child initiative score. However, chi-square statistics from the likelihood ratio (LR) tests were significant (at 5% level) only for the model estimating the effect of teacher's classroom organization score on child's emotional skills. And the models for child communication skills and motivation showed insignificant LR test results.

Table 5-9: Proportion of Variance Explained by Model 3 with Classroom Organization Score as Level-2 Variable

		Total child initiative	Emotional skills	Communication skills	Motivation
Proportion of variance explained	Between classroom	0.21	-1.18	0.05	0.15
	Within classroom	0.35	0.38	0.34	0.01
Likelihood ratio test	Deviance	511.18	351.60	560.96	658.57
	Degrees of freedom	4	3	3	3
	χ^2 statistic	12.25	159.58	81.06	159.58
	P-value	0.015	<0.001	<0.001	<0.001

Source: Created by author based on HLM analysis

Table 5-10: The Effect of Teacher-child interaction (Instructional Support) on Child Initiative Score

Outcome	Child characteristic	Coefficient	Standard Error	t-statistic	p-value
Child initiative score(total score)					
Level 1					
	Intercept	3.71***	0.04	91.37	<0.001
	Child gender	0.21***	0.04	4.81	<0.001
	Child age	0.02***	0.00	4.41	<0.001
	Mother's work	-0.03	0.05	-0.18	0.85
Level 2					
	Teacher's instructional support score	0.16***	0.05	3.07	<0.004
Emotional skills (Domain 1)					
Level 1					
	Intercept	3.74***	0.04	92.03	<0.001
	Child gender	0.30***	0.05	6.32	<0.001
	Child age	0.02***	0.00	3.42	0.00
	Mother's work	-0.04	0.07	-0.58	0.57
Level 2					
	Teacher's instructional support score	0.32***	0.07	4.44	<0.001
Communication skills (Domain 2)					
Level 1					
	Intercept	3.80***	0.05	79.55	<0.001
	Child gender	0.15**	0.08	2.91	0.01
	Child age	0.02***	0.05	3.86	<0.001
	Mother's work	-0.03	0.07	-0.51	0.60
Level 2					
	Teacher-child interaction	0.30***	0.09	3.65	0.00
Motivation (Domain 3)					
Level 1					
	Intercept	3.69***	0.04	89.86	<0.001
	Child gender	0.17**	0.05	3.20	0.01
	Child age	0.02***	0.00	4.59	<0.001
	Mother's work	-0.03	0.07	-0.04	0.66
Level 2					
	Teacher's instructional support score	0.27***	0.09	3.11	0.00

Source: Created by the author based on HLM analysis

N = 375 (Level 1), 41 (Level 2)

*** p<0.01, ** p<0.05, * p<0.1

Model 3 results shown in Table 5-9 above show that teachers' performance score has significant positive association with child's socio-emotional skills measured by child initiative score ($\beta = .03, p < .01$). The association was also significant between teacher-child interaction score and all three separate domains of child initiative score. As teacher's interaction score increased by 1 unit, children's initiative score increased by 0.31 in aggregate child initiative score ($p < .01$), 0.32 for emotional skills ($p < .01$), 0.30 for communication skills ($p < .01$), and 0.27 for motivation score ($p < .01$).

As explained before, it is important to calculate the proportion of variance explained of each model in order to verify whether large portion of variance in the dependent variable – child initiative score – has been explained by adding additional variables. Table below shows that, teacher's performance explained 33% of child's total child initiative score, 25% of emotional skills, 27% of communication skills, and 33% of motivation score, indicating that adding level-2 variables could explain significantly larger variance in the dependent variable compared to the previous model and that model 3 was a relevant model to verify the effect of level-2 predictors of child initiative score. Chi-square statistics from the likelihood ratio tests were significant (at 5% level) for models estimating the effect of teacher's instructional support score on child emotional skills and child motivation but was insignificant for child's emotional skills. Therefore, the association between teachers' instructional support and children's emotional skills can be concluded as statistically insignificant.

Table 5-11: Proportion of Variance Explained by Model 3 with Instructional Support

		Total child initiative	Emotional skills	Communication skills	Motivation
Proportion of variance explained	Between classroom	0.18	0.15	0.18	0.13
	Within classroom	0.02	0.02	0.02	0.02
Likelihood ratio test	Deviance	494.94	547.81	638.82	562.79
	Degrees of freedom	7	9	9	9
	χ^2 statistic	9.35	13.99	21.76	97.61
	P-value	0.037	0.122	0.010	<0.001

Source: Created by author based on HLM analysis

5.1.3. The effect of teacher-child interaction on the effect size of child characteristics on child development outcomes

Model 4

Table 5-11 demonstrates results of the model 4 which measures the effect of interaction effects between child characteristics and teacher-child interaction.

Table 5-12: The Interaction Effect between Child characteristics and Teacher-child interaction

	Child characteristic	Coefficient	Standard Error	t-Statistic	p- Value
Child initiative score (total score)	Intercept	3.69***	0.04	87.69	<0.001
	Interaction	0.26***	0.08	3.11	0.00
	Child gender * Teacher-child interaction	-0.11	0.07	-1.51	0.13
	Child age * Teacher-child interaction	-0.01	0.01	-1.55	0.13
	Mothers' working status* Teacher-child interaction	0.00	0.07	-0.04	0.97
Emotional skills	Intercept	3.75***	0.05	85.92	<0.001
	Interaction	0.31***	0.07	4.15	<0.001
	Child gender * Teacher-child interaction	0.06	0.08	1.10	0.43
	Child age * Teacher-child interaction	-0.01*	0.01	-2.56	0.05
	Mothers' working status* Teacher-child interaction	0.03	0.11	0.43	0.81
Communication skills	Intercept	3.81***	0.05	77.89	<0.001
	Interaction	0.28***	0.08	3.38	0.00
	Child gender * Teacher-child interaction	-0.04	0.07	-0.55	0.59
	Child age * Teacher-child interaction	-0.01*	0.01	-1.99	0.05
	Mothers' working status* I Teacher-child interaction	0.12	0.07	-1.66	0.11
Motivation	Interaction	0.22**	0.07	2.97	0.01
	Child gender * Teacher-child interaction	-0.10	0.07	-1.41	0.17
	Child age * Teacher-child interaction	-0.01	0.01	-1.29	0.21
	Mothers' working status* Teacher-child interaction	0.01	0.08	0.11	0.91

Source: Created by the author based on HLM analysis

N = 375 (Level 1), 41 (Level 2)

*** p<0.01, ** p<0.05, * p<0.1

Results of the model 4 demonstrated in 5-11 above show that the effect size of teacher-child interaction on child development outcomes measured on child initiative score differs depending on children's ages only in two domains – emotional skills ($\beta = 0.01$, $p < .1$) and communication skills ($\beta = -.01$, $p < .1$); the effect size of teacher-child interaction did not vary for the total child initiative score or motivation score depending on child age. As the direction of the coefficient is negative for the interaction term between child age and teacher-child interaction, it implies that as teacher-child interaction scores increases, the effect of child age on child initiative score diminishes, indicating that high quality teacher-child interaction can provide effective support for child initiative level of younger children. The results also show that the effect of teacher-child interaction on the child initiative score and all domains of child initiative score was not significantly different depending on child gender and mothers' working status.

The table below shows that the interaction between teacher-child interaction and children's characteristics can explain higher percentage of variance in children's child initiative score. Compared to the previous model, model 4 explained 31% of the variance in total child initiative score, 18% of emotional skills, 22% of communication skills and 25% of motivation score.

Table 5-13: Proportion of Variance Explained by Model 4

		Total child initiative	Emotional skills	Communication skills	Motivation
Proportion of Variance explained	Between classroom	0.31	0.18	0.22	0.25
	Within classroom	0.06	0.06	0.06	0.06
Likelihood ratio test	Deviance	566.45	593.57	695.37	630.02
	Degrees of freedom	3	3	3	3
	χ^2 statistic	55.27	82.39	184.19	118.84
	P-value	<0.001	<0.001	<0.001	<0.001

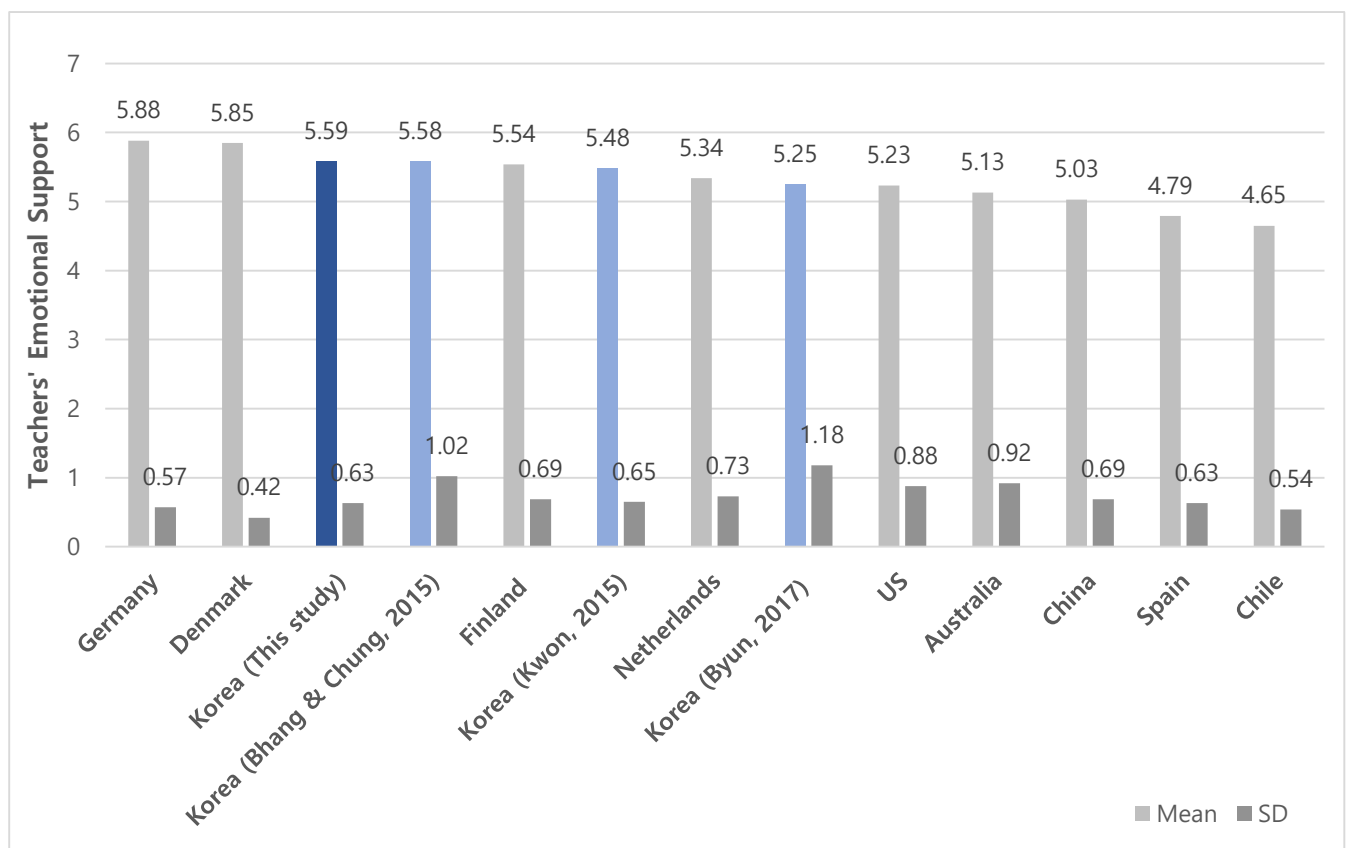
Source: Created by the author based on HLM analysis

5.2. Factors affecting Teacher-child interaction

5.2.1. The current quality of teacher-child interaction in Korea

This section provides comparison of the quality of teacher-child interaction observed in this study with that of the past studies conducted in the Korean context using the same observation instrument, CLAS. The figure below illustrates the overall levels of teachers' performance in emotional support when engaging with children in their classrooms, in comparison with international and previous Korean studies. Data shows that teachers observed for this study scored 5.47 on average which is higher than the international average of 5.28. Teachers in this study also scored higher than the average of the three studies conducted in Korea. Teachers from Germany (5.88) and Denmark (5.85) scored the highest among the 13 studies in emotional support domain, although teachers from this study (5.59) follow them with a small version of only 0.26 points.

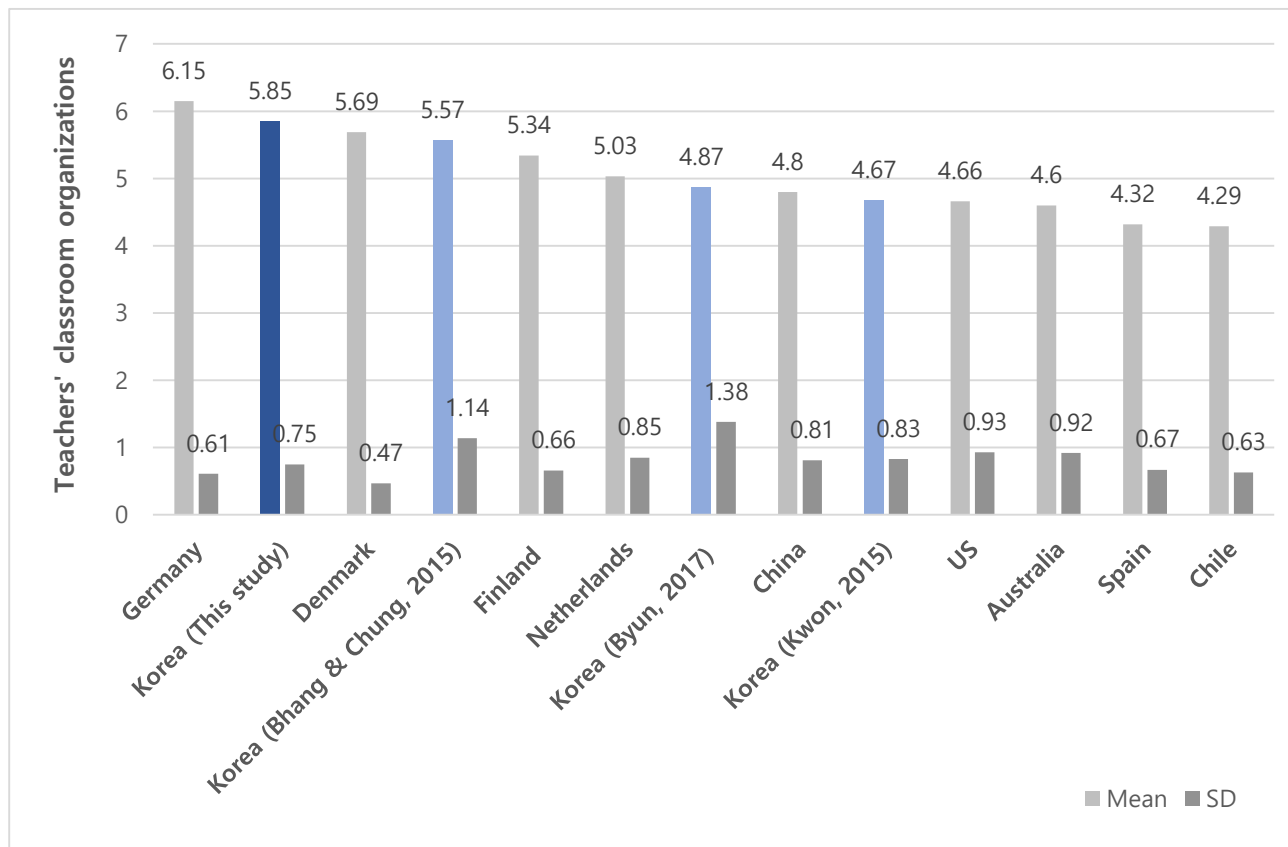
Figure 5-1: International Comparison of Teachers' Emotional Support Score



Source: Created by the author based on Slot (2017), OECD (2016) and observations conducted for this study

In terms of teacher-child interaction in classroom organization, teachers observed in this study also recorded a score (5.85) higher than both international average (5.00) and the average of the Korean studies (5.24). Korea was preceded by only one country – Germany – which scored 6.15, showing that teachers observed in this study ranks higher in this domain than the other two domains.

Figure 5-2: International Comparison of Teachers' Classroom Organization Score

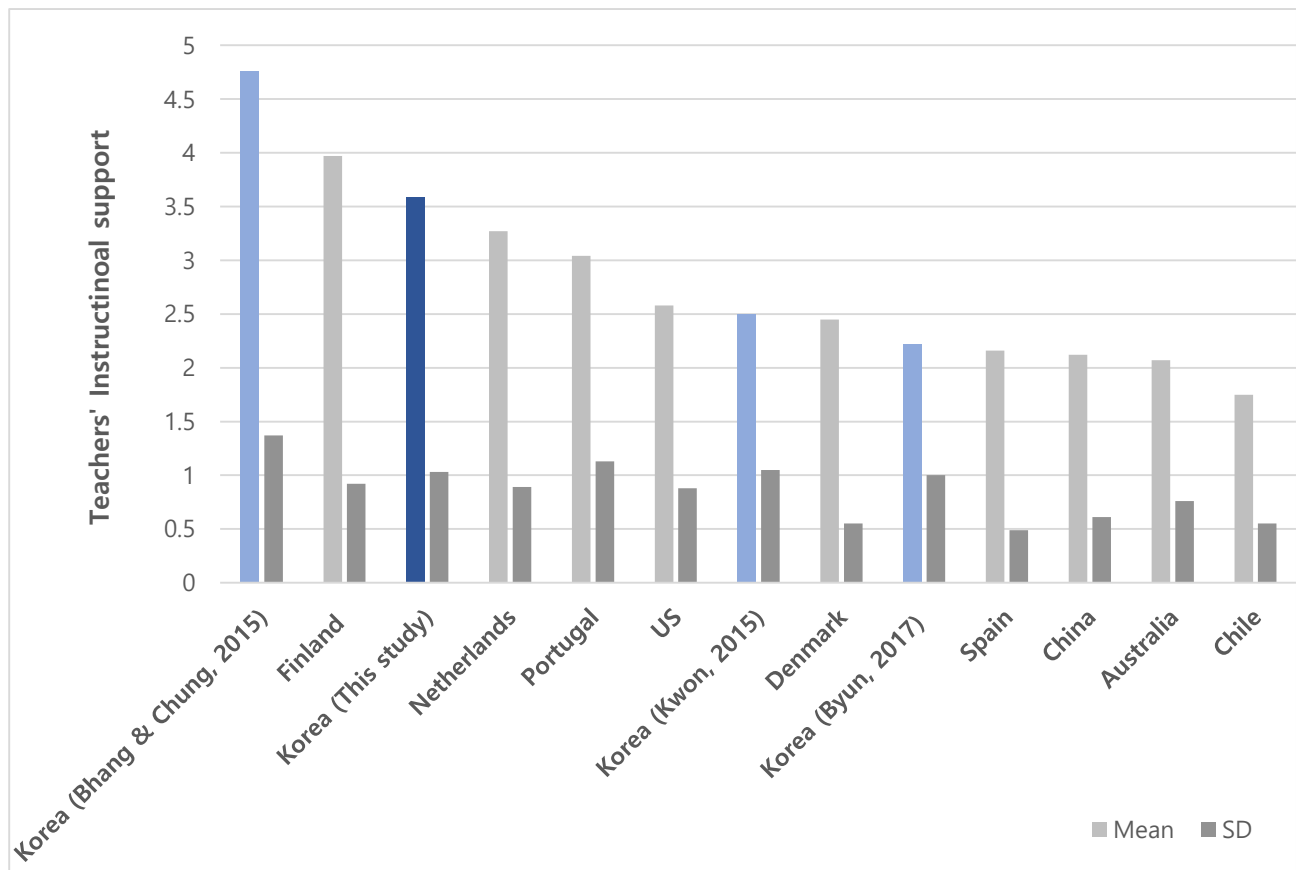


Source: Created by the author based on Slot (2017) and OECD (2016) and observations conducted for this study

Teachers observed for this study scored higher scores in instructional support domain compared to both international average and the average of the Korean studies. However, their average score (3.59) was lower than teachers assessed in Bhang (2015) who scored an average of 4.87. All teachers who were selected for Bhang (2015) were from kindergartens – as opposed to childcare centers – that are located in the metropolitan area; In Byun (2017)'s study, teachers were from both kindergartens and childcare centers and in Kwon (2015)'s study, all observed classrooms were from

childcare centers. It should also be noted that the standard deviation of average teacher scores in Korea are notably larger in all three domains – emotional support (0.87), classroom organization (1.03) and instructional support (1.11) – compared to international averages - emotional support (0.75), classroom organization (0.83) and instructional support (0.84).

Figure 5-3: International Comparison of Teachers' Instructional Support Score



Source: Created by the author based on Slot (2017) and OECD (2016) and observations conducted for this study

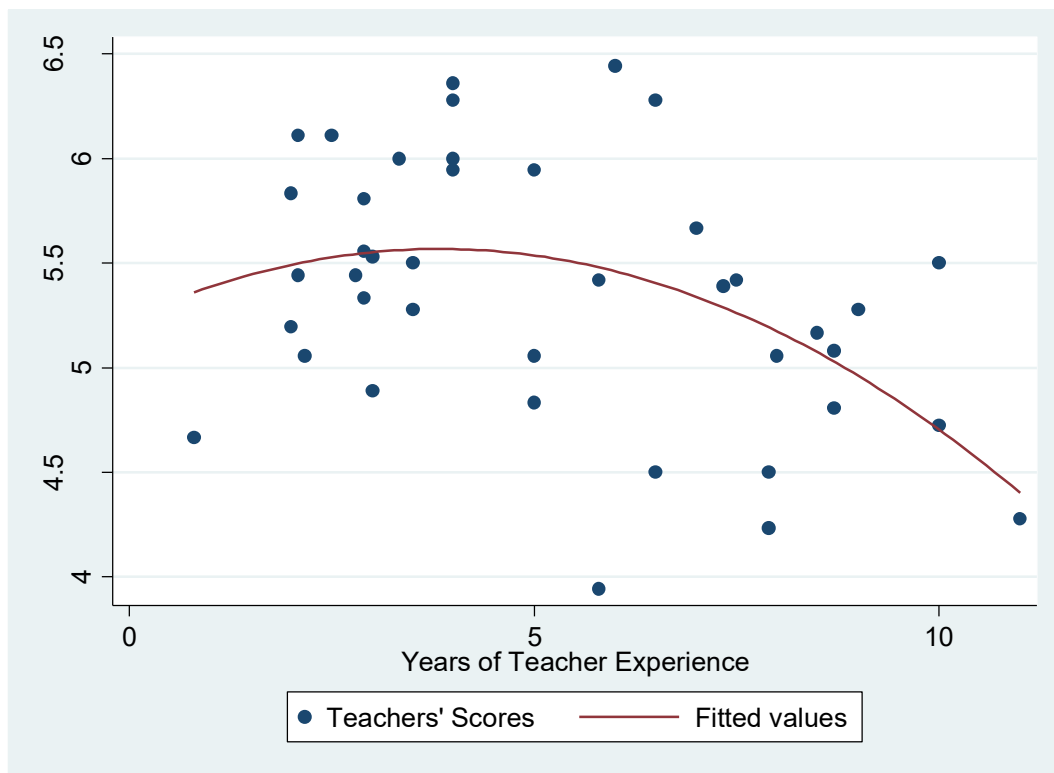
5.2.2. The Effect of Teacher Characteristics on Teacher-Child Interaction

This subsection shows the results from the analyses conducted to investigate the effect of teacher characteristics on the level of teacher-child interaction. The study conducted multiple regression analysis to find out which factors can predict the level of teacher-child interaction – measured by their interaction skills. Teacher-child interaction was measured by CLASS (Classroom

Assessment Scoring System), a 7-point Likert scale observation tool.

First, the preliminary regression analysis showed negative coefficient for the years or teacher experience on teacher-child interaction, the result which differed from the hypothesis that the years of teacher experience is likely to have positive or no association with teachers' interaction skills. In order to look more closely to the association between these variables, a two-way quadratic prediction plots were drawn as in the figure below. The graphics predicted a possibility that the years of experience may have varying effects on teacher score depending on the different levels of experience. In particular, the preliminary results showing significant negative association was visibly distinct towards higher number of experiences.

Figure 5-4: The effect of teacher experience on teacher-child interaction skills



Source: Created by author based on estimation

Therefore, the main regression analysis divided teachers into three groups depending on their years of experience. Descriptive statistics show that teachers' years of experiences ranged from 0.8

years to 11 years. As the dependent variable is teacher-child interaction score based on teacher-child interaction, possible points in time relevant to policy changes that were related to factors that can affect the teacher-child interaction practices were identified. That is, teachers were divided into three groups depending on the point in time that they began to teach; the groups consist of; i) teachers who began to teach in or after the year 2013 when the Nuri curriculum was initiated for children aged 3 to 5 years enrolled in ECEC centers (0.1 to 4 years), ii) teachers who began to teach in or after the year 2010 when the second phase of Childcare Quality accreditation was introduced (5 to 7 years), iii) and teachers who began to teach ahead of these two points in time (8 to 11 years). As explained in earlier chapters, the introduction of the Nuri Curriculum is a strong factor that can affect teachers' experience as the curriculum and the teachers' manual demonstrate emphasis on teacher-child interaction; in addition, under the Nuri Curriculum, the 8 hour training that includes contents on teacher-child interaction for teachers for children aged 3 to 5 years is mandatory. Also, as explained in other sections, the second phase of the Childcare Quality accreditation marks a period when the criteria on teacher-child interaction became stronger, indicating that from this period more focus may have been given to teacher-child interaction in this aspect.

Table below shows the results of the multiple regression used to test if teacher characteristics significantly predict teachers' performance measured by teacher-child interaction score. The results of the regression indicate that four predictors significantly predicted teacher-child interaction - teacher education ($\beta = .40, p < .10$), teacher training ($\beta = .06, p < .05$), and teacher experience longer than eight years ($\beta = -.63, p < .05$).

In terms of teacher education, teachers with bachelor's degrees were more likely to perform better in terms of interaction skills, compared to teachers without bachelor's degrees. With regard to the frequency of training, teachers who received higher number of training per year on teacher-child interaction scored higher on teacher-child interaction. As the number of training per year increased by one unit, teachers' performance score increased by .06 point. Teacher age did not show significant

effect on teacher-child interaction on interaction.

In terms of the years of teacher experience, the study found intriguing results. As mentioned above, teachers were divided into three groups. Group 1 where teachers have 0.1 to 4 years (group 1) 5 to 7 years (group 2) and 8 to 11 years (group 3). Regression used group 1 as a reference group. The results show that compared to group 1, group 2 did not show significant difference but group 3 (teacher experience of 8 to 11 years) showed significantly lower score than group 1 ($\beta = -.63, p < .05$). That is, teachers with 8 to 11 years of experience showed significantly lower performance in terms of teacher-child interaction skills compared to teachers with 0.1 to 4 years of experience.

Table 5-14: The Effect of Teacher Characteristics on Teacher-Child Interaction

	Teacher's Interaction Score	β	<i>SE</i>	<i>t-statistics</i>	<i>p-Value</i>
Teacher characteristics	Teacher age	0.02	0.03	0.67	0.51
	Teacher education	0.40*	0.20	1.96	0.06
	Teacher training	0.06**	0.03	2.07	0.05
	Experience (5-7 yrs)	-0.10	0.25	-0.38	0.70
	Experience (8-11 yrs)	-0.63**	0.24	-2.58	0.02

N = 41, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

R-squared = 0.5785

Adjusted R-squared = 0.4379

Source: Created by the author based on analysis

In addition, teacher's interaction score was broken down into three sub-domains and tested to see how they were predicted by the teacher variables. The results are shown in the tables below. The results demonstrated in Table 5-15 show that as average child age in classroom increased, teacher's performance in emotional support also increased, which is consistent with the results for teachers' overall interaction score. Even teachers' years of experience longer than 8 years – which has negative effect on overall teachers' interaction score did not show significant association with teachers' score in the emotional support domain.

Table 5-15: The Effect of Teacher and Classroom Characteristics on Teacher's Emotional Support Score

	Teacher's Interaction Score	β	<i>SE</i>	<i>t</i>	<i>p</i> -Value
Teacher characteristics	Teacher age	0.01	0.04	0.14	0.89
	Teacher education	0.38	0.26	1.46	0.15
	Teacher training	0.05	0.04	1.23	0.23
	Experience (5-7 yrs)	0.43	0.43	-0.38	0.70
	Experience (8-11 yrs)	-0.08	0.08	-2.58	0.02
N = 41, *** p<0.01, ** p<0.05, * p<0.1					
R-squared		=	0.5153		
Adjusted R-squared		=	0.3537		

Table 5-16 below illustrates the association between the teacher characteristic on teacher-child interaction in classroom organization. Interestingly, none of the teacher characteristics predicted teachers' score on classroom organization.

Table 5-16: The Effect of Teacher Characteristics on Teacher's Classroom Organization Score

	Teacher's Interaction Score	β	<i>SE</i>	<i>t</i>	<i>p</i> -Value
Teacher characteristics	Teacher age	0.08	0.05	1.57	0.13
	Teacher education	0.26	0.30	0.87	0.39
	Teacher training	0.03	0.04	0.58	0.57
	Experience (5-7 yrs)	-0.47	0.37	-1.28	0.21
	Experience (8-11 yrs)	-0.46	0.36	-1.28	0.21
N = 41, *** p<0.01, ** p<0.05, * p<0.1					
R-squared		=	0.3505		
Adjusted R-squared		=	0.134		

Table 5-17 below illustrates the association between the teacher characteristic and teacher-child interaction in instructional support. The results show that higher level of education and more frequent teacher training on teacher-child interaction in interaction with children contributed significantly to higher teacher score in instructional support. Such results differ from cases of emotional support and classroom organization domains where teacher characteristics showed no association with teacher-child interaction. Teachers with bachelor's degrees were more likely to

provide better instructional support to children than teachers who did not. In addition, when teachers received more number of interaction trainings per year, their scores in instructional support skills increased by .11 point. Teachers' longer years of experience showed strong negative association with teachers' performance instructional support. Compared to the base level group of teachers who had less than five years of experience, the group of teachers who had eight years of experience or more were likely to score less by a large margin – when teachers' experience increased by one year, their score decreased by 1.34 score points. This is a significantly large margin given that teachers' instructional support scores ranged from 3.00 to 6.33 on a 7-point Likert scale.

Table 5-17: The Effect of Teacher Characteristics on Teacher's Instructional Support Score

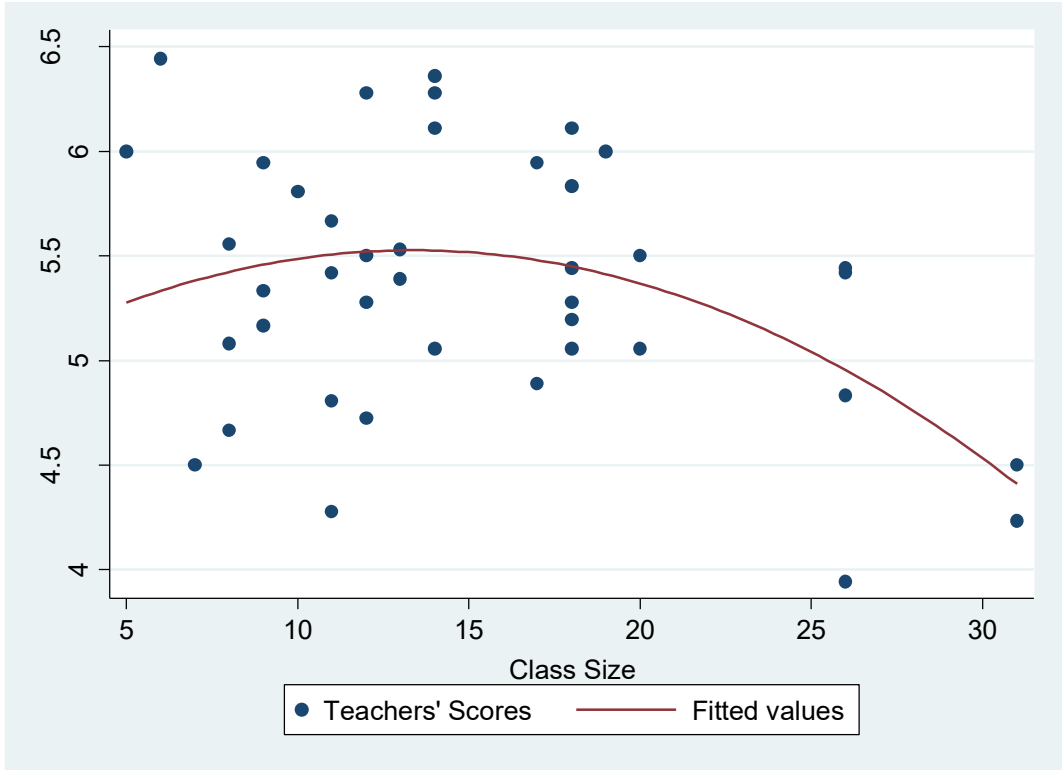
	Teacher's Interaction Score	β	<i>SE</i>	<i>t statistic</i>	<i>p</i> -Value
Teacher characteristics	Teacher age	-0.02	0.05	-0.30	0.77
	Teacher education	0.55*	0.31	1.78	0.09
	Teacher training	0.11**	0.05	2.48	0.02
	Experience (5-7 yrs)	-0.25	0.38	-0.64	0.53
	Experience (8-11 yrs)	-1.34***	0.02	0.46	0.65
N = 41, *** p<0.01, ** p<0.05, * p<0.1					
R-squared		= 0.5274			
Adjusted R-squared		= 0.444			

5.2.3. The Effect of Classroom Characteristics on Teacher-Child Interaction

Similarly to the effect of teacher characteristics on teacher-child interaction, some of the classroom characteristics also demonstrated varying degrees of association with teacher-child interaction. As in the case of teachers' experience, class size also indicated negative effect teacher's performance in the preliminary regression. a two-way quadratic prediction plots were drawn as in the figure below. The graphics predicted a possibility that the total number of children per classroom may have varying effects on teacher score depending on the different numbers of children. In particular, the preliminary results showing significant negative association was visibly distinct towards higher number of children. In this light, the variable of total number of children were divided into four groups taking

into account the current regulations set by the Korean government with regards to class size; the groups consist of; i) classes that have 1 to 14 children that are below (reference group), ii) classes that have 15 to 18 children (the maximum capacity set for classrooms of three year-olds), iii) classes that have 19 to 23 children (the levels above the capacity set for classrooms of three year-olds but within the capacity for four/five year-olds) and iv) classes that have 24 to 31 children (classes above the maximum capacity set for classrooms of four/five year-olds).

Figure 5-5: The effect of class size on teacher-child interaction measured by interaction skills



Source: Created by author based on estimation

The total number of students in the classroom (class size) and child-teacher ratio were both used as separate variables, as even when the child-teacher ratio is the same, the total size of the students can vary significantly which results in large differences in class size. In addition, average age in months of children that belong to a classroom was also used as a classroom characteristic in order to study the potential effect of child age on the way that teachers’ interaction with children. As

shown in the table below, average age of children in the classroom showed positive association with teacher score ($\beta = .02$, $p < .05$). However, child-teacher ratio did not demonstrate significant association with teacher-child interaction. In terms of class size, different class sizes were divided into three groups as mentioned above. The group of classrooms with less than 14 children was used as a reference group. Results show that compared to the reference group, class size of 24 children or more had significantly negative association with teacher-child interaction. Other groups of classrooms did not show significant difference.

Table 5-18: The effect of teacher and classroom characteristics on teacher-child interaction

	Teacher's Interaction Score	β	SE	t -statistics	p -Value
Classroom characteristics	Average child age	0.02**	0.01	2.27	0.03
	Child-teacher ratio	-0.03	0.04	-0.82	0.42
	Class size (15-18)	-0.23	0.21	-1.08	0.29
	Class size (19-23)	-0.34	0.32	-1.06	0.30
	Class size (24-31)	-0.69**	0.29	-2.39	0.02
	Constant	3.38***	1.03	3.29	0.00
N = 41, *** p<0.01, ** p<0.05, * p<0.1					
R-squared		=	0.5785		
Adjusted R-squared		=	0.4379		
Source: Created by the author based on analysis					

As shown in Table 5-7 below, lass size larger than 24 children per classroom also showed significantly negative association with teachers' emotional support score.

Table 5-19: The Effect of Classroom Characteristics on Teacher's Emotional Support Score

	Teacher's Interaction Score	β	SE	t	p-Value
Classroom characteristics	Average child age	0.02**	0.01	2.27	0.03
	Child-teacher ratio	-0.01	0.05	-0.15	0.89
	Class size (15-18)	-0.13	0.27	-0.50	0.62
	Class size (19-23)	0.20	0.42	0.48	0.64
	Class size (24-31)	-1.02**	0.37	-2.72	0.01
	Constant	2.71***	1.32	2.05	0.05
N = 41, *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$					
R-squared		= 0.5153			
Adjusted R-squared		= 0.3537			

Table 5-8 below illustrates the association between classroom characteristic on teacher-child interaction in classroom organization. Child-teacher ratio did not show meaningful association with teacher score in classroom organization, but class size between 19 to 23 children per classroom showed significant negative association with teacher's classroom organization score.

Table 5-20: The Effect of Teacher and Classroom Characteristics on Teacher's Classroom Organization Score

	Teacher's Interaction Score	β	<i>SE</i>	<i>t</i>	<i>p-Value</i>
Teacher characteristics	Teacher age	0.08	0.05	1.57	0.13
	Teacher education	0.26	0.30	0.87	0.39
	Teacher training	0.03	0.04	0.58	0.57
	Experience (5-7 yrs)	-0.47	0.37	-1.28	0.21
	Experience (8-11 yrs)	-0.46	0.36	-1.28	0.21
Classroom characteristics	Average child age	0.02	0.01	2.27	0.03
	Child-teacher ratio	-0.01	0.06	-0.14	0.89
	Class size (15-18)	0.08	0.31	0.26	0.80
	Class size (19-23)	-1.26**	0.48	-2.65	0.01
	Class size (24-31)	-0.51	0.43	-1.20	0.24
	Constant	2.58*	1.51	1.71	0.10

N = 41, *** p<0.01, ** p<0.05, * p<0.1

R-squared = 0.3505

Adjusted R-squared = 0.134

Table 5-21: The Effect of Teacher and Classroom Characteristics on Teacher's Instructional Support Score

	Teacher's Interaction Score	β	<i>SE</i>	<i>t statistic</i>	<i>p-Value</i>
Classroom characteristics	Average child age	0.01	0.06	-0.78	0.44
	Child-teacher ratio	-0.05	0.04	-0.82	0.42
	Class size (15-18)	-0.63	0.32	-1.95	0.06
	Class size (19-23)	0.03	0.49	0.06	0.95
	Class size (24-31)	-0.55	0.44	-1.25	0.22
	Constant	4.86***	1.57	3.09	0.00

N = 41, *** p<0.01, ** p<0.05, * p<0.1

R-squared = 0.5274

Adjusted R-squared = 0.444

Table 5-9 above illustrates the association between classroom characteristics and teacher-child interaction in instructional support. Unlike the other two domains where teacher score was negatively associated with the class size, teachers' instructional support score did not show significant association with the total number of children in classrooms.

CHAPTER 6:

DISCUSSION AND CONCLUSION

6.1. Discussion

6.1.1 Predictors of Child Outcomes

1) The Effect of Child Characteristics on Child Development Outcomes

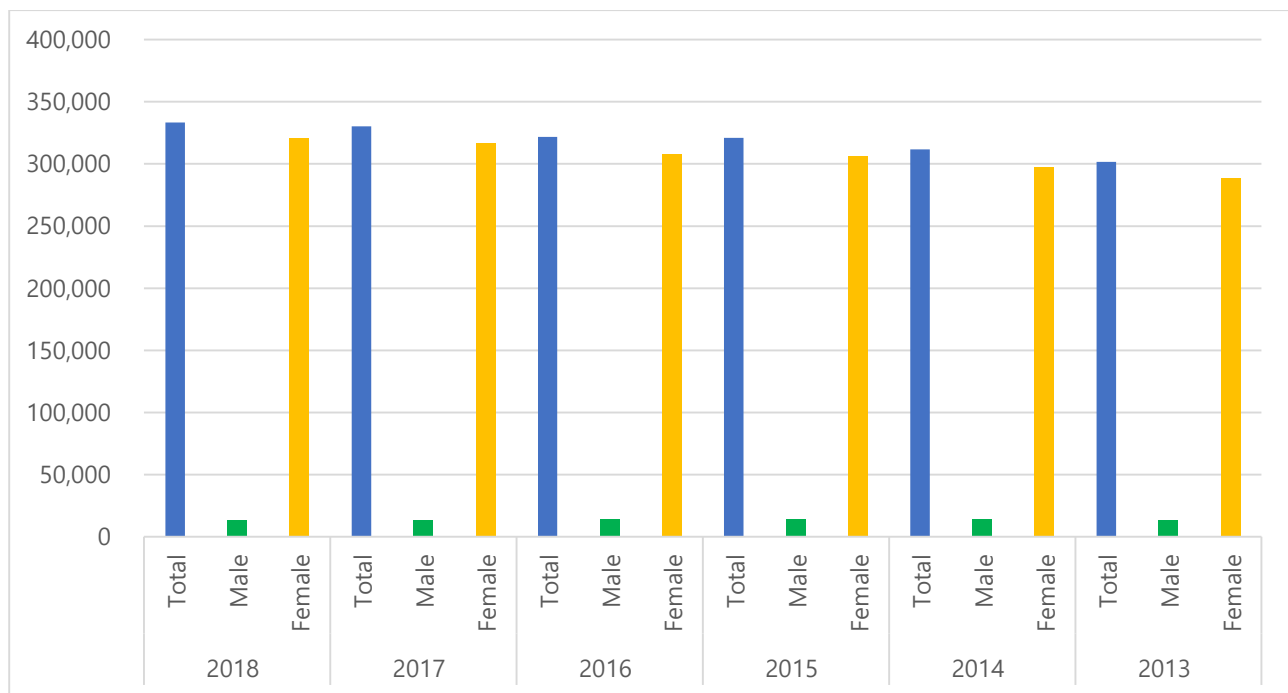
The results of the study show that older children scored higher than younger children and that girls scored higher than boys on all domains of child initiative, in line with hypothesis 1.1. Such results are also consistent with the study by Bhang & Chung(2015), where older children and girls performed better than boys in all four domains of school readiness, including living in group setting, emotional skills, daily life knowledge and academic abilities. In the current study, girls showed better outcome than boys in all domains – emotional skills, communication skills and motivation, which is also in line with previous literature where girls showed higher performance than boys in child initiative. In Seo (2016), girls showed higher scores in the domains of child initiative scale – the same scale that was used in this study when analyzing the effect of teachers’ temperament – emotionality, activity and sociability - on child development outcomes.

The gender difference between girls and boys has been considered in more studies due to its potentially lasting effect during children’s later lives. A study by and Hamre and Pianta (2001) shows that the gender-related differences in early years have extended impact leading to social skills and academic achievement in primary schools and promoting good interaction in early years. Another research by Goodman (2015) looked into the gender differences between boys and girls in terms of their level of good conduct and tracked how the gender gap progressed with time. In Goodman’s study, good conduct referred to self-control as well as self-regulation which was defined as the way children

manage and express their emotions, and their ability to control short-term impulse behaviors. Goodman and his colleagues went further to track these differences at ages three, five, seven and eleven. Their study demonstrated lower levels of good conduct than girls at all observed ages between three and eleven. What is important here to note is that the gender gap appears to widen gradually after children reach the age of five until they reach the age of eleven. That is, the gender gap between girls and boys in their emotional control and self-regulation persists from early childhood years through pre-adolescence.

In order to close the gender gap between boys and girls and to potentially prevent wider gaps in later stages in their lives, it is necessary to look into how this gap has come about in the first place. Kenser (2000) argued that with increasing number of hours that children spend in ECEC centers, teachers are playing an increasingly important role in children's learning and development. He also argued that a predominantly female teacher workforce may yield an unfavorable effect on the development prospects of boys. Such finding provides highly relevant implications for the current study as all teachers – as well as teachers - who participated in this study were female. Statistics show that, during the past six years (2013-2018) in Korea, only four to five percent of childcare teachers nationwide were male, while 95 to 96% of them were female.

Figure 6-1: Number of Male/Female Teachers in Childcare Centers (2013-2018)



Source: Created by the author based on MOHW (2019b)

A study by Nelson (2002) shows that early childhood education and care profession is traditionally deemed to be more suitable for female teachers due to relatively low social status attached to the job, low salary as well as the social prejudice that categorize women as more apt caregivers. However, there is belief among female teachers that male teachers can present role models and that male teachers can also be effective as caregivers (Lee & Cho, 2008). Parents also showed preference for female teachers, in particular, when their children are younger (Lee & Cho, 2008). It is important to note here that among the reasons that discourage men from pursuing ECEC profession is lack of professionalism recognized by the society and unfavorable working conditions especially when teaching younger children (Cho & Lee, 2005). However, given the fact that childcare setting is one of the primary educational setting for children - along with family settings – where children experience extended interactions with adults, the role model presented by male teachers is paramount especially to boys in terms of their experiences, sociability and character skills development (Lee & Cho, 2008). In addition, male teachers can help children build balanced gender role in the society going forward.

Given the fact that promoting good teacher-child interaction can reduce emotional and behavioral problems in later years (Ahn, 2013; Baker, 2006; Hamre & Pianta, 2001), it is important to ensure an environment where boys and girls have equitable environment for the development of socio-emotional skills. In addition, the findings from this study and past literature review mentioned above indicate that gender gap in the early years have potential to exist or even widen as children get older, calling for measure to mitigate the gender gap in the early years to minimize the later and wider gap in important skills that can predict their future academic performance and success.

The importance of the role played by male teachers can be further emphasized by the number of boys enrolled in childcare centers in Korea. In 2008, more than half of children in childcare centers were boys - 731,498 (or 51.7%) of the total enrolled children in childcare centers across the country were boys, while 684,244 (48.3%) were girls. It may be considered to increase the number of male teachers in classrooms of older children that may need less attention of a caregiver, so that boys can benefit from developing sociability and character skills development more effectively. This may be one possible consideration to narrow the gap between boys and girls as observed in this study.

Table 6-1: Number of Boys and Girls in Childcare Centers by type (2018)

	Total	Public	Social welfare corporation	Corporations	Private	Family child care	Parent cooperation	Employer-supported
Total	1,415,742	200,783	92,787	41,298	711,209	302,674	4,360	62,631
Boys	731,498	103,444	48,702	21,633	367,436	155,682	2,272	32,329
Girls	684,244	97,339	44,085	19,665	343,773	146,992	2,088	30,302

Source: Created by the author based on MOHW (2019b)

Lastly, this study found no association between mothers' working status and children's development outcomes, which is not consistent with the hypothesis 1.1. Such findings also go against the arguments of previous studies by Ruhm (2004) and Brooks-Gunn et al. (2002) who found negative association between maternal employment on child's cognitive development. In addition, Baydar (1991) and Belsky and Eggebeen (1991) revealed negative effect of maternal employment on

children's emotional skills and behavior. It should be noted here that all sampled children in this study attend employer-supported childcare centers which leaves them with similar hours with their mothers regardless of their mothers' employment status. However, the study still attempted to see whether mothers' employment can affect child development outcomes even when the hours of exposure with mothers may be equal. The result that there is no association between these two variables is positive finding as it provides evidence that when the children are enrolled in a particular ECEC setting provided by employer-supported childcare centers, their development outcomes have a tendency to remain similar regardless of whether mothers are employed or not.

2) The Effect of Teacher-child interaction on Child Outcomes

This study investigated the effect teacher-child interaction on child socio-emotional development outcomes. Teacher-child interaction was measured by CLASS focusing on teacher's skills to interaction with children measured by three domains – emotional support, classroom organization and instructional support. Children's socio-emotional development outcomes were measured by child initiative scale that measures a child's emotional skills, communicational skills and motivation. These three domains are common elements of socio-emotional skills that are also referred to as character skills. As mentioned in section 2.3, the principle objective of Korea's current ECEC curriculum for children aged three to five years – the Nuri Curriculum – is to nurture children's character skills and it places strong importance on teacher-child interaction (MOEST & MOHW, 2012). From the perspectives of the Input-Process-Output framework of the educational quality by Scheerens (2011), teacher and classroom characteristics constitute the category of input, teacher-child interaction falls into the category of process and child's character skills – measured by child initiative scale in this study – constitutes the outcome in the Korean policy context. With this said, this study was an important exercise to investigate the education quality of Korea's ECEC. The timing of the study makes this effort even more relevant. Since the Nuri Curriculum for Ages 3 to 5 has been implemented in 2013 with objectives to improve the quality of ECEC services, there has been a series of policy

changes mentioned in Section 2 which reflect government's efforts to further solidify the effects of the new curriculum. These efforts include increasing the number of indicators in the Childcare Center Quality Accreditation that measure the quality of teacher-child interaction as well as the making the accreditation mandatory for all childcare centers beginning in the year 2019 (MOHW, 2019; KCPI, 2018).

With the afore-mentioned series of policy changes in the recent years highlighting the importance of the quality of ECEC, with particular focus on teacher-child interaction, the study first set out to compare the overall level of teacher's interaction skills with previous studies in order to see if the policy measures have contributed to improved quality. Teachers' performance in all emotional support and classroom organization in this study was higher than all pervious studies conducted in Korea (Byun, 2017; Kwon, 2016; Bhang & Chung, 2015). Also in international comparison, teachers in this study have scored higher than a majority of countries. Teachers scored particularly higher in classroom organization compared to other studies. However, in terms of teachers' instructional support, teachers in the previous study by Bhang and Chung (2015) scored the highest and the other two Korean studies showed relatively lower scores in the international comparison compared to other domains of teacher score. It can be taken into consideration that Bhang and Chung (2015)'s samples were entirely kindergarten teachers while this study and the other two studies targeted either all or partly childcare teachers. Kindergartens have traditionally played a more education-focused function and therefore require higher levels of pre-service education from teachers. The minimum level qualification for kindergarten teachers is a 2-year college degree or higher degree with designated credits in early child education or a Master's degree from graduate school of education (majoring in early childhood education). On the other hand, the entry level qualification for childcare center teachers is a high school diploma and training designated by the Ministry of Health and Welfare.

Nevertheless, the instructional support domain is a critical domain focused on obtaining new knowledge and supporting children's learning; it assesses teacher's support in concept development, quality feedback and language development. Therefore, it is important to ensure that childcare center classrooms are continuously monitored in order to ensure that their educational role in classrooms of

ages three to five are up to par with kindergartens classrooms in terms of the quality of teaching and learning. The results also pointed out the relatively larger discrepancies even among teachers from childcare centers in terms of instructional support scores. Such observation calls for government-led efforts to ensure that childcare centers provide equitable level of quality, in order to give equitable access to high quality ECEC services to all children as expressed in the objectives of the Nuri Curriculum (MOEST & MOHW, 2012).

The analyses aimed at studying the effect of teacher-child interaction on child outcomes show that high quality interaction with children conducted by teachers had significant positive impact on all three domains of child outcome measured on child initiative scale, with similar effect sizes. Such results were in line with previous studies that found the positive association between teacher-child interaction and child outcomes (Bhang & Chung, 2015; Hamre & Pianta, 2005). The three domains of child initiative score used in this study – emotional skills, communication skills and motivation – constitute important elements of child's socio-emotional skills which then represent child character skills, which is the primary objective of the current Nuri Curriculum. The results of this analysis verify that within the sampled childcare centers, higher quality of teacher-child interaction could predict higher levels of child development outcomes.

Among the three domains of children's socio-emotional skills measured by child initiative scale (Oh, 2004), emotional skills domain was most strongly predicted by the aggregate teacher interaction score. This sustains previous studies that found strong positive effect of teacher engagement for children's emotional skills (Hu et al., 2017; Suh, 2016; Bhang & Chung, 2015; Howes et al., 2008). Such findings stress the importance of quality teacher-child interaction, reinforcing the evidence for the increasing focus on interaction observed in Nuri curriculum and childcare center accreditation criteria. They also highlight the need for enhanced policy support to facilitate better quality interaction based on factors that contribute to higher teacher-child interaction.

Results found that teachers' emotional support score has significant positive association with the aggregate child initiative score as well as all three domains of child's socio-emotional skills measured by child initiative score – emotional skills, communication skills and motivation. Such

results are in line with hypothesis 1.2 as well as a number of previous studies that found positive association between teacher's emotional support and children's emotional development (Byun, 2017; Suh, 2016; Hu et al., 2016 ; Bhang & Chung, 2015; Von Suchodoletz et al., 2014).

Different from other two teacher score domains, classroom organization showed notably weaker association with child motivation in the HLM analyses. In addition, the likelihood ratio test showed that the effect of teachers' classroom organization demonstrated was significant only for child's emotional skills and had insignificant association with child's communication skills and motivation. This domain of teacher-child interaction scale measured on CLASS refers to well-managed classrooms that provide children with frequent, engaging learning activities (Pianta et al., 2008). More specifically, this domain measures teachers' interactive activities to facilitate behavior management, productivity and instructional learning formats. Compared to other domains, teacher engagement measured in this domain – particularly focused on behavior management and productivity - are rather teacher-oriented as teachers are expected to impose certain level of control over children's actions, movements or decisions as a way to ensure order and abide by scheduled daily plans. This study finds that such teacher-led interventions may not be as effective as other types of support in boosting child initiative.

In the study of Bhang and Chung (2015), teacher's classroom organization also showed weaker association with child development outcome, in particular in emotional skills domain of child outcomes, indicating that teachers' efforts to maintain order in the classrooms may not contribute greatly to child development outcomes. In addition, Byun (2017) found no association between teachers' classroom organization skills and child peer initiative – which refers to the tendency and ability to show leadership and effective sociability in interactions with peers (Byun, 2017). Downer (Downer et al., 2012) had argued that when teachers ensure that classroom is well-organized it reduces problem behaviors by children and improves children's academic performance. Also Park and Kim (2011) found that when teachers ensure that daily routine and order is well-maintained, children feel more emotionally stable and can concentrate better on their activities. However, it can be inferred that teachers' efforts to improve classroom organization can provide such an environment where children

can engage in activities and learning more efficiently, but may not directly affect children's behaviors and socio-emotional skills. As classroom organization concerns how teachers organize daily routines and children's activities to, it can certainly ensure that students learn in well-organized environment. However, as classroom organization assess whether teachers employ their agency – as opposed to encouraging child agency, it is likely to play a weaker role in promoting child agency. It is notable that this teacher domain showed the weakest effect size and significance on child motivation. This implies that even though this domain is considered an important part of teacher-child interaction, the teacher-oriented nature of this domain did not contribute to increasing children's child initiative outcomes.

3) The Effect of Teacher-child interaction on the Effect Size of Child Characteristics on Child Outcomes

This section discusses the results of the analyses run to identify whether the level of teacher-child interaction – measured in teachers' interaction skills – can affect the size of the effect that child characteristics have over child outcomes. The results partly upheld the hypothesis that the effect size of child characteristics on their child initiative score decrease when teachers perform better in terms of interacting with children in classrooms.

First, with regards to the effect size of child age on their outcomes, the effect size of teacher-child interaction changed the effect size of child age on child initiative score in two out of three domains – emotional skills and communication skills. This implies that when teachers interact better with children, children's initiative score is less likely to be affected by their age when it comes to emotional skills and communication skills, but their motivation level is not likely to be affected. Results indicate that as a child age increases, child outcome measured by emotional skills and communication skills became less likely to be affected by teacher score, whereas a child's motivation score was not affected by the level of teacher-child interaction. This implies that when children are younger, teacher's interaction with children has stronger influence on children's development of emotional and communication skills. This finding shows that teachers have stronger leverage in promoting children's emotional and communicative skills development through high quality teacher-

child interaction during children's younger ages. Children's emotional skills were measured by four indicators (in 18 questions) that consist of emotional awareness, self-control, empathy and interpersonal skills. Oh (2004) defined children's emotional skills as skills to understand other people's emotions and to be able to control their own emotions in order to maintain harmonious relationships. Children's communication skills refer to skills to interact with other people as a member of the society and were measured in three domains (in 11 questions) that consist of linguistic skills, expression and delivery and sense of humor (Oh, 2004).

This section of the HLM analyses shows that when the aggregate score of the teachers' interaction skills - measured by emotional support, classroom organization and instructional support as a whole could – are of high quality, it can mitigate the effect of child age on their emotional and communicative skills development and such influence of teacher intervention decreases as children get older. In hypotheses, this study had expected to find that the effect size of all child characteristics on their development outcomes in all domains decrease when teachers perform better in terms of interacting with children in classrooms. This means that the results only partly upheld the hypotheses, as the effect size of child gender or mothers' employment status were not affected by the quality of teacher-child interaction. It was found in previous section of the analyses that there were significant disparities between boys and girls in terms of their development outcomes where girls scored significantly all domains of child initiative – emotional skills, communication skills and motivation. But there were no differences found between children whose mothers worked and did not work. Therefore this study was more keen to find out whether teacher intervention can interfere with the way child characteristics affect their development outcomes. However, unlike the hypotheses higher quality teachers' interaction skills did not affect the effect size of child gender and mother's working status of the child on their child initiative score but teacher intervention only affected the interaction between child age and child's emotional and communicative skills. These results implies that in order to enhance children's emotional skills and communication skills development, it is important to intervene as early as possible, when engaging with children in ECEC classrooms of three to five year-olds.

6.1.2. Predictors of Classroom Quality

1) The Current Quality of Teacher-Child Interaction in Korea

The study portrayed a positive landscape of the current quality of teacher-child interaction in Korea's ECEC settings. The results of the study showed that teachers' performance in teacher-child interaction in all three domains was relatively high among the past studies conducted in the Korean context - Bhang & Chung (2015), Kwon (2015) and Byun (2017) - as well as among the international studies - Sheridan (2009) and Brinkman (2016). In terms of emotional support, teachers in this study scored higher than all three Korean studies a majority of the studies from other countries, in accordance with the Hypothesis 2-1. Moreover, the relative level of the current quality of ECEC in Korean childcare centers was higher than a majority of international studies. This is a positive development given the growing policy focus on increasing the quality of ECEC services in Korea, in particular the quality of teacher-child interaction as reflected in the Nuri Curriculum and quality accreditation system (MOEST & MOHW, 2013; MOHW & KCPI, 2018). It is especially welcome to note that the level of teacher-child interaction in this study was higher in some domains than the past study conducted in kindergartens, indicating improved quality of childcare services in comparison to kindergartens in the midst of policy objective to equalize the quality in the two types of institutions. It is likely that the implementation of the Nuri Curriculum with the importance of teacher-child interaction strongly emphasized in the teacher guidelines as well as the increased focus on teacher-child interaction in quality accreditation have provided grounds for higher quality of interactions in childcare centers. Nevertheless, it should be noted that in terms of instructional support domain, teachers' scores in this study were lower than previous observations in kindergartens (Bhang & Chung, 2015) and the disparities among teacher scores were relatively higher than in other studies. As instruction support is the domain that is most focused on the pedagogical role of the teachers and the delivery of new concepts and knowledge, it will be desirable for teachers in childcare centers to receive more standardized training so that more equitable level of instructional support can be provided in childcare

centers.

2) The effect of teacher characteristics on teacher-child interaction

In terms of the research question 1.1 designed to investigate the association between teacher characteristics and their interaction skills, the results were mixed. First, teachers' interaction score was not statistically influenced by teacher's age. This finding is consistent with the hypothesis that teacher's age is not likely to have a significant effect on teacher outcomes (Seo, 2016). With regards to teacher education, the results did uphold the hypothesis that teacher-child interaction is higher in classrooms of teachers with higher education level. The descriptive statistics show that the age of the teachers sampled in this study ranged from 23 to 37 years old. It can be inferred that with other factors held constant, teachers' age between 23 and 37 years do not significantly affect the level of teacher-child interaction.

Teachers with bachelor's degree interacted significantly better with children than teachers with lower level of education. Korea's childcare centers traditionally required lower level of education allowing some teachers to enter the workforce with high school diploma with the required training completed. With the ongoing trend of the increasingly educational function of the childcare centers, it may be necessary to increase the minimum level of pre-service education. Descriptive data showed that out of 41 teachers who participated in the study, 32 teachers, or close to 80% of the teachers reported to have bachelor's degree, indicating that among the sampled childcare centers, significantly larger number of teachers had a four-year degree. However, nationally, there are still more than 5,000 teachers with the 3rd level childcare teacher certificate holders – the category of teachers who have entered the workforce with the minimum educational requirement which is high school degree with training (MOHW, 2019). And there may be more teachers who are categorized as 2nd level certificate holders but who have been promoted from the 3rd degree with 2 years of experience. Therefore, it may be beneficial to assign teachers with bachelor's degrees to classrooms for children aged 3 to 5 so that teachers' stronger interaction skills can ensure development of child initiative which is best

nurtured during this age range (Seo, 2016).

Interestingly, teachers with longer years of experience – longer than 8 years - scored lower on teacher-child interactions core, which is not consistent with the hypothesis that teacher experience may not show any association with their interactions core based on a meta analysis that found more studies that reported no relationship between teacher's experience and their interaction score (OECD, 2018a; von Suchodoletz et al., 2017). To see the effect of teachers' years of experience on their performance measured in teacher-child interaction score, the study divided teachers into three groups depending on the years of experience - group 1 consisted of teachers who have 0.1 to 4 years of experience, group 2 was for teachers who have 5 to 7 years and group 3 had teachers who had 8 to 11 years of experience. Regression using the group 1 as the basis group produced results showing that compared to group 1, group 2 did not show significant difference but teacher sin group 3 showed significantly lower interaction score than group1. There can be several interpretations about such result as follows.

- i. Given the significantly positive effect of targeted training on teacher-child interaction on teachers' interaction score, it can be inferred that the significantly lower interaction score of group 3 teachers may be attributed to lack of training on teacher-child interaction that they have received. The Nuri curriculum for ages three to five was introduced in 2013. The accompanying Nuri curriculum training which includes elements of teacher-child interaction was initiated along with the curriculum introduction. Given that teachers in group 3 reported having 8 to 11 years of experience at the time of survey in 2017, it means they had started teaching between 2006 to 2009, before training for the Nuri Curriculum was available.
- ii. Another possible interpretation can be that when teachers interact with children over a certain number of years, they may experience weakening of ability to respond sensitively to children, which is the phenomenon also experienced by people in many fields requiring prolonged contact with people that need constant care including staff in nursing homes (Wilcox & Wilcox, 2004). Such phenomenon intensifies in facilities where employees are often overworked and underpaid. Unfortunately, childcare workers often suffer from unfavorable working conditions and are

exposed to extended working hours, relatively low salary, and physical demands. It is likely that unfavorable working conditions may create an environment over time wherein childcare workers find it difficult to continue to interact with children in a highly sensitive and supportive manner. This argument clearly resonates within the Korean context as childcare teachers' working conditions have been reported to be unfavorable in a number of studies (Cho & Lee, 2005; Kim et al., 2008^[1]; Choi 2016; Kim et al., 2018^[2]). According to these studies, unfavorable working conditions of childcare teachers - including salary level, workload, professional development opportunities and administrative support – can lead to teachers' psychological burnout. This can then bring weakened sensitivity and higher turnover rate, potentially leading to children's sense of instability.

With regards to the effect of the number of teacher experience in terms of their performance measured by teacher-child interaction, past studies have found that there may be optimal levels of experience at which teachers perform the best. Phillipsen et al. (1997) argued in a study that approximately three years of experience might be the most ideal length of time after which teachers show the best quality of teaching.

- iii. Years of time spent with children may not be a good measure for “experience”. That is, simply spending time with young children is not a good measurement of teachers' experience as a predictive factor to their expertise (Wilcox & Wilcox, 2004). That is, perhaps teachers' expertise in a specific domain instead relies on quality time spent with young children accompanied with the access to quality training on domain-specific knowledge and skills, as teacher-child interaction.

In terms of teachers' in-service training, the results were in line with the hypothesis that the interaction score was higher for teachers with more frequent training per year, indicating that teacher's in-service training focused on teacher-child interaction is a strong predictor of teacher-child interaction. The result is in line with previous studies that found association between teachers' professional development opportunities and teacher-child interaction (OECD 2014b; Burchinal et al., 2002; OECD, 2006). This finding is also in line with past research that argued that ongoing

professional development in a broader sense contributes to high quality interactions and pedagogical practices. In addition, training facilitates teachers' ability to provide latest trends in effective teaching practices and updates in the curriculum contents, given that the focus is on teacher-child interaction is an emerging trend in the Nuri curriculum (Burchinal et al., 2002; OECD, 2006, 2014). As this study looked particularly at teacher training focused on the topic of teacher-child interaction, the result also agrees with previous literature that found professional development that is specialized in specific areas have stronger impact on process quality dimensions (Assel et al., 2007; Sylva et al., 2006; OECD, 2006; Shonkoff & Richter, 2012). This finding carries strong significance for the Korean ECEC context as there is lack of training on teacher-child interaction despite the fact that it is increasingly emphasized in the Nuri Curriculum as well as in the Childcare Center Quality Accreditation (MOWH & KCPI, 2018).

It is also important to note here that the frequency of and the participation in-service training is often determined by teachers' daily workload and whether or not the childcare centers are able to provide substitute teachers to allow full-time teachers to be away from classrooms to participate in the training. In addition, despite the growing emphasis on teacher-child interaction in the Nuri Curriculum, adequate in-service training on teacher-child interaction to prepare the teachers to adapt to the changes in the curriculum has not been sufficient (Lim, 2012). In addition, the importance of teacher-child interaction is increasingly highlighted in Childcare Center Quality Accreditation (MOHW & KCPI, 2018). Compared to the previous phase of the accreditation, the third phase of the accreditation has added four more criteria onto the existing six criteria that measure the quality of teacher-child interaction. However, teachers are only obliged to receive limited number and volume of training related to teacher child interaction. First, teachers are obliged to training on the Nuri Curriculum only once in their career, which is divided into an 8-hour group training where teachers need to participate offline and a distance training after completion of the offline training where they can access the lessons online for another 8 hours. In addition, there are two 3-hour courses on teacher-child interaction as part of their general and promotion training but these two courses are categorized as optional courses. Even if teachers opt to take these courses, the general and promotion training take place only once every 3 years.

It should also be marked that although the national Childcare Center Quality Accreditation System places increasing importance on teacher-child interaction – the indicators on this domain has increased from 6 to 10 indicators from 2017 – the training that childcare centers receive are limited to index training which provides general specifications of each indicator without instructions on how to prepare themselves for the assessment (KCPI, 2018). Such infrequent and irregular nature of in-service training calls for more government-led initiative to ensure that teachers are ready to not only be prepared for the accreditation but to be able to build knowledge and confidence to exercise adequate teacher-child interactions.

Going further, the study found that frequency in training was particularly a strong predictor for the domain of instructional support; as shown in table below, instructional support is the domain with the lowest mean score, largest standard deviation meaning there is greater variability about the mean score among teachers within this domain. The finding about the positive effect of in-service training on instructional support can provide implications for potential increase in the frequency of training to facilitate teacher-child interaction. Such implication is relevant with increasing focus of childcare accreditation on teacher-child interaction which will require increased and targeted in-service training in this area.

Table 6-2: Descriptive Data on Teachers’ Interaction Score by Domain

Variable	Mean	Std. Dev.	Min	Max
Emotional support	5.56	0.75	4.00	7.00
Classroom organization	6.07	0.71	4.33	7.00
Instructional support	4.57	1.03	3.00	6.33

Source: Created by the author based on descriptive statistics

3) The effect of classroom characteristics on teacher-child interaction

This subsection discusses the implications of the results of research question 1.2, concerning the effect of classroom on teacher-child interaction. In terms of bow, the results did not support the hypothesis that teachers’ interaction score is negatively affected by child teacher ratio. The results showed no

significant impact of child-teacher ratio on teachers' interaction quality. Descriptive statistics show that the child-teacher ratio of the sampled classrooms in this study ranged from as low as 4.5 to 1 to as high as 13 to 1. With this said, the finding about the insignificant effect of child-teacher ratio may be explained by the fact that the child-teacher ratio of all observed classrooms was within the government recommended child-teacher ratio of 15:1 for all childcare center classrooms for children of ages three to five years. In fact, close to 83% of classrooms had the ratio of 10:1 or under, and about 53% percent of the classrooms were 7:1 or under, indicating that a majority of classrooms were well under the threshold of the child-teacher ratio. In addition, the average child-teacher ratio of sampled classrooms in this study was 7.9:1, which is lower than the average of child-teacher ratio (8.6:1, with a range of 3.1 to 25) observed in the international meta-analysis (OECD, 2018a; von Suchodoletz et al., 2017).

With regards to the total number of children in the classroom – class size – the results upheld the hypothesis that teachers' interaction score decreases when the class size increases. Teacher score in teacher-child interaction decreased significantly, by 0.3 point, as the number of children in the classroom increased by one child. The results are in line with previous literature that also found negative impact of larger class size on the classroom quality (Hu et al., 2016; Mashburn et al., 2008; Burchinal et al., 2002). Descriptive statistics show that the total number of children in classrooms ranged from 5 to 31 with the average of 15. These numbers are relatively similar to the data reported by the meta-analysis on the effect of teacher/classroom characteristics on classroom – average number of children per classroom of 15 with a range from 9.1 to 30. In light of the regulations imposed by the Korean government, however, these numbers are rather concerning. Table below shows the maximum number of children that childcare centers can accommodate per classroom. Classrooms for three year-olds can accommodate 15 children, whereas classrooms for four year-olds and five-year old children and above can accommodate up to 20 children. These numbers are naturally higher than the maximum number of children allocated for classrooms for younger children that need more focused care.

Table 6-3: Korea's government regulations on the number of children in childcare classrooms

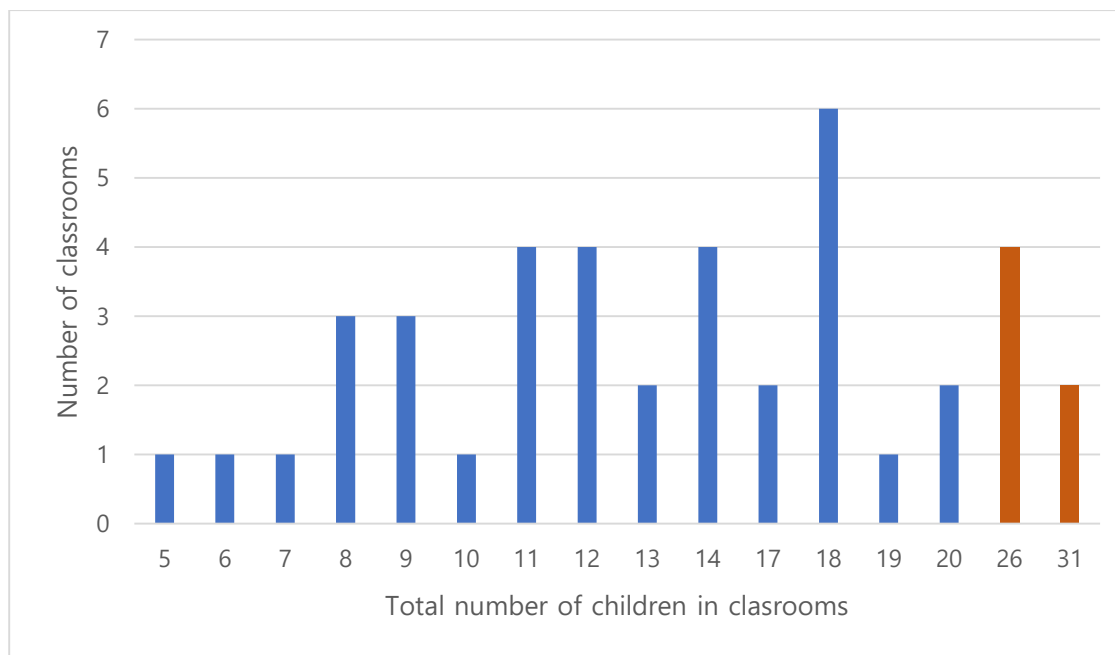
	Below age 1	1 year-olds	2 year-olds	3 year-olds	4 year-olds and above
Recommended capacity	3	5	7	15	20
Extra capacity allowed	-	1	2	3	3
Total	3	6	9	18	23

Source: Created by the author based on MOHW (2018)

The government allows extra capacity for classrooms that are mix-aged due to the shortage of children for a particular age group. Even with the extra capacity applied, the maximum number of children that one classroom can accommodate is 23. In cases where children of different ages are grouped into the same classroom – within regulations – the total number of children should correspond to the regulation set out for the higher age.

However, the descriptive statistics show that the number of children per classroom surpassed 23 in 6 out of 41 classrooms as shown in Figure 6-2, indicating that the government regulations are not abided by as strictly as expected. Given the significantly positive impact of smaller class size on teacher-child interaction, the regulations on the classroom capacity may need to followed more actively to ensure quality of classroom.

Figure 6-2: Total Number of Children in the Sampled Classrooms



Source: Created by the author based on descriptive statistics

International studies that were compiled by the OECD (2018) show that there exist large differences in child-staff ratio and group size of classrooms that were observed in different studies. It can be noted that child-staff ratio ranged from 6:1 to 20:1 whereas the total number of children in one classroom ranged from 13 to 25. It can be implied that Korea's standards for child-teacher ratio of 5:1 for children up to the age of 3 years and 15:1 for ages 4 and 5 years are fall within low to middle range among the reported international studies. Nevertheless, Korea's regulations on the class size which allows for up to 18 in classrooms for 3 year-olds and up to 23 in classrooms for 4 year-olds and above are evidently closer to the higher end of the range observed in reported international studies. There was no compiled data on the state regulations of countries on class size of ECEC classrooms from the afore-mentioned international studies or the complied report by the OECD (2018), whereas the data on regulations on child-teacher ratio was available as shown in Table 6-3. This can be an indication of stronger emphasis that has been placed on child-teacher ratio in the policies and academic research. The variable of child-teacher ratio has been included in many international studies, including in Korean studies, to see its effect on teacher performance and child outcomes, whereas the class size was considered less frequently in international studies as seen in the table below, including

in the Korean studies. Nevertheless, with growing evidence on the predictive power of class size on teacher performance, particularly its negative association with effective teacher-child interaction, more research and policy attention will be warranted in this area.

Table 6-4: Disparities in Child-staff Ratio and Class Size in Reported International Studies in Classrooms for Children Aged 3 to 5

Country	Reference	Child-staff ratio	Class size
China	Hu et al. (2016)	18:1	N/A
Denmark	Slot et al. (2017)	8:1~15:1	N/A
Europe and North America	Vermeer et al. (2016)	8.6:1	15
Netherlands	Vermeer et al. (2010)	6:1	N/A
Spain	Sandstrom (2012)	20:1	25
Spain and Germany	Cryer et al. (1999)	N/A	Spain: 24 Germany: 20
US	Phillips et al. (2000)	10:1 ~ 15:1	California: 15~16 Colorado: 13~16 Connecticut: 13 North Carolina: 14~15
US	Burchinal et al. (2002)	7:1	N/A
US	Pianta et al. (2005)	7:1	N/A
US	Mashburn et al. (2008)	7:1	18
US	Howes et al. (2008)	9:1	18
US	Dennis et al. (2013)	7:1	N/A
US	Bowne et al. (2017)	9:1	17

Source: Created by the author based on OECD (2018b)

Note: Studies are listed in an alphabetical order of the country/region.

6.2. Limitations of the Study

Due to challenges involved in the collection of data, the study bears some limitations. First, the sample size is relatively small and limited to employer-supported childcare centers. Due to challenges in encountering childcare centers that are willing to allow direct classroom observation, the number of

sampled childcare centers could not increase after a certain number. As centers are even more reluctant to open their classrooms to outsiders, snowball sampling was used in order to rely on referrals among the head teachers. The samples were constrained to employer-supported to employer-supported childcare centers as this study intended to investigate the classroom quality of this fastest-growing type of centers that are also receiving both employers' support and increasing amount of government support. However, it will be a meaningful exercise to compare the quality of employer-supported childcare centers with other types of centers that receive less financial support.

Second, although the data on mothers' working status was collected, there is no data on whether all children have fathers of their working status. In addition, data collected did not include the actual duration of hours that children spend with mothers outside of the childcare centers. It was also challenging to collect data on the exact number of hours that each child spend at the childcare centers as the numbers of hours they spend at the center can vary. Such variables – although they have possibilities to affect the child outcomes – could not be controlled due to absence of data. Future studies that use mothers' working status as a variable are encouraged to consider if there is a difference in the amount of time that children spend with mothers depending on their working status.

This study was conducted based on the premise that early childhood education and care can have positive impact on children's development and well-being in the long run. However, in Asian countries, including Korea, there is lack of research investigating the long-term positive effect of ECEC. Most research is focused on the effect of ECEC on children's performance in primary or secondary. Studies that investigated the long-term effects of education used more often variables such as family's SES but not enrolment in ECEC services. Korea's ECEC policy documents recognize the long-term effect of ECEC based on the evidence of western countries. Such evidence is based on long-term observation and analysis and have strong validity. However, future studies are warranted to investigate the long-term effect of ECEC in the Asian context that consider the region's educational philosophy, educational goals, and culture.

6.3. Conclusion

The importance of early childhood education and care is receiving increasingly strong emphasis with growing evidence of its effect on children's academic performance and socio-emotional skills. The adoption of SDG 4.2 by the global education community has further strengthened the international mandate to provide quality early education to all children. Although there is comparatively less evidence suggesting long-term impact of ECEC in Asia, Korea places strong importance on the equitable access of quality ECEC. The importance of quality ECEC is emphasized particularly for children aged 3 to 5 years, which is stipulated in the objectives of the Nuri Curriculum, the integrated early childhood education and care curriculum for children in this age bracket.

Access to quality ECEC services is of particular importance in Korea given its lowest fertility rate among OECD countries. Korea is also categorized as a country with the fastest ageing population. As a policy response, the Korean government has initiated the Plan for Low Fertility and Ageing Society in 2016 with objectives to improve quality of ECEC services so as to provide reliable childcare to parents. As part of the efforts, the Korean government has pledged to increase the number of employer-supported childcare centers and improve the quality of childcare centers by making Childcare Center Quality Accreditation mandatory from the year 2019, among other measures.

The definition of quality ECEC is not officially established in the Korean policy context but the categorization of structural quality and process quality of ECEC services is recognized in its policy documents. At the same time, the importance of teacher-child interaction, which is a key element of ECEC process quality is strongly emphasized in the new ECEC curriculum. Policy focus on improving quality of early childhood education and care services in Korea is also manifested in the recent changes made in the Childcare Center Quality Accreditation. Participation in the accreditation, which was executed on a voluntary basis, has become mandatory for all childcare centers in 2019. The increasing focus on the quality of teacher-child interaction is reflected in the growing number of criteria measuring teacher-child interaction, which has increased from 6 to 10 indicators in 2017. With the focus on teacher-child interactions in the Korean policy context, this study will focus the process quality of the classroom as well as how structural aspects of the quality may predict the process

aspects.

In the Nuri Curriculum, the main development outcomes that are intended to be cultivated through the quality education is children's character skills development. The character skills are also referred to as personality or socio-emotional skills that are necessary to foster desirable relationships with other people in the society. These also leadership in one's responsibilities, motivation, communication skills and empathy for others. As early childhood is an important period where such socio-emotional skills can be most effectively cultivated, ensuring that children are equipped with these skills during their early education and studying how these skills can be best developed deserve much attention. The Nuri Curriculum clearly reflects the educational objectives by prescribing the selected learning areas to be taught through effective teacher-child interactions, eventually to ensure development of children's character skills.

Although the clear educational objectives have been set in the curriculum, necessary support measures and research have not been fully put in place for effective implementation. There is a lack of research verifying the association between teacher-child interactions and children's character skills development, and the elements that can effectively improve the quality of teacher-child interaction. In addition, a majority of studies that examined the quality of ECEC centers in Korea were focused more on kindergartens that traditionally played a stronger education role. Quality assessment studies targeting employer-supported childcare are extremely scarce despite the fastest growing number and policy focus on this type of childcare centers and the international evidence on Korea's ECEC quality is outdated, requiring up-to-date data for accurate international comparison. Research is limited in studying the association between teacher-child interaction and children's socio-emotional skills development since the introduction of the Nuri Curriculum. Lastly, there is little evidence on the factors – teacher and classroom characteristics - that can help improve the quality of teacher-child interactions.

This study set out to answer two main research questions. (i) First, this study explores the factors that can predict children's character skills, referred to as socio-emotional skills in some literature; that is how much teacher-child interaction and child's individual characteristics – child age,

gender, and mother's working status - can predict child's socio-emotional skills. Second, this study answers what are the factors that can predict classroom quality by studying the effects of teacher characteristics and classroom characteristics on the quality of teacher-child interaction.

This study holds significance in a number of aspects that contribute to the existing literature with regards to the quality of early childhood education and care in Korea. There is only a small number of studies that have attempted to assess the classroom quality of Korea's childcare through direct observation method. Out of studies conducted in Korea, only a limited number of employer-supported childcare centers have been assessed for quality through direct observation due to stronger focus on the assessment of kindergartens. Given the fact that employer-supported childcare centers one of the fastest growing type of with the longest operation hours that exposes children to longest hours of teacher-child interaction. With this said, this study sheds light onto the classroom quality of employer-supported childcare centers which contributes to existing literature within the Korean context. Internationally as well, the study provides more up-to-date and comparable evidence on Korea's ECEC quality using the globally used observation tool – Classroom Assessment Scoring System (CLASS) - in the midst of continually increasing policy focus on the classroom quality. Such increasing importance is reflected in intensifying standards of Childcare Quality Accreditation System through the years 2018 and 2019 during which standards on teacher-child interaction was expanded and the disclosure of accreditation results have become mandatory. Given that the quality of Korean ECEC portrayed in past studies was relatively low, it will be meaningful to see if the level of quality has increased after strong government policy efforts to improve ECEC quality have been implemented. The study also sheds light on the specific association between teacher-child interaction and children's character skills development, the linkage that has not been explored in many studies. Previous studies have focused more on the association between teacher-child interaction and children's school readiness a partial aspect of character skills or socio-emotional skills. Lastly, the study probes into potential elements among teacher characteristics that can contribute to higher quality of their interactions with children. There has been a limited number of studies that examined the predictors of quality teacher-child interactions and the one conducted did not include an important variable as teacher training, which was examined in depth in this study.

Through direct classroom observation, the study targeted 41 classrooms from employer-supported childcare centers located in Korea's Metropolitan area that were recruited through snowball sampling. From these classrooms, the study surveyed 41 teachers and head teachers with regards to their teacher characteristics and general operational questions about the centers. Teachers were then asked to assess 5 to 10 randomly selected children from their classroom - a total of 375 children were assessed for the study. For the direct classroom observation, the study used the Classroom Assessment Scoring System (CLASS) observation scale, after being certified following an intensive official training in the United States. CLASS measures teacher-child interaction in three different domains – emotional support, classroom organization and instructional support. In order to measure child's character skills assessment, the study used the Child Initiative Scale, which was developed to assess children's abilities to live harmoniously with other members of the society while taking leadership in their own tasks. Attributes of this scale – emotional skills, communication/social skills and motivation coincide with the elements cited by the Nuri Curriculum by Heckman and Kautz (2013) to form character skills.

The study set out to test the following hypotheses that were designed to answer the research question 1; (1-1) the assessed level of child development outcomes are higher for girls and older children, and for children whose mothers are not employed; (1-2) total teacher-child interaction score significantly increases the child's child initiative score; when measured separately, each of three domains of teacher-child interaction has significant positive effect on child outcome; (1-3) in classrooms where teacher's interaction score is higher, the differences in child outcomes score caused by child individual characteristics become mitigated. The second set of hypotheses for research question 2 are as follows; (2-1) aggregate teacher-child interaction score is higher in classrooms of teachers with higher education level and more frequent training but it not significantly associated with teachers' experience or age; (2-2) the level of teacher-child interaction score is higher in classrooms where child-teacher ratio is low and the overall classroom size measured by the total number of children in classroom is small.

In order to analyze collected data, hierarchical Linear Modelling (HLM) was employed to

analyze research question 1 as the collected data were divided into two different levels – child level (level 1) and classroom level (level 2). The child level data was nested in classroom level data. Since the research question 2 only concerned data at the classroom level – teachers and classroom characteristics, multiple regression was used to answer research question 2.

The study found that teachers observed in this study scored higher than average teachers sampled in the previous Korean studies in all three domains of teacher-child interaction. However, in instructional support, this study produced lower scores than one previous study (Bhang, 2015) which observed classrooms from kindergartens only. Teachers from another study (Kwon, 2015) that only looked at childcare center classrooms also documented lower instructional support scores than kindergarten teachers. In addition, the standard deviations in Korean classrooms in terms of this particular domain – instructional support – were notably higher than international average. These findings highlight the need for the government to ensure that the classroom quality between kindergartens and childcare centers, particularly in classrooms for children of ages 3 to 5, are equitable which was the main objective of the Nuri Curriculum. In terms of the larger differences among teachers in this domain, more standardized in-service training mandated by the government is called for in order to ensure that all teachers are well-trained to provide equitable quality of instructional support to children.

The study then examined the effect of child characteristics on their child-initiative score. In terms of child age and gender, older children showed tendency to score higher than younger children in all three domains and girls scored higher than boys in all three domains. Maternal employment did not have significant effect on children's child initiative score.

The level of teacher-child interaction had significant impact on all three domains of child initiative score, namely emotional skills, communication skills and motivation – skills that form important parts of character skills that are evidenced to be a strong predictor of future successes. Among the domains of teacher-child interaction score, teachers' emotional support demonstrated positive association with the aggregate child initiative score, as well as all three domains. The association was strongest between emotional support and children's communication skills. Teachers'

classroom organization score had positive association with aggregate child initiative children as well as child emotional skills but did not show significant relationship with children's communication skills and motivation. Teachers' instructional support had positive association with children's aggregate child initiative score, children's communication skills, and motivation but did not have significant association with children's emotional skills.

The effect size of teacher-child interaction on child development outcomes measured on child initiative score changed depending on children's ages only in two domains – emotional skills and communication skills. As teacher-child interaction scores increased, the effect of child age on child emotional skills and communication skills diminishes, implying that high quality teacher-child interaction can provide stronger support for child initiative for younger children. On the other hand, child gender and mothers' working status did not work as factors that changed the effect size of teacher-child interaction on the child initiative score and all domains of child initiative score.

The estimation results on the predictors of the teacher-child interaction showed that teacher age did not have significant association with teacher's interaction scores. Teacher education had relatively weak but significant association with teacher-child interaction. That is, teachers with bachelor's level scored higher teacher-child interaction score. With regards to the years of teacher experience, the study found interesting results. As initial regression estimations indicated negative association between teacher experience and their teacher-child interaction score, the study attempted to test for different durations of teacher experience. That is, teachers were divided into three groups - 0.1 to 4 years (group 1) 5 to 7 years (group 2) and 8 to 11 years (group 3), using group 1 as a base level. The estimations indicated that compared to group 1, group 2 did not show significant difference. However, group 3 where teachers had experience of 8 to 11 years showed significantly lower performance than group 1 – where teachers had 0.1 to 4 years of experience – in terms of teacher-child interaction skills. The negative association between long experience and teachers' interaction score was strongest for the domain of instructional support. Among other potential predictors of teacher-child interaction score, specialized in-service training showed the strongest association with

the quality of teacher-child interaction performed by teachers, followed by smaller class size. Child-teacher ratio did not show statistically meaningful association with teacher-child interaction score.

The study finds that there are disparities among children in terms of their level of child initiative, depending on their age and gender. Older children scored higher in all three domains – emotional skills, communication skills and motivation – of child initiative score. Such results are consistent with other similar studies and it is positive to note that children's socio-emotional skills improve as they get older. Nevertheless, the fact that girls show better outcome than boys in all three domains call for attention. The three attributes of socio-emotional skills that are closely consistent with attributes of character skills – which are the main objectives of the current ECEC curriculum – are important skills that affect children's later academic performance and success. Given evidence that such initial gap in early years may widen as children get older, responsive measures may be necessary to close these early disparities. In the light of dominantly female workforce in ECEC settings in Korea – close to 96% of ECEC teaching staff are female - and their potentially impartial effect on the boy's development of selected skills, it may be considered to increase the number of male teachers in the ECEC centers. Such initiative may need to be accompanied by improved working conditions of ECEC teachers in order to attract more male workforce. Unlike child age and gender, the working status of children's mothers did not show significant association with children's outcomes.

This study provided a positive snapshot of the level of Korea's ECEC quality as teacher-child interaction in employer-supported childcare centers was found be relatively higher than that of the previous studies – conducted in the Korean context. The scores that were higher than previous studies were found in the domains of teacher's emotional support and classroom organization. However, instructional support is an area that can be improved compared to the other two domains, compared to other domestic studies. Nevertheless, the level of teacher-child interaction in all three domains were positioned relatively at higher ends when compared to international studies that also assessed teacher-

child interaction on CLASS observation tool. This is a positive development given that past international comparison of ECEC quality had portrayed Korea's ECEC quality status as relatively low. In order to address the relatively lower score on instructional support compared to other studies conducted in kindergartens, more specialized training may be necessary for childcare teachers. Instructional support is an area that requires pedagogical skills to help children with concept development, quality of feedback and language modeling. As childcare center teachers now need to play a stronger educational along with the implementation of the Nuri Curriculum, specialized training will be necessary to support them to develop such pedagogical skills.

This study finds that teacher-child interaction contributes significantly to development of children's character skills that were measured by child initiative score that comprises emotional skills, communication skills and motivation. All three domains of teacher-child interaction – emotional support, classroom organization and instruction support – had positive effect on children's overall outcome. In particular, teachers' emotional support for children had the strongest impact on overall domains of child initiative. Among the domains of children's socio-emotional skills measured by child initiative scale, emotional skills of children were most strongly predicted by the teacher-child interaction score. The study found that teachers' emotional support score had the strongest association with the aggregate child initiative score as well as all three domains of child's socio-emotional skills. This highlights the important role of teachers to maximize positive climate, treat children with sensitivity and to show regards for student perspectives.

The importance of quality teacher-child interaction on child outcomes highlight the importance of measures to ensure high quality teacher-child interaction, justifying the increasing focus on interaction in Nuri curriculum and childcare center quality accreditation criteria. It is equally important, therefore, to have in place adequate instruments to prepare the teachers to perform high quality teacher-child interaction. Such preparations will not only ensure higher quality teacher-child interaction in classrooms but also help prepare teachers for the childcare center quality accreditation exercises. Evidence collected in earlier chapters reveal that there is lack of structured support for teacher-child interaction in both pre-service and in-service trainings. In pre-service training, there is

no mandatory course dedicated to teacher-child interaction and the teacher-child interaction course in in-service training is categorized as option. In addition, there is only training provided on understanding the indicators of the quality accreditation but there is lack of support for teachers in childcare centers on how to actually prepare for the teacher-child interaction section of the quality accreditation. Therefore, the ECEC authority can consider prescribing mandatory credits to be taken on teacher-child interaction in pre-training as well as in-service training, including elements that are assessed in childcare quality accreditation which has now become mandatory for all centers. Such measures will be highly timely as the childcare center quality accreditation which used to be carried out on voluntary basis has become mandatory from the year 2019.

The study finds that teachers with bachelor's degree perform better in terms of teacher-child interaction. As the current minimum education level required for teachers is a 3rd level childcare certificate which requires a high school degree with required level of training, there are still large number of teachers teaching with high school degrees. In order to ensure that teachers are equipped to implement the objectives of the Nuri Curriculum with high quality teacher-child interaction, the centers may consider assigning teachers with bachelor's degree or only teachers with 2nd or 1st level certificates to classrooms of children aged 3 to 5.

This study finds that teacher education and number of training received per year had significant positive effect on teachers' interaction score. Such finding strongly calls for structured and targeted teacher training on teacher-child interaction – both pre-service and in-service – that are mandatory for all teachers. In earlier sections, the study mentioned significant policy gaps in terms of teacher training. That is, the policy focus on quality teacher-child interaction is evident in both the Nuri Curriculum and the childcare center quality accreditation, but the training domain has not caught up with the speed of policy changes to support the teachers understand and perform according to the expectations. It may be useful to mention jointly in this section that teachers with longer years of experience – namely teachers with 8 to 11 years of experience – have scored significantly lower than other teachers on teacher-child interaction. Combined with the strong association between the

frequency of training received and the quality of teacher-child interaction performed, the ECEC authorities need to ensure that all teachers – regardless of the number of experiences of teachers – participate in specialized training on teacher-child interaction. Such measure will help ensure that all teachers all childcare centers are equipped with skills to interact with children in accordance with the standards that are expected by the curriculum and the quality accreditation as well as support long-serving teachers to stay abreast with the requirements expected by the latest policy focus.

The study found that the total number of children in a classroom – or the class size – has strong association with the quality of teacher-child interaction performed by teachers, whereas child-teacher ratio showed no association the level of interaction. Within the Korean context, such finding has strong implications as the state regulations on class size is rather lenient and also allows for extra capacity – totaling about 23 children for class - when the class is mixed-age. Given research evidence that child outcome is maximized in classrooms where there are 15 or less children (Bowne, 2017), the regulations on class size can be reduced to enhance child outcomes. In addition, once the regulation has been set, monitoring of whether such regulation is complied with is equally important. That is, this study found that the number of children per classroom exceeded 23 in 6 out of 41 classrooms, indicating that the government regulations are not always followed as strictly as expected. In light of strong positive association between smaller class size on teacher-child interaction, the national regulations on the class size may need to be followed more strictly to ensure an adequate level of classroom quality.

REFERENCES

- Ahn, Byunghun. 2017. "A Multi-Level Analysis of the Effects of Student Background and School Quality on the University Entrance Rates : Focusing on Changeable Factors." *Korean Journal of Educational Research* 55 (3): 231–58. (In Korean, with English abstract).
- Ahn, Ra-ri. 1994. "The Impact of the Quality of Early Childhood Education Institutions on Children's Stress Behaviors." Ewha Women's University. (In Korean, with English abstract).
- Arnett, Jeffrey. 1989. "Caregivers in Day-Care Centers: Does Training Matter?" *Journal of Applied Developmental Psychology*.
- Assel, Michael, Susan Landry, Swank Paul, and Susan Gunnewig. 2007. "An Evaluation of Curriculum, Setting, and Mentoring on the Performance of Children Enrolled in Pre-Kindergarten." *Reading and Writing* 20: 463–94.
- Barnett, W Steven. 2002. "Early Childhood Education." In *School Reform Proposals: The Research Evidence*, edited by Alex Molnar, 1–26. Greenwich, CT: Information Age Publishing.
- Baydar, Nazli, and Jeanne Brooks-Gunn. 1991. "Effects of Maternal Employment and Child-Care Arrangements on Preschoolers' Cognitive and Behavioral Outcomes: Evidence from the Children of the National Longitudinal Survey of Youth." *Developmental Psychology* 27 (6): 932–45.
- Belsky, Jay, and David Eggebeen. 1991. "Early and Extensive Maternal Employment and Young Children's Socioemotional Development: Children of the National Longitudinal Survey of Youth." *Source: Journal of Marriage and Family*. Vol. 53.
- Bhang, Eun-jung, and Ock Boon Chung. 2015. "The Influence of Kindergarten Teachers' Teaching Behaviors on Young Children's School Readiness." *Early Childhood Education & Care* 10 (3):

225–52. (In Korean, with English abstract).

Bhang, Eun-Jung, and Ock Boon Chung. 2015. “The Influence of Kindergarten Teachers’ Teaching Behaviors on Young Children’s School Readiness.” *Early Childhood Education & Care*.

Biernacki, Patrick, and Dan Waldorf. 1981. “Snowball Sampling.” *Sociological Methods and Research* 10 (2): 141–63.

Blair, Clancy. 2002. “School Readiness: Integrating Cognition and Emotion in a Neurobiological Conceptualization of Children’s Functioning at School Entry.” *American Psychologist*.

Bliese, Paul D. 1998. “Group Size, ICC Values, and Group-Level Correlations: A Simulation.” *Organizational Research Methods* 1 (4): 355–73.

Bowne, Jocelyn, Katherine A Magnuson, Holly S Schindler, Greg J Duncan, and Hirokazu Yoshikawa. 2017. “A Meta-Analysis of Class Sizes and Ratios in Early Childhood Education Programs: Are Thresholds of Quality Associated With Greater Impacts on Cognitive, Achievement, and Socioemotional Outcomes?” 39 (3): 407–28.

Bredekamp, Sue. 1987. “Developmentally Appropriate practice in early childhood programs serving Children From Birth through Age 8. (Expanded Edition).” Washington, DC: NAEYC.

Brinkman, Sally Anne, Amer Hasan, Haeil Jung, Angela Kinnell, Nozomi Nakajima, and Menno Pradhan. 2017. “The Role of Preschool Quality in Promoting Child Development: Evidence from Rural Indonesia*.” *European Early Childhood Education Research Journal* 25 (4): 483–505.

Bronfenbrenner, Urie. 1994. “Ecological Models of Human Development.” *Readings on the Development of Children*.

Bronfenbrenner, Urie, and Pamela Morris. 2006. “The Bioecological Model of Human Development.” *Handbook of Child Psychology, Theoretical Models of Human Development*, 793–828.

- Brooks-Gunn, Jeanne, Wen-Jui Han, and Waldfogel. Jane. 2002. "Maternal Employment and Child Cognitive Outcomes in the First Three Years of Life: The NICHD Study of Early Child Care." *Child Development* 73 (4): 1052–72.
- Bryant, Donna. 2010. "Observational Measures of Quality in Center-Based Early Care and Education Programs," no. December 2010: 1–16.
- Burchinal, Margaret, Debby Cryer, Richard Clifford, and Carollee Howes. 2002. "Caregiver Training and Classroom Quality in Child Care Centers." *Applied Development Science* 6 (1): 2–11.
- Burchinal, Margaret, Lynne Vernon-Feagans, Virginia Vitiello, Mark Greenberg, Lynne Vernon-Feagans, Mark Greenberg, Martha Cox, et al. 2014. "Thresholds in the Association between Child Care Quality and Child Outcomes in Rural Preschool Children." *Early Childhood Research Quarterly*.
- Burchinal, Margaret, Martha Zaslow, and Louisa Tarullo. 2016. "Quality, Threshold, Features and Dosage in Early Care and Education: Secondary Data Analyses of Child Outcomes." *Monographs of the Society for Research in Child Development* 81 (2).
- Buss, Arnold, and Robert Plomin. 1984. *Temperament: Early Developing Personality Traits*. Hillsdale. NJ: Erlbaum.
- Byun, Hye Weon. 2017. "The Effects of Children's Inhibitory Control, Temperament and Teacher-Child Interaction on Peer Initiative." Sungkyunkwan University. (In Korean, with English abstract).
- Central Support Center for Childcare. 2019. "Central Support Center for Childcare." 2019. <http://eng.educare.or.kr/>.
- Cho, Ha-na, and Eun-jung Kim. 2013. "Child's Academic Achievement Satisfaction and Emotional Problems in Accordance with the Experience in Preschool Institutions." *Childcare Support*

- Research* 8 (1): 187–210. (In Korean, with English abstract).
- Cho, Kyung-ja, and Hyun-sook Lee. 2005. “Student Teachers’ Perceptions of Teaching Young Children as a Career in Early Childhood Education.” *Journal of Future Early Childhood Education* 12 (1): 289–312. (In Korean, with English abstract).
- Choi, Eunyoung. 2016. “Trends and Tasks of Early Childhood Education Policy in Korea.” *Early Childhood Education and Care Policy* 10 (1): 221–40. (In Korean, with English abstract).
- Choi, Ilsun, and Unjoo Cho. 2016. *Assessment in Early Childhood Education*. Changji Publications. (In Korean).
- Choi, Minsoo, Noui Kwak, Kyoosoo Kim, and Dukgun Kim. 2016. *Introduction to Early Childhood Education in Korea*. Hakjija Publication. (In Korean).
- Choi, Minsoo, and Eunyooung Lim. 2013. “The Character Education Contents and Method of Young Children to Improve NURI Curriculum for Three to Five Year Olds Choi,,” *Future Early Childhood Education* 20 (1): 1–36. (In Korean, with English abstract).
- Choi, Yunjung. 2014. “Analysis of Teaching and Learning in the 3-5 Year Old Nuri Curriculum Based on OECD’s Optimum Learning Criteria.” *Early Childhood Education and Care Research* 9 (4): 29–55.
- Clifford, R, S Reszka, and H-G Rossbach. 2010. “Reliability and Validity of the Early Childhood Environment Rating Scale.” *Chapel Hill: FPG Child Development Institute*, no. January: 1–27.
- Connell, James P., and James G. Wellborn. 1991. “Competence, Autonomy, and Relatedness: A Motivational Analysis of Self-System Processes.” *Self Processes and Development. The Minnesota Symposia on Child Psychology, Vol. 23*.
- Cronbach, Lee J. 1951. “Coefficient Alpha and the Internal Structure of Tests.” *Psychometrika* 16 (3).

- Cryer, Debby, Tietze Wolfgang, Margaret R. Burchinal, Teresa Leal, and Jesús Palacios. 1999. "Predicting Process Quality from Structural Quality in Preschool Programs: A Cross-Country Comparison." *Early Childhood Research Quarterly* 14 (3).
- Curby, Timothy, and Catharine Chavez. 2013. "Examining CLASS Dimensions as Predictors of Pre-K Children's Development of Language, Literacy, and Mathematics" 16 (2).
- Curby, Timothy W., Jennifer LoCasale-Crouch, Timothy R. Konold, Robert C. Pianta, Carollee Howes, Margaret Burchinal, Donna Bryant, Richard Clifford, Diane Early, and Oscar Barbarin. 2009. "The Relations of Observed Pre-K Classroom Quality Profiles to Children's Achievement and Social Competence." *Early Education and Development*.
- Dennis, Sarah E., and Erin O'Connor. 2013. "Reexamining Quality in Early Childhood Education: Exploring the Relationship between the Organizational Climate and the Classroom Process Quality." *Journal of Research in Childhood Education* 27 (1).
- Dickinson, David K. 2002. "Shifting Images of Developmentally Appropriate Practice as Seen Through Different Lenses." *Educational Researcher*.
- Downer, J. T., M. L. López, K. J. Grimm, A. Hamagami, R. C. Pianta, and C. Howes. 2012. "Observations of Teacher-child Interactions in Classrooms Serving Latinos and Dual Language Learners: Applicability of the Classroom Assessment Scoring System in Diverse Settings." *Early Childhood Research Quarterly* 27 (1): 21–32.
- Early, Diane M, Kelly L Maxwell, Margaret Burchinal, Soumya Alva, Randall H Bender, Donna Bryant, Karen Cai, et al. 2007. "Teachers' Education, Classroom Quality, and Young Children's Academic Skills: Results From Seven Studies of Preschool Programs." *Child Development* 78 (2): 558–80.
- Ejakait1, Epari, Olel Maureen, Othuon Lucas, and Khasenye4 Ochanda. 2016. "A Hierarchical Linear

- Modelling of Teacher Effects on Academic Achievement in the Kenya Certificate of Primary Education Examination.” *American Journal of Educational Research* 4 (14): 1030–40.
- Emmer, Edmund T, and Laura M Stough. 2001. “EMMER AND STOUGH CLASSROOM MANAGEMENT Classroom Management: A Critical Part of Educational Psychology, With Implications for Teacher Education.”
- Enders, Craig, and Davood Tofighi. 2007. “Centering Predictor Variables in CrossSectional Multilevel Models: A New Look at an Old Issue.” *Psychological Methods* 12 (2).
- Faour, Basma. 2010. “Early Childhood in Arab Countries: Status and Challenges.” *World Conference on Chilhood Care and Education*, 1–51.
- Fiona Steele, Centre for Multilevel Modelling; University of Bristol. 2019. “Module 5: Introduction to Multilevel Modelling Concepts Fiona Steele.” Accessed June 3, 2019.
- Fujiwara, Natsuto. 2014. “Korea’s Free Provision of Early Childhood Education and Care and Integration of Early Childhood Education and Care.” *National Diet Library Research and Legislative Review Bureau*. (In Japanese).
- Galton, M. 2002. “Cognition and Instruction: Twenty-Five Years of Progress.” *British Journal of Educational Psychology*.
- Garson, David G. 2013. *Introductory Guide to HLM With HLM 7 Software: Guide and Applications*. SAGE Publications.
- Go, Jaesuk. 2016. “The Development of the Evaluating Standards for Humanity Education Based on the Lunyu.” *Journal of Eastern Philosophy* 88: 206–31.
- Goodman, Alissa, Heather Joshi, Bilal Nasim, and Claire Tyler. 2015. “Social and Emotional Skills in Childhood and Their Long-Term Effects on Adult Life: A Review for the Early Intervention Foundation.”

- Greenberg, Mark T, Celene Domitrovich, and Brian K Bumbarger. 2001. "The Prevention of Mental Disorders in School-Aged Children: Current State of the Field." *Prevention and Treatment* 4 (1).
- Ham, Myeong ok. 2002. "Analysis of the Association between Study Patterns and Academic Performance of Chidlren in Higher Grades of Primary Schools." Yonsei University. (In Korean, with Engilsh abstract).
- Hamre, Bridget K., Robert C. Pianta, Jason T. Downer, Jamie DeCoster, Andrew J. Mashburn, Stephanie M. Jones, Joshua L. Brown, et al. 2013. "Teaching through Interactions: Testing a Developmental Framework of Teacher Effectiveness in over 4,000 Classrooms." *Elementary School Journal*.
- Hamre, Bridget K, and Robert C Pianta. 2001. "Early Teacher-Child Relationships and the Trajectory of Children's School Outcomes." *Source: Child Development*. Vol. 72.
- Han, Suk Sil. 2015. "Exploration of Reasonable Child Assessment System through Literature Review." *Early Childhood Education Research*, 73–95. (In Korean, with Engilsh abstract).
- Harrell, Frank E. 2017. "Regression Modeling Strategies." in Department of Biostatistics, Vanderbilt University School of Medicine. Nashville TN, USA.
- Harms, T, and R. Clifford. 1983. "Assessing Preschool Environments with the Early Childhood Environment Rating Scale." *Studies in Educational Evaluation* 8: 261–269.
- Heckman, J. 2012. "Noncognitive Skills and Socioemotional Learning." *A Research Symposium on Learning*.
- Heckman, James J., Jora Stixrud, and Sergio Urzua. 2006. "The Effects of Cognitive and Noncognitive Abilities on Labor Market Outcomes and Social Behavior." *Journal of Labor Economics* 24 (3): 411–82.
- Heckman, James J. 2006. "Skill Formation and the Economics of Investing in Disadvantaged

- Children.” *Science* 312 (5782): 1900–1902.
- Heckman, James J., and Dimitriy V. Masterov. 2007. “The Productivity Argument for Investing in Young Children.” *Review of Agricultural Economics* 29 (3). Oxford University Press: 446–93.
- Heckman, James J, and Tim Kautz. 2013. “Fostering and Measuring Skills: Interventions That Improve Character and Cognition: NBER Working Paper Series No. 19656.”
- Heckman, James J, and Yona Rubinstein. 2001. “The Importance of Noncognitive Skills: Lessons from the GED Testing Program.” *American Economic Review*.
- Hedges, Larry V, and E C Hedberg. 2007. “Intraclass Correlation Values for Planning Group-Randomized Trials in Education.” *Educational Evaluation and Policy Analysis* 29 (1): 60–87.
- Howes, Carollee, Margaret Burchinal, Robert Pianta, Donna Bryant, Diane Early, Richard Clifford, and Oscar Barbarin. 2008. “Ready to Learn? Children’s Pre-Academic Achievement in Pre-Kindergarten Programs.” *Early Childhood Research Quarterly* 23 (1): 27–50.
- Hu, Bi Yung, Kuan Mak, Miranda Chi, Jennifer Neitzel, Kejian Li, and Xitao Fan. 2016. “Predictors of Chinese Early Childhood Program Quality: Implications for Policies.” *Children and Youth Services Review* 70: 152–62.
- Hwang, Hae-ik, and Kyung-hwa Lee. 1995. “tablevelopment of Assessment Measures for Childcare Facilities.” *Early Childhood Education Research* 5 (1): 99–129. (In Korean, with English abstract).
- Jang, Hyejin, and Shinyeong Song. 2014. “International Comparative Research for Managing the Quality of ECEC Hyejin.” *KICCE Research Report* 14. (In Korean, with English abstract).
- Ju, So Hee, and Keung Eun Lee. 2005. “Factors Influencing the Adaptation of Children in Post-Divorce Stage: Related to Patterns of Child Rearing.” *Journal of Family and Culture* 17 (3): 125–53. (In Korean, with English abstract).

- Kang, Hyun-ok, and Hye-Won Hwang. 2013. "Factors Related to the School Readiness of Young Children from Multicultural Families." *Korean Society for Child Education*. 22 (1): 101–19. (In Korean, with English abstract).
- Karoly, L, M Kilburn, and J Cannon. 2005. "Proven Benefits of Early Childhood Interventions." *RAND Corporation Research Brief*.
- Kautz, Tim, James J. Heckman, Ron Diris, Bas T Weel, and Lex Borghans. 2014. "Fostering and Measuring Skills : Improving Cognitive and Non-Cognitive Skills to Promote Lifetime Success." *OECD Education Working Papers*, no. 110: 1–87.
- KCPI. 2018. "Korean Childcare Center Accreditation." Childcare Accreditation System. 2018. <https://www.kcpi.or.kr/>. (In Korean)
- Kenser, John E. 2000. "Teacher Characteristics and the Quality of Child–Teacher Relationships." *Journal of School Psychology* 28 (2): 133–49.
- KICCE. 2013. "The First Step toward the Integration of the Split Systems of Early Childhood Education and Care in Korea." *KICCE Policy Brief*, no. 2. (In Korean, with English abstract).
- . 2015. "ECEC Statistics of Korea : Access to Services , Participation and Financial Resources." *KICCE Policy Brief*, no. 5.
- . 2016. "Implementation Strategies for ECEC Integration and Its Settlement in Korea."
- Kim, Eunseol; Rhee, Ock; Shin, Nary; Moon, Mugyeong; 2008. "Developing Models to Integrate Early Childhood Education and Childcare in Korea." *International Journal of Child Care and Education Policy* 2 (1): 53–66. (In Korean, with English abstract). [1]
- Kim, Chung-hwa, Young-Mee Kim, and Kyung-Nim Lee. 2018. "The Effects of Negative Emotionality, Emotion Intelligence and Mother-Child Interaction on Young Children's Creative Personality." *Journal of Early Childhood Education and Care Research* 22: 171–97. (In Korean,

with English abstract). [2]

Kim, Il-Bu, and So-Hee Lee. 2017. “Development and Effect of Training Program for Empowerment of Teacher’s Interaction in Early Child Character-Leadership Education : Using TREASURE Talk Coaching Model.” *Journal of Coaching Research* 10 (4): 73–100. (In Korean, with English abstract). [3]

Kim, J., W. Cho, M. Moon, H. Park, J. M. Cho, J. Park, Y. Choi, and J. Song. 2015. “Education for All 2015 National Review: Republic of Korea.” *World Education Forum 2015*, 1–47. (In Korean, with English abstract). [4]

Kim, Joeng Kyoum, and Young-sik Kang. 2015. “A Study on Parents ’ Satisfaction of Contracting-Out System in Employer-Supported Childcare Centers - Focused on the Comparison of Difference Between National, Public and Private Childcare centers.” *Journal of the Korean Academia-Industrial Cooperation Study* 16 (1): 282–90. (In Korean, with English abstract). [5]

Kim, Mi-Jeong, Nam-Hee Do, Hyuk-Joon Moon, and Ji-Won Kim. 2014. “Analysis of the Workplace Child Care Center’s Installation and Operation Current Status and Improvement of the Service.” (In Korean, with English abstract). (In Korean, with English abstract). [6]

Kim, Mijeong, Namhee Doh, Hyukjoon Moon, and Jiwon Kim. 2014. “Employer-Supported Childcare Centers: Establishment, Operation and Reform.” *Master Thesis: Ewha University*. (In Korean, with English abstract). [7]

Kim, Minjeong. 2013. “The Quality Effect of Early Childhood Care and Education Centers on 5-Year-Old Children’s Achievement Based on Nuri Curriculum.” Ewha University. [8]

Kim, Young Chul. 2014. “What Determines the Admission to University?: An Evaluation on the Degree of Influences by Socioeconomic Status, Residential Area and Educational Environments.” *Korean Journal of Financial Studies* 7 (3): 127–71. (In Korean, with English abstract). [9]

- “Kindergarten and Childcare Center Information.” 2019. <http://www.childinfo.go.kr/main.jsp>.
- Klette, Kirsti, and Marte Blikstad-Balas. 2018. “Observation Manuals as Lenses to Classroom Teaching : Pitfalls and Possibilities.” *European Educational Research Journal* 17 ((I)): 129–46.
- Kojima, Katsuhisa. 2009. “Trends in Korea’s Childcare Subsidies.” *National Social Welfare and Population Issues Research*.. (In Japanese).
- Korea, Statistics. 2019. “Changes in the Budget for the Nuri Curriculum.” 2019. <http://kostat.go.kr/portal/korea/index.action>. (In Korean)
- Korean Educational Statistics Service. 2019. “Educational Statistics.” 2019. <http://kess.kedi.re.kr/index>. (In Korean)
- Kwak, Jung in, and Kwi-Ok Nah. 2011. “Early Childhood Assessment in UK Based on Document Analysis and Field Visits.” *Early Childhood Education Rsearch* 31 (4): 289–313. (In Korean, with Engilsh abstract).
- Kwon, Shinyoung. 2015. “A Study on the Validation of the Classroom Assessment Scoring System in Child Care Centers in Korea.” (In Korean, with Engilsh abstract).
- Lee, Jihyun, and Lazar Stankov. 2018. “Non-Cognitive Predictors of Academic Achievement: Evidence from TIMSS and PISA.” *Learning and Individual Differences* 65 (July). JAI: 50–64.
- Lee, Jin-Hee. 2012. “Meaning-Making from Early Childhood Sssessment through Action Research.” *Early Childhood Education Research* 32 (1): 5–29. (In Korean, with Engilsh abstract).
- Lee, Ki-sook, Yong-hwi Hong, Eun-hae Park, and Hee-jin Kim. 2002. “Accreditation Model for Early Childhood Education Institutions.” *Ewha Education Journal* 3: 1–130. (In Korean, with Engilsh abstract).
- Lee, Na-mi, and Kyung-ja Cho. 2008. “Mothers’ Perceptions on Male Teachers of Young Children.”

- Journal of Future Early Childhood Education* 15 (4): 299–321. (In Korean, with English abstract).
- Lee, Samsik, and Hyojin Choi. 2015. “Lowest-Low Fertility and Policy Responses in South Korea.” In *Low and Lower Fertility*, 107–23. Cham: Springer International Publishing. (In Korean, with English abstract).
- Lee, Seung-eun, and Tae-jong Kim. 2012. “What Causes the College Entrance Gap in Korea? Short-Term Financial Constraints vs. Long-Term Constraints.” *Korean Journal of Labor Economics* 25 (3). (In Korean, with English abstract).
- Lee, Sung Hee, and Young Sook Sa. 2004. “A Survey with Analysis of Daycare Center Teacher’s Perceptions on Performance Assessment.” *The Journal of Future Early Childhood Education* 11 (3): 95–117. (In Korean, with English abstract).
- Lim, sung won. 2012. “Teachers’ Understanding of NooRi Curriculum for Five Years Olds and Recommendations for Future Teacher Training Program of NooRi Curriculum.” Hanyang University. (In Korean, with English abstract).
- Liu, Jin-Tan, Shin-Yi Chou, and Jin-Long Liu. 2006. “Asymmetries in Progression in Higher Education in Taiwan: Parental Education and Income Effects.” *Economics of Education Review* 25 (6). Pergamon: 647–58. (In Korean, with English abstract).
- Locasale-Crouch, Jennifer, Tim Konold, Robert Pianta, Carollee Howes, Margaret Burchinal, Donna Bryant, Richard Clifford, Diane Early, and Oscar Barbarin. 2007. “Observed Classroom Quality Profiles in State-Funded Pre-Kindergarten Programs and Associations with Teacher, Program, and Classroom Characteristics.” *Early Childhood Research Quarterly* 22: 3–17.
- Love, John, Linda Harrison, Abraham Sagi-Schwartz, Marinus van IJendoorn, Christy Brady-Smith, Christine Ross, Judy A. Ungerer, Helen Raikes, Diane Kimberly Boiler, Jeanne Brooks-Gunn,

- Jill Constantine, Ellen Eliason Kisker, and Paulsell and Rachel Chazan-Cohen. 2003. "Child Care Quality Matters: How Conclusions May Vary with Context." *Society for Research in Child Development*. 74 (4): 1021–33.
- Maas, Cora J., and Joop Hox. 2005. "Sufficient Sample Sizes for Multilevel Modeling. [References]." *Journal of Research Methods for the Behavioral and Social Sciences* 1: 86–92.
- Mashburn, Andrew J., Robert C. Pianta, Bridget K. Hamre, Jason T. Downer, Oscar A. Barbarin, Donna Bryant, Margaret Burchinal, Diane M. Early, and Carollee Howes. 2008. "Measures of Classroom Quality in Prekindergarten and Children's Development of Academic, Language, and Social Skills." *Child Development* 79 (3): 732–49.
- Matsumoto, Asahito, and Akihiko Hashimoto. 2015. "Government-Supported Pre-Primary Education in Korea : Achievements and Challenges." *Education System*, no. 38. (In Japanese).
- Melhuish, Edward, and Konstantinos Ereky-Stevens, Katharina Petrogiannis. 2015. "A Review of Research on the Effects of Early Childhood Education and Care (ECEC) upon Child Development. WP1. Curriculum and Quality Analysis Impact Review." *CARE*.
- Ministry of Government Legislation. 2019. "Primary and Secondary Education Implementation Act." 2019. www.law.go.kr.
- MOEL. 2019. "Employer-Supported Childcare Centers Support Measures." 2019. www.moel.go.kr.
- MOEST, and KICCE. 2012. "Improving Quality of Early Childhood Education and Care."
- MOEST, and MOHW. 2012. "Nuri Curriculum for Ages 3 - 5 : Handbook."
- . 2013a. "Nuri Curriculum for Age 5 - Teacher Guidelines."
- . 2013b. "Nuri Curriculum for Ages 3-5: Teacher Guidelines."
- MOHW. 2018. "Childcare Centers Operation Guildelines."

- . 2019a. “Central Portal for Pregnancy and Childcare.” 2019. www.childcare.go.kr.
- . 2019b. “Childcare Allowances.” 2019. <http://www.mohw.go.kr>
- . 2019c. “Childcare Center Information Portal.” 2019. <http://info.childcare.go.kr>
- . 2019d. “Childcare Portal.” 2019. www.childcare.go.kr.
- MOHW, and KCPI. 2018. “Childcare Center Quality Accreditation Guidelines.”
- Moon, Moogyong, Wonsoon Park, and Junbum Lim. 2015. “Issues and Tools of the International Assessment on Young Children’s Learning and Development.” *KICCE Research Report* 14.
- Myers, Nicholas D., Ahnalee M. Brincks, and Mark R. Beauchamp. 2010. “A Tutorial on Centering in Cross-Sectional Two-Level Models.” *Measurement in Physical Education and Exercise Scienc* 14.
- Nah, Kwi-Ok, and Kyoung-Hee Kim. 2012. “An Investigation of Directions for Child Assessment in Relation with Nuri Curriculum.” *Journal of Early Childhood Education Research* 2 32 (4): 465–92. (In Korean, with English abstract).
- National Assembly Budget Office. 2019. “Annual Education Budget Estimatinos.” 2019. <http://nabo.go.kr/>.
- NICHD. 2006. “The NICHD Study of Early Child Care and Youth Development - Findings for Children up to Age 4 1/2 Years.”
- NIEER. 2006. “Early Literacy: Policy and Practice in the Preschool Years.” New Jersey.
- OECD. 2006. *Starting Strong II: Early Childhood Education and Care*. Paris: OECD Publishing.
- . 2011. “PISA in Focus Nr. 10: What Can Parents Do to Help Their Children Succeed in Sch2011ool?” Paris OECD Publishing.

- . 2014a. *Education at a Glance 2014: OECD Indicators*. *Oecd*. <https://doi.org/10.1787/eag-2013-en>.
- . 2014b. “New Insights from TALIS 2013.” paris: OECD Publishing.
- . 2015a. *Education Policy Outlook*. Paris: OECD Publishing.
- . 2015b. “Starting Strong IV : Monitoring Quality in Early Childhood Education and Care.” Paris: OECD Publishing.
- . 2016a. “Starting Strong IV: Monitoring Quality in Early Childhood Education and Care Country Note: Korea.” Paris: OECD Publishing.
- . 2016b. *Walking the Tightrope: Background Brief on Parents’ Work-Life Balance across the Stages of Childhood*. Paris: OECD Publishing.
- . 2017a. *How’s Life? 2017: Measuring Well-Being*. Paris: OECD Publishing. https://doi.org/doi: 10.1787/how_life-2017-en.
- . 2017b. *Starting Strong 2017: Key OECD Indicators on Early Childhood Education and Care*. Paris: OECD Publishing.
- . 2018a. *Education at a Glance 2018: OECD Indicators*. Paris: OECD Publishing. <https://doi.org/10.1787/eag-2018-en>.
- . 2018b. *Engaging Young Children Lessons from Research about Quality in Early Childhood Education and Care*. <https://www.oecd-ilibrary.org/docserver/9789264085145-en.pdf?expires=1525331811&id=id&accname=guest&checksum=793AF63252560DF244694FCE860CECDA>.
- . 2018c. “OECD Fertility Rates.” OECD Fertility Rates. 2018. <https://data.oecd.org/pop/fertility-rates.htm>.

- OECD Data. 2019. "Fertility Rates." Accessed May 4, 2019. <https://data.oecd.org/pop/fertility-rates.htm>.
- OECD Family Database. 2018. "Marriage and Divorce Rates." <http://www.oecd.org/els/family/database.htm>.
- Ogawa, Katsunori. 2018. "Pre-Primary Education and Social Stratification: Association between the Choice of Kindergartens · Childcare Centers and Educational Achievement." In *Education and Social Stratification*, 13–28. University of Tokyo Press. (In Japanese).
- Oh, Jae Chun. 2003. "The Meaning of Portfolio Assessment That Four Kindergarten Teachers Experienced." *The Journal of Open Early Childhood Education Research*. (In Korean, with English abstract).
- Paccagnella, Omar. 2006. "Centering or Not Centering in Multilevel Models: The Role of the Group Mean and the Assessment of Group Effects." *Evaluation Review* 30 (1).
- Park, Chan-ok, Han-Young Lee, Eun-Young Lee, and Sook-Duk Choi. 2015. "A Study on the Current Condition and Needs of Child-Care Programs in Consignment Workplace Child-Care Centers." *Journal of Early Childhood Education Studies* 19 (1): 107–33. (In Korean, with English abstract).
- Park, Youn Jung, and Ok Bun Chung. 2008. "Study on the School Readiness of Preschoolers in Korea." *Journal of Research in Human Development* 25 (1): 23–47. (In Korean, with English abstract).
- Phillips, Deborah, Debra Mekos, Sandra Scarr, Kathleen McCartney, and Martha Abbott-Shime. 2000. "Within and beyond the Classroom Door: Assessing Quality in Child Care Centers." *Early Childhood Research Quarterly* 15 (4).
- Phillipsen, Leslie C., Margaret R. Burchinal, Carollee Howes, and Debby Cryer. 1997. "The Prediction of Process Quality from Structural Features of Child Care." *Early Childhood Research Quarterly* 12 (3). JAI: 281–303.

- Pianta, R, Carollee Howes, and Donna Bryant. 2005. "Features of Pre-Kindergarten Programs, Classrooms, and Teachers: Do They Predict Observed Classroom Quality and Child-Teacher Interactions?" *Applied Developmental Science* 9 (3): 144–159.
- Pianta, Robert C., Karen M. La Paro, and Bridget K. Hamre. 2008. *Classroom Assessment Scoring System Pre-K Manual*.
- Pianta, Robert C, and Bridget K Hamre. 2009. "Conceptualization, Measurement, and Improvement of Classroom Processes: Standardized Observation Can Leverage Capacity." *Educational Researcher* 38 (2): 109–19.
- Pianta, Robert, Karen La Paro, and Bridget Hamre. 2008. "CLASS: Classroom Assessment Scoring System." Virginia: Teachstone.
- Presidential Committee for Ageing Society and Population Policy. 2006. "First Phase Plan for Low Fertility and Ageing Society."
- Raudenbush, Stephen W., and Anthony Bryk. 2002. *Hierarchical Linear Models: Applications and Data Analysis Methods (2nd Ed.)*. Thousand Oaks, CA: Sage.
- Raudenbush, Stephen W., Anthony Bryk, YukFai Cheong, and Richard Congdon. 2000. *Hierarchical Linear and Nonlinear Modeling*. Scientific software International.
- Raudenbush, Stephen W., Anthony Bryk, YukFai Cheong, Richard Congdon, and Mathilda du Toit. 2011. *Hierarchical Linear & Nonlinear Modeling*. Scientific software International.
- Rimm-Kaufman, Sara E., Karen M. La Paro, Jason T. Downer, and Robert C. Pianta. 2005. "The Contribution of Classroom Setting and Quality of Instruction to Children's Behavior in Kindergarten Classrooms." *The Elementary School Journal* 105 (4): 377–94.
- Roeser, Robert W., Jacquelynne S. Eccles, and Arnold J. Sameroff. 2000. "School as a Context of Early Adolescents' Academic and Social-Emotional Development: A Summary of Research

- Findings.” *Elementary School Journal*.
- Ruhm, Christopher J. 2004. “Parental Employment and Child Cognitive Development.” *The Journal of Human Resources*. 39 (1): 155-192.
- Sandstrom, Heather. 2012. “The Characteristics and Quality of Pre-School Education in Spain.” *International Journal of Early Years Education* 20 (2): 130–58.
- Scheerens, Jaap. 2005. “The Quality of Education at the Beginning of the 21st Century.”
- . 2011. “Measuring Educational Quality by Means of Indicators.” In *Perspectives on Educational Quality*, 35–50. Dordrecht: Springer.
- Schweinhart, Lawrence J, Jeanne Montie, Zongping Xiang, W Steven Barnett, Clive R Belfield, and Milagros Nores. 2005. “The High / Scope Perry Preschool Study Through Age 40 Summary, Conclusions, and Frequently Asked Questions.” *Lifetime Effects: The High/Scope Perry Study through Age 40* 40: 194–215.
- Seo, Ran A. 2016. “The Relationship between Early Childhood Teacher’s Temperament and Children’s Child initiative.” *Master's thesis: Kyoung-in University*. (In Korean, with English abstract).
- Sheridan, Sonja, Joanna Giota, You Me Han, and Jeong Yoon Kwon. 2009. “A Cross-Cultural Study of Preschool Quality in South Korea and Sweden: ECERS Evaluations.” *Early Childhood Research Quarterly* 24 (2): 142–56.
- Shieh, Gwown. 2015. “Choosing the Best Index for the Average Score Intraclass Correlation Coefficient.” *Behavior Research Methods*.
- Shonkoff, Jack P, and Linda Richter. 2012. “An Integrated Scientific Framework for Child Survival and Early Childhood Development.” *Journal of American Academy of Pediatrics* 129 (2).

- Siraj-Blatchford, Iram, Kathy Sylva, Brenda Taggart, Edward Melhuish, Pam Sammons, and Karen Elliot. 2004. "The Effective Provision of Pre-School Education Project: Findings from the Pre-School Period." EPPE.
- Skinner, Ellen A., and Michael J. Belmont. 1993. "Motivation in the Classroom: Reciprocal Effects of Teacher Behavior and Student Engagement Across the School Year." *Journal of Educational Psychology*.
- Slot, Pauline L., Jan Boom, Josje Verhagen, and Paul P.M. Leseman. 2017. "Measurement Properties of the CLASS Toddler in ECEC in The Netherlands." *Journal of Applied Developmental Psychology* 48 (January): 79–91.
- Slot, Pauline L, Paul PM Leseman, Josje Verhagen, and Hanna Mulder. 2015. "Associations between Structural Quality Aspects and Process Quality in Dutch Early Childhood Education and Care Settings." *Early Childhood Research Quarterly* 33: 64–76.
- Slot, Pauline Louise, Dorthe Bleses, Laura M Justice, Justin Markussen-Brown, and Anders Højen. 2018. "Early Education and Development Structural and Process Quality of Danish Preschools: Direct and Indirect Associations With Children's Growth in Language and Preliteracy Skills." *Early Education and Development* 29 (4): 581–602.
- Smith, Miriam W., and David K. Dickinson. 2002. "Early Language & Literacy Classroom Observation (ELLCO) Toolkit, Research Edition." Paul H Brookes Publishing.
- Stipek, Deborah, and Patricia Byler. 2004. "The Early Childhood Classroom Observation Measure." *Early Childhood Research Quarterly*. 19(3): 375-397.
- Suchodoletz, Antje von, Anika Fäsche, Catherine Gunzenhauser, and Bridget K. Hamre. 2014. "A Typical Morning in Preschool: Observations of Teacher-Child Interactions in German Preschools." *Early Childhood Research Quarterly* 29 (4): 509–19.

- Swick, Kevin J, and Reginald Williams. 2006. "An Analysis of Bronfenbrenner's BioEcological Perspective for Early Childhood Educators: Implications for Working with Families Experiencing Stress." *Early Childhood Education Journal*. 33(5): 371–378.
- Sylva, Kathy, Iram Siraj-Blatchford, Brenda Taggart, Pam Sammons, Edward Melhuish, Karen Elliot, and Vasiliki Totsika. 2006. "Capturing Quality in Early Childhood through Environmental Rating Scales." *Early Childhood Research Quarterly* 21 (1): 76–92.
- Taguma, Miho, Ineke Litjens, and Kelly Makowiecky. 2012. *Quality Matters in Early Childhood Education and Care*. Paris: OECD Publishing.
- Teachstone. 2019. "The CLASS System." 2019. <https://info.teachstone.com>.
- The National Law Information Center. 2019. "Chracter Education Promotion Act." 2019. <http://www.law.go.kr>.
- Thomason, Amy C., and Karen M. La Paro. 2009. "Measuring the Quality of Teacher-Child Interactions in Toddler Child Care." *Early Education and Development* 20 (2): 285–304.
- Todd, Samuel, T. Russel Crook, and Anthony G. Barilla. 2005. "Hierarchical Linear Modeling of Multilevel Data." *Journal of Sport Management* 19: 387–403.
- UNESCO Institute for Statistics (UIS). 2012. "International Standard Classification of Education 2011." UNESCO Institute for Statistics.
- UNESCO International Bureau of Education (IBE). 2013. "Glossary of Curriculum Terminology." In . UNESCO-IBE.
- Vandell, Deborah Lowe, and Barbara Wolfe. 2000. "Child Care Quality: Does It Matter and Does It Need to Be Improved?" *Institute for Research on Poverty*.
- Veenman, Marcel V.J., and Marleen A. Spaans. 2005. "Relation between Intellectual and

- Metacognitive Skills: Age and Task Differences.” *Learning and Individual Differences*. 15(2): 159-176.
- Vermeer, Harriet J., Marleen G. Groeneveld, Ináki Larrea, Marinus H. van IJzendoorna, Alexander Barandiaran, and Mariëlle Linting. 2010. “Care Quality and Children’s Cortisol in Basque Country and the Netherlands.” *Journal of Applied Developmental Psychology* 31 (4).
- Vermeer, Harriet J., Marinus H. van IJzendoorn, Rodrigo A. Cárcamo, and Linda J. Harrison. 2016. “Quality of Child Care Using the Environment Rating Scales: A Meta-Analysis of International Studies.” *International Journal of Early Childhood* 48 (1): 33–60.
- Vygotsky, Lev. 1978. “Interaction Between Learning and Development.” Cambridge, MA: Harvard University Press.
- Wentzel, Kathryn R. 2002. “Are Effective Teachers like Good Parents? Teaching Styles and Student Adjustment in Early Adolescence.” *Child Development*.
- Yoo, Hae-mi. 2012. “The Current Status of Ensuring Rights of Children in Childcare Centers and Suggestions for Improvement.” *Childcare Policy Research* 6 (1).
- Yoon, Jungil, Gichang Song, Byungjoo Kim, and Minjoo Na. 2015. *The New Education Finance of Korea*. Seoul: Hakji Publisher.
- Yoshikawa, Hirokazu, and Sarah Kabay. 2015. “The Evidence Base on Early Childhood Care and Education in Global Contexts; Background Paper Prepared for the Education for All Global Monitoring Report 2015, Education for All 2000-2015: Achievements and Challenges.”
- Yun, Kyeong-Im. 2015. “A Study on the Improvement Plan of the Local Education Subsidy Program.” *Master's Thesis: Changwon National University*. (In Korean, with English abstract).

APPENDICES

APPENDIX I: Supplementary Tables and Figures

Table A-1: The Big Five Domains and Their Facets

Big Five Personality Factor	Facets (and correlated skill adjective)	Related Skills	Analogous Childhood Temperament Skills
Openness to Experience	Fantasy (imaginative), Aesthetic (artistic), Feelings (excitable), Actions (wide interests), Ideas (curious), and Values (unconventional)	-	Sensory sensitivity, Pleasure in low-intensity activities, Curiosity
Conscientiousness	Competence (efficient), Order (organized), Dutifulness (not careless), Achievement striving (ambitious), Self-discipline (not lazy), and Deliberation (not impulsive)	Grit, Perseverance, Delay of gratification, Impulse control, Achievement striving, Ambition, and Work ethic	Attention/(lack of) distractibility, Effortful control, Impulse control/delay of gratification, Persistence, Activity*
Extraversion	Warmth (friendly), Gregariousness (sociable), Assertiveness (self-confident), Activity (energetic), Excitement seeking (adventurous), and Positive emotions (enthusiastic)	-	Surgency, Social dominance, Social vitality, Sensation seeking, Shyness*, Activity*, Positive emotionality, and Sociability/affiliation
Agreeableness and Neuroticism	Trust (forgiving), Straight-forwardness (not demanding), Altruism (warm), Compliance (not stubborn), Modesty (not show-off), and Tender-mindedness (sympathetic)	Empathy, Perspective taking, Cooperation, and Competitiveness	Irritability*, Aggressiveness, and Willfulness

Neuroticism/ Emotional Stability	Anxiety (worrying), Hostility (irritable), Depression (not contented), Self- consciousness (shy), Impulsiveness (moody), Vulnerability to stress (not self- confident)	Internal versus External, Lo- cus of control, Core self- evaluation, Self- esteem, Self-efficacy, Optimism, and Axis I psychopathologies (mental disorders) including depression and anxiety disorders	Fearfulness/behavioral Inhibition Shyness*, Irritability*, Frustration, (Lack of) soothability, sadness
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Source: Created by the author based on Heckman and Kaut (2013)

Table A-2: Fertility Rates (Total Fertility Rates: Children/Woman): 1970-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Korea	1.3	1.2	1.1	1.2	1.2	1.3	1.2	1.2	1.2
Italy	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Germany	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5
Japan	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.5
China	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.6	1.6
Australia	2	2	2	2	1.9	1.9	1.9	1.8	1.8
Brazil	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8
Russia	1.4	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.8
UK	1.9	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8
US	2.1	2.1	2	1.9	1.9	1.9	1.9	1.9	1.8
France	2	2	2	2	2	2	2	2	1.9
Turkey	2.2	2.2	2.1	2.1	2	2.1	2.1	2.2	2.1
Mexico	2.4	2.3	2.3	2.3	2.3	2.2	2.2	2.2	2.2
Argentina	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3
South Africa	2.6	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.3
India	2.8	2.8	2.7	2.6	2.6	2.5	2.5	2.4	2.4
Indonesia	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.4
Saudi Arabia	3.2	3.1	3	3	2.9	2.9	2.8	2.8	2.7
Canada	1.7	1.7	1.7	1.6	1.6	1.6	1.6	N/A	N/A

Source : Created by the author based on OECD Data (2019)

Table A-3: Domains and learning objectives of the Nuri Curriculum

	Learning objectives	Behavior markers
Physical exercise and health	Recognizing the body	• Developing and using the physical senses • Recognizing and mobilizing the body
	Body control and basic exercises	• Controlling the body • Practicing basic exercises
	Physical activities	• Voluntarily participating in physical activities • Physical activities outdoor • Physical exercises using equipment
	Living a healthy life	• Keeping the body and surroundings clean • Keeping healthy diet • Living a healthy lifestyle • Preventing illnesses
	Living a safe life	• Playing safely • Following traffic rules • Dealing with emergencies
Communication	Listening	• Listening to words and sentences and understanding • Understanding stories • Understanding songs, poems, and fairy tales • Listening with proper attitudes
	Speaking	• Using words and sentences • Expressing feelings, thoughts and experiences • Speaking with appropriate attitudes according to specific situations
	Reading	• Taking interest in reading • Taking interest in reading books
	Writing	• Taking interest in writing • Using writing tools
Social relations	Understanding and respecting myself	• Understanding and taking care of myself • Taking responsibility for my duties
	Understanding and managing feelings of myself and others	• Understanding and expressing feelings of myself and others • Controlling my feelings
	Respecting family	• Living harmony with my family • Cooperating with family
	Living in harmony with others	• Managing harmonious relationship with friends • Living in harmony in a group

		• Understanding and protecting the values of the society
	Understanding the society	• Understanding my community • Understanding my country • Taking interest in the world and other cultures
Artistic experience	Searching for beauty	• Exploring musical elements • Exploring movements and dance • Exploring artistic elements
	Artistic expression	• Musical expression • Expressing through movements and dance • Expressing through artistic activities • Expressing through role-playing • Comprehensive expressions
	Appreciating art	• Appreciating art of diverse forms • Appreciating folk art
Natural exploration	Developing aptitude to explore	• Maintaining and expanding curiosity • Enjoying exploration • Utilizing explorative skills
	Mathematical exploration	• Understanding numbers and basic concepts of calculations • Understanding space and shapes • Basic measuring • Understanding regularity • Basic data collection and reporting results
	Scientific exploration	• Studying objects and substances • Studying living creatures and environment • Studying natural phenomena • Utilizing simple tools and equipment

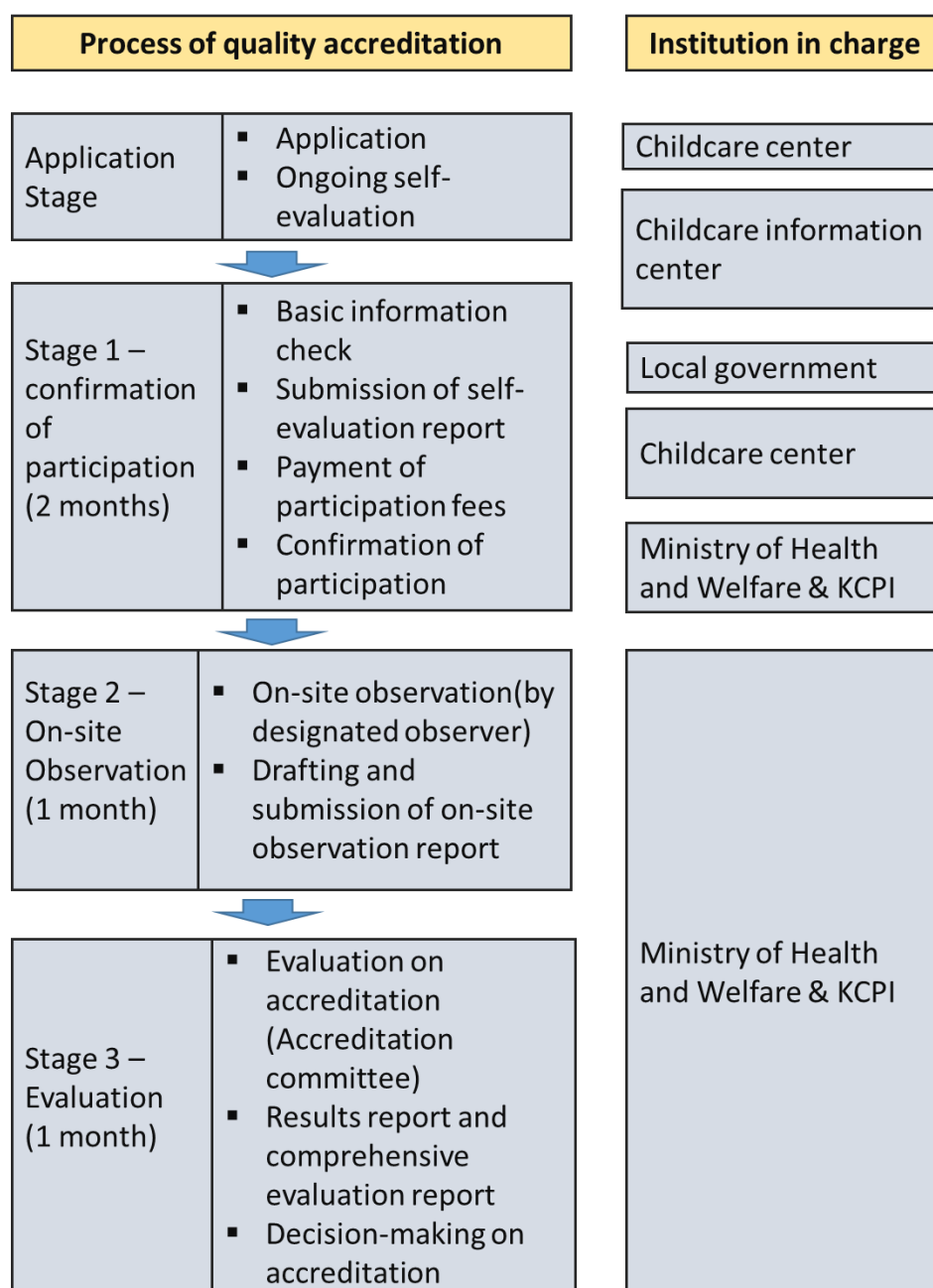
Source: Created by the author based on MOEST and MOHW (2013)

Table A-4: Guidelines on Teacher-Child Interaction in the Nuri Curriculum Teacher Guideline

Learning domains	Activities	Guidelines on Teacher-Child Interaction
Communication	Role playing	Children can learn to move from self-centered mindset to understand feelings of others through proper interaction, which will prepare them to live in groups and communities.
Social relations	While engaging in activities to learn about different job categories	Teachers shall ensure that children can experience diverse occupations while being mindful to provide sufficient information to avoid prejudice about the gender role. Appropriate linguistic teacher-child interaction is necessary to avoid impartial expressions.
Artistic experience	While engaging in activities to distinguish rhythms of a particular piece of music	Teachers shall promote appropriate teacher-child interaction to acknowledge and respect diverse impressions and reactions that children may have to music.
		Teachers shall engage in proactive interaction in order to encourage children to take the initiative to express in their own ways. Teachers' intervention is necessary to provide children with activities that interest them and to design transition to the next activity.
Natural sciences	While engaging in an activity to study the characteristics of objects	Teachers shall engaging in teacher-child interaction to scaffold while allowing children sufficient time to explore their curiosity and to avoid providing simple knowledge.
		Teachers shall use interaction to encourage children's curiosity and to express in diverse ways what they have observed.
	While engaging in activities related to numbers and sciences	Teachers shall initiate effective interactions among children and the available learning tools to facilitate different types of games that can be educational.

Source: Created by the author based on MOEST and MOHW (2013)

Figure A-1. Childcare Center Quality Accreditation System



Source: Created by the author based on Choi and Cho (2016); KCPI (2018)

Table A-5: Quality accreditation criteria for childcare centers of over 40 children (2nd phase)

Type of institution by the number of children	Domains	Indicators
Over 40 children (6 domains, 70 indicators)	• Childcare environment • 11 indicators	• Environment of the facilities (3 indicators) • Childcare activities documents (5 indicators) • Childcare support environment (3 indicators)
	• Operation and management • 12 indicators	• Operation and management of the childcare center (3 indicators) • Childcare staff (3 indicators) • Cooperation with families (4 indicators) • Cooperation with the community (2 indicators)
	• Childcare curriculum • 14 indicators	• Childcare plan and organization (7 indicators) • Childcare activities (7 indicators)
	• Teacher-child interaction and pedagogy • 11 indicators	• Daily childcare (3 indicators) • <u>Teacher-child interaction</u> (6 indicators) • Pedagogy (2 indicators)
	• Health and nutrition • 12 indicators	• Sanitation (8 indicators) • Disease prevention (2 indicators) • Meals and snacks (2 indicators)
	• Safety • 10 indicators	• Safety measures both inside and outside of the facilities (5 indicators) • Safety and protection of the children (5 indicators)

Source: Created by the author based on Choi and Cho (2016).

Table A-6: Indicators in the domain of teacher-child interaction in childcare center quality accreditation (phase 2)

Indicator #	Behavior markers	Method of assessment	Results
1-4-1	Teachers respect children regardless of their physical traits, family and ethnic background.	Classroom observation	Yes/No
1-4-2	Teachers respond appropriately to the characters, emotional state and preference for activities of individual children	Classroom observation	Yes/No
1-4-3	Teachers pay attention to children's individual requests and questions and respond appropriately.	Classroom observation	Yes/No
1-4-5	Teachers refrain from negative language that can insinuate threatening, blaming or mocking	Classroom observation	Yes/No
1-4-6	Teachers boost children's confidence by giving them compliments and encouragement.	Classroom observation	Yes/No
Excellent	Teachers scored "Yes" in 5 or more indicators		
Effective	Teachers scored "Yes" in 3-4 indicators		
Improvement Needed	Teachers scored "Yes" in 2 or less indicators		

Source: Created by the author based on Choi and Cho (2016).

Table A-7: Quality accreditation criteria for childcare centers (phase 3)

Type of institution by the number of children	Domains	Criteria of assessment
All types of centers 4 domains, 21 indicators, 79 criteria for assessment	1. Childcare curriculum and <u>teacher-child interaction</u>	1.1. Childcare curriculum planning and implementation (4 indicators) 1.2. Daily schedule administration (5 indicators) 1.3. Teaching and learning methods and play support (6 indicators) <u>1.4. Teacher-child interaction</u> (6 indicators) <u>1.5. Teacher role in teacher-child interaction</u> (4 indicators) 1.6. Assessment (4 indicators) 1.7. Daily life (2 indicators)
	2. Childcare environment and operation	Indoor space planning (5 indicators) Outdoor space planning (3 indicators) Center administration (4 indicators) Cooperation with families and community (5 indicators) Guarantee access for childcare center (2 indicators)
	3. Health and safety	Sanitation and safety of indoor and outdoor space (4 indicators) Meals and snacks (3 indicators) Education and management for health improvement (3 indicators) Safety in children's arrival and departure (2 indicators) Safety education and response measures to accidents (3 indicators)
	4. Staff management	<u>4.1. Leadership of the head teacher</u> (4 indicators) 4.2. Working environment of teachers and staff (3 indicators) 4.3. Benefits and welfare of teachers and staff (3 indicators) <u>4.4. Professional development of teachers</u> (4 indicators)

Source: Created by the author based on Choi and Cho (2016).

Table A-8. Indicators in the domain of teacher-child interaction in childcare center quality accreditation (phase 3)

Indicator #	Criteria of assessment	Method of assessment	Results
1-4-1	Teachers respect children regardless of their physical traits, family and ethnic background.	Classroom observation	Yes/No
1-4-2	Teachers respond appropriately to the characters, emotional state and preference for activities of individual children	Classroom observation	Yes/No
1-4-3	Teachers pay attention to children's individual requests and questions and respond appropriately.	Classroom observation	Yes/No
1-4-4	Teachers adjust the level of conversation to help children's understanding, while making eye contact.	Classroom observation	Yes/No
1-4-5	Teachers refrain from negative language that can insinuate threatening, blaming or mocking	Classroom observation	Yes/No
1-4-6	Teachers boost children's confidence by giving them compliments and encouragement.	Classroom observation	Yes/No
1-5-1	Teachers encourage children to engage in positive interaction with other peers	Classroom observation	Yes/No
1-5-2	Teachers encourage children to express their opinions and thoughts verbally to other peers	Classroom observation	Yes/No
1-5-3	Teachers encourage children to understand and	Classroom observation	Yes/No

	follow rules and commitments		
1-5-4	Teachers try to prevent conflict among children and respond properly when it happens	Classroom observation	Yes/No
Excellent	Teachers scored “Yes” in 5 or more indicators		
Effective	Teachers scored “Yes” in 3-4 indicators		
Need work	Teachers scored “Yes” in 2 or less indicators		

Source: Created by the author based on KCPI (2018).

Table A-9: Behavior markets under the indicator for head teacher leadership (phase 3)

Indicator #	Criteria of assessment	Method of assessment	Results
4-1-1	Head teacher pursues professional development for themselves.	Interview	Yes/No
4-1-2	Head teacher treats teachers with respect, supports teachers’ professional development, and conducts counseling sessions.	Interview Observation	Yes/No
4-1-3	Head teacher organizes regular teacher meetings in order to embraces opinions of staff members in a democratic manner.	Interview Document	Yes/No
4-1-4	More than 50% of the teaching staff have been employed for two consecutive years or longer.	Document	Yes/No

Source: MOHW and KCPI (2018).

Table A-10: Behavior markets for Professional development of teachers (phase 3)

Indicator #	Criteria of assessment	Method of assessment	Results
4-4-1	New teachers receive an orientation regarding their work responsibilities	Interview Document	Yes/No
4-4-2	Teachers receive opportunities for various types of training for the purpose of professional development	Interview Document	Yes/No
4-4-3	Teachers receive observations and feedback from the center about their teaching and learning methods.	Interview Document	Yes/No
4-4-4	The center conducts performance assessment for teachers.	Interview Document	Yes/No

Source: MOHW and KCPI (2018).

Table A-11: Early Childhood Classroom Observation Measures for Global Quality or Dimensions of Quality Measure

Measure	Domains Observed	Observation Procedure	Age Range	Key references
CIS: Caregiver Interaction Scale	Emotional tone, discipline style, and responsiveness of teachers	45 minutes; rating of 26 items; 4 point scale 2-3 hours;	Toddlers – Kindergarten	Arnett (1989)
CLASS: Classroom Assessment Scoring System	Teacher-child interactions in 3 domains: instructional support, emotional support & classroom organization	30-minute cycles of observe-code; 10 items; 7 point scale	PreK & K-3 versions; toddler soon	Pianta, La Paro, & Hamre (2008)
ECCOM: Early Childhood Classroom Observation Measure	Quality of instruction, management, social climate, cultural sensitivity, and resources	3 hours; time sample of specific behaviors	Ages 4-7	Stipek & Byler (2004)
ECERS-R: Early Childhood Environment Rating Scale – Revised	Global quality & 7 subscales: space and furnishings, personal care, language and reasoning, activities, interactions, program structure, and parents/staff	3 hours + 20 minute interview; 43 items; 7 point scale	Ages 2.5-5	Harms & Clifford (1983)
ECERS-E: Early Childhood Environment Rating Scale – Extended	Developed to supplement the ECERS-R with more focus on academic achievement:	2 hours + 5 minute interview; 18 items; 7 point scale	Ages 4-6	Sylva, Siraj-Blatchford, & Taggart (2006)

	literacy, math, science & diversity; reflects the British national pre-k curriculum			
ELLCO: Early Language and Literacy Classroom Observation	3 tools: (1) Literacy environment checklist; (2) classroom rating of 14 dimensions of literacy; and (3) literacy activities rating scale with a summary rating	1.5 hours; 24 checklist items; 14 observed items on a 5 point scale	Ages pre-k to 3 rd grade	(Smith & Dickinson, 2002)
ORCE: Observational Record of the Caregiving Environment	Focuses on an individual child's interactions with adults; sensitive, warm, and responsive caregiving; several discrete behaviors and 5 qualitative ratings	2 observation cycles of 44 minutes; discrete behaviors and global ratings	Ages 6- 54 months	NICHD ECCRN, 1996 & 2001
PQA: Preschool Program Quality Assessment – 2nd edition	3 observed domains: learning environment, daily routines, and adult-child interaction; 4 domains via interview: curriculum planning and assessment, parent involvement, staff qualifications	2-3 hours + teacher interview; 63 items; 5-point scale	Ages 3-5	High/Scope Educational Research Foundation, 1989 & 2003

	and program management.			
Profile: Assessment Profile for Early Childhood Programs	5 subscales: learning environment, scheduling, curriculum, individualizing, interacting	2-3 hrs; 60-item checklist; Yes/No response	Ages 3-7	Abbott-Shim & Sibley, 1998 (the research version)

Source: Created by the author based on (Bryant, 2010)

Table A-12: International Comparison of Teachers' Interaction Scores by Domain

Country	Reference	N	Class level	Emotional support		Classroom organization		Instructional support		Total score	
				Mean	SD	Mean	SD	Mean	SD	Mean	SD
Australia	Taylor et al., 2013	254	Preschool	5.13	0.92	4.6	0.92	2.07	0.76	3.93	0.87
Chile	Leyva et al., 2015	91	Preschool	4.65	0.54	4.29	0.63	1.75	0.55	3.56	0.57
China	Hu et al., 2016	180	Preschool	5.03	0.69	4.8	0.81	2.12	0.61	3.98	0.70
Denmark	Slot et al., 2017	402	Preschool	5.85	0.42	5.69	0.47	2.45	0.55	4.66	0.48
Germany	Stuck et al., 2016	61	Preschool	5.88	0.57	6.15	0.61	1.61	0.49	4.55	0.56
Finland	Pakarinen et al., 2010	49	Preschool	5.54	0.69	5.34	0.66	3.97	0.92	4.95	0.76
Netherlands	Veen and Leseman, 2015	133	Preschool	5.34	0.73	5.03	0.85	3.27	0.89	4.55	0.82
Spain	Sandrom, 2012	25	Preschool	4.79	0.63	4.32	0.67	2.16	0.49	3.76	0.60
US	Hamre et al., 2013	4035	Preschool	5.23	0.88	4.66	0.93	2.58	0.88	4.16	0.90
Korea 1	Bhang, 2015	31	Preschool	5.58	1.02	5.57	1.14	4.76	1.37	5.30	1.18
Korea 2	Kwon, 2015	24	Class of age 3-5	5.48	0.65	4.67	0.83	2.5	1.05	4.22	0.84
Korea 3	Byun, 2017	31	Class of age 3-5	5.25	1.18	4.87	1.38	2.22	1.00	4.11	1.19
Korea 4	This study	41	Class of age 3-5	5.59	0.63	5.85	0.75	3.59	1.03	5.01	0.80
Average score/SD (Korean studies)				5.48	0.87	5.24	1.03	3.27	1.11	4.81	1.06
Average score/SD (All studies)				5.28	0.75	5.00	0.83	2.72	0.84	4.34	0.80

Source: Created by the author based on Slot (2017); OECD (2016)

Table A-13: Number of Male/Female Teachers Childcare Centers in Korea

		Total	Public	Social welfare corporat- ion	Corpora- tions	Private	Family child care	Parent coopera- tion	Employer - supported
2018	Total	333,420	41,122	19,139	8,259	146,386	100,987	1,051	16,476
	Male	12,956	971	1,882	668	8,118	1,100	26	191
	Female	320,464	40,151	17,257	7,591	138,268	99,887	1,025	16,285
2017	Total	330,217	36,098	18,845	8,254	146,920	104,176	1,066	14,858
	Male	13,648	954	1,895	691	8,644	1,260	28	176
	Female	316,569	35,144	16,950	7,563	138,276	102,916	1,038	14,682
2016	Total	321,766	32,937	18,920	8,436	145,609	101,891	979	12,994
	Male	14,124	941	1,928	726	9,013	1,330	29	157
	Female	307,642	31,996	16,992	7,710	136,596	100,561	950	12,837
2015	Total	321,067	30,823	18,933	8,637	145,724	105,124	970	10,856
	Male	14,447	942	1,908	725	9,226	1,470	29	147
	Female	306,620	29,881	17,025	7,912	136,498	103,654	941	10,709
2014	Total	311,817	28,977	19,045	8,749	141,977	102,947	856	9,266
	Male	14,270	884	1,878	729	9,117	1,527	25	110
	Female	297,547	28,093	17,167	8,020	132,860	101,420	831	9,156
2013	Total	301,719	26,750	18,765	8,703	136,180	102,731	730	7,860
	Male	13,182	806	1,768	672	8,304	1,534	18	80
	Female	288,537	25,944	16,997	8,031	127,876	101,197	712	7,780

Source: Created by the author based on MOHW (2019b)

APPENDIX II: Questionnaires

Questionnaire for Teachers 1

Researcher: Najung Kim

Title: Analysis of the Effect of Classroom Quality on Child Outcomes in Employer-Supported Childcare Centers in the Republic of Korea : *Focusing on the Effect of Teacher-Child Interaction on Child's Self Initiative (Emotional development, Communication skills and Motivation)*

Dear Sir/Madame,

Thank you very much for your time and agreeing to participate in the survey. Kindly note that your information and answers to questions below will be treated as confidential and will be used exclusively for research purposes. All collected data will be disposed once the analyses have been completed.

1. How many teachers are there in the classroom that you're responsible for?

Lead	Assistant	Teacher for Special Activities	Teacher for disabled children	Others

2. How many children do you currently have in your classroom?

3. What is your age?

4. What is the highest level of education that you have completed?

2 year college	3 year college	4 year university	Graduate degree

5. How many years and months have you worked as a childcare center teacher?

6. How many times per year do you receive training focused on teacher-child interaction?

: _____ times per year

Thank you very much for your participation.

Questionnaire for Teachers 2 **(Child Assessment)**

The purpose of this section of the questionnaire is to ask teachers to evaluate children in their classrooms on their emotional skills, communication skills and motivation using Child Initiative Scale (Oh, 2004) to investigate the effect of teacher-child interaction and classroom environment on child initiative. Your accurate answers and evaluation will be much appreciated. The information provided will be treated as confidential and will be disposed once the analyses have been completed.

- 1) Gender of child : (boy/girl)
- 2) Age in months (or birthday) :
- 3) Period of enrollment in the observed center (if record exists) :
- 4) Period of enrollment in previous ECCE center (if record exists) :
- 5) Does the mother of the child of have a full-time job? : (yes/no)
- 6) Child's Self Initiative Level (using Child Initiative Scale (Oh, 2004)):

Child Initiative Scale (Oh, 2004)

Question	Strong Positive	Positive	Neutral	Negative	Strong Negative
Emotional Control					
1. The child expresses verbally or physically which activity he/she wants to participate in.	⑤	④	③	②	①
2. The child recognizes his/her emotions when he/she has or has not successfully completed a planned activity.	⑤	④	③	②	①
3. The child emphasizes with his/her friends' emotions when they have made mistakes.	⑤	④	③	②	①
4. The child understands and expresses the sentiments of the background or characteristics from music, art work or books.	⑤	④	③	②	①
5. The child controls his/her emotions while playing.	⑤	④	③	②	①
6. The child respects the rules while playing. (order of play, play time, etc.)	⑤	④	③	②	①
7. The child accepts the results when he/she loses while playing with peers.	⑤	④	③	②	①
8. The child comforts peers when they seem unsuccessful with their tasks or when they appear	⑤	④	③	②	①

sad.					
9. The child feels apologetic toward a friend who was affected by his/her mistake.	⑤	④	③	②	①
10. The child recognizes and refrains from actions that others disapprove of.	⑤	④	③	②	①
11. The child is aware that congratulating friends' accomplishments enhances their joy.	⑤	④	③	②	①
12. The child signals a desire to participate in a play on behalf of friends who are not able to express their interest.	⑤	④	③	②	①
13. The child expresses signs of amicability toward peers that he/she wants to be friends with.	⑤	④	③	②	①
14. The child apologizes to peers when they are affected by his/her mistake.	⑤	④	③	②	①
15. The child allows a friend to go first when playing with a toy or playing a game.	⑤	④	③	②	①
16. The child makes a compliment to a friend for kind words or behavior.	⑤	④	③	②	①
17. The child makes peace with peers after a fight while playing.	⑤	④	③	②	①
18. The child helps a friend who need help during an activity.	⑤	④	③	②	①
Communication Skills					
19. The child pays close attention to verbal instructions directed at him/her.	⑤	④	③	②	①
20. The child follows accurately instructions from others (peer or teacher).	⑤	④	③	②	①
21. The child understands the messages from a verbal interaction with peers.	⑤	④	③	②	①
22. The child seeks help from a peer or teacher when he/she tries out a new activity or faces difficulties.	⑤	④	③	②	①
23. The child expresses apologies and gratitude when he/she makes mistakes or receives help.	⑤	④	③	②	①
24. The child expresses to the peer group his/her desire to participate in their activity.	⑤	④	③	②	①
25. The child verbally expresses his/her interest in peers' activity or behavior.	⑤	④	③	②	①
26. The child shares information about an activity with a friend that he/she is playing with.	⑤	④	③	②	①
27. The child uses humor in order to overcome and resolve a situation where he/she feels uneasy or worried.	⑤	④	③	②	①
28. The child entertains others with witty remarks and puzzles.	⑤	④	③	②	①
29. The child amuses friends with playful behaviors and facial expressions.	⑤	④	③	②	①
Motivation to Achieve					
30. The child feels joy when he/she is satisfied with his/her accomplishment.	⑤	④	③	②	①
31. The child participates in an activity with a	⑤	④	③	②	①

sense of confidence.					
32. The child usually has bright facial expressions when playing.	⑤	④	③	②	①
33. The child stands up for his/her right when a peer interferes with his/her activity.	⑤	④	③	②	①
34. The child takes initiative in planning and preparing for the activity of interest.	⑤	④	③	②	①
35. The child puts away toys after playing with them.	⑤	④	③	②	①
36. The child understands the boundaries of accepted behaviors and acts freely within them.	⑤	④	③	②	①
37. During group activities, the child understands and delivers on the role expected of him/her.	⑤	④	③	②	①
38. The child attempts to solve his/her own problems although it takes trial and error.	⑤	④	③	②	①
39. The child expresses his/her favorable feelings for a friend through words or behavior.	⑤	④	③	②	①
40. The child initiates a conversation with a new classmate or peers that he/she is not very close to.	⑤	④	③	②	①
41. The child does not support a friend who intends to conduct a wrongful act.	⑤	④	③	②	①
42. The child makes an effort to try out a new activity that he/she has never tried or that seems challenging.	⑤	④	③	②	①
43. When it is time to wrap up an activity, the child controls his/her desire to play more and starts cleaning to move on to the next activity.	⑤	④	③	②	①
44. The child carries out an activity in a consistent manner until it is completed.	⑤	④	③	②	①
45. The child does not give up easily on a task that is challenging to solve.	⑤	④	③	②	①
46. The child can use materials in creative ways.	⑤	④	③	②	①
47. The child plays with a toy in various ways.	⑤	④	③	②	①
48. The child comes up with diverse solutions about a problem situation.	⑤	④	③	②	①
49. The child helps with a problem that his/her friend is not able to solve.	⑤	④	③	②	①

Thank you very much for your participation.

