



## The effects of the first reading experience of infancy on reading and academic achievement of elementary first graders

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**Abstract:** The purpose of this study was to analyze the structural relationship among the age of first reading, child's reading motivation, reading ability, and academic achievement in elementary first graders. A total of 267 pairs of elementary first graders and their mothers and teachers were sampled in Gyeonggi province, South Korea. First graders were tested with tasks to measure reading ability and mothers' responses and teachers' evaluation were collected to measure students' age of first reading, reading motivation, and academic achievement. The results were as follows. First, first reading, reading motivation, reading ability, and academic achievement were partly different by socio-demographic factors. Second, earlier age of first reading was associated with higher reading motivation, reading ability, and academic achievement in the first grade. Third, SEM analysis showed that reading motivation and reading ability fully mediated the effect of the age of first reading on academic achievement.

**Keywords:** First reading, reading ability, reading motivation, academic achievement, structural equation model (SEM)

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### INTRODUCTION

Academic achievement is a key factor in promoting children's school adjustment, self-esteem, and subjective well-being. Children's language, cognitive, and social development are associated with the factors related to academic achievement. In this aspect, the experience of early reading can be linked to reading attitude, reading ability, and academic achievement after early childhood. Crain (2000) argued that infants experience the transition from sensorimotor stage to preoperational stage, enabling them to form internal representation of objects and events which are not in sight. In other words, they begin to use symbols and internal image after the developmental transition (Kim, Jun, & Jo, 2011). Due to this change, the first reading experience in infancy is crucial not only to cognitive and emotional development but also to attitude toward reading and academic achievement in later childhood.

Previous research has argued that experiences of reading at an early age before school can contribute to development of reading attitude. It has been shown that reading frequency and reading activities in early ages were related to reading ability in later years (Debrayshe, 1993; Wells, 1985). Debrayshe (1993) reported that picture book reading in seven months predicted language development at two years old and the frequency of picture book reading from one to three years old was related to literal and oral language development at five years old and reading ability at seven years old.

Much research has been done to find the effective ways to promote children's language development. Firstly, children's language development should start from practical and natural language activities (Kim, Youn, & Kwak, 2016). Secondly, language development can be achieved through constant interaction between a child and adults (Heath, 1983; Lee, Lee, & Kim, 2010) and interaction with adult language models in family, community, and daily events (Youn, 2014). For example, the activity that parents and teachers read aloud picture books to infants can enhance children's language development (Kim, Kim, & Youn, 2017).

When adults read aloud picture books to children, they deliver contents of books through sounds of texts including rhythm, intonation, and pose with various body movements and sounds, which is helpful in improving children's language ability (Jung, 2012). The pictures in books can strengthen language interaction between adults and children, thus promoting children's language development. As this process occurs through interaction with a reader and a listener, reading aloud can provide a model of reading as well as deliver sounds and meaning of texts (Kim, 2015). Therefore, reading aloud picture books has positive effects on infants' language development, as they can learn reading and acquire ability to comprehend meanings, leading to facilitate both language and cognitive development.

The family environment plays a critical role in young children's language development (Kim & Kwon, 2002; Makin & Whitehead, 2004; Silvern, 1985; Snow & Ninio, 1986). Makin and Whitehead (2004) argued that literacy environment which parents provide is essential for language development as infants need a plenty of experience in family contexts from the earliest years to develop the literal and oral language. In addition, Heath (1983) showed that the development of literal and oral language begins from the early ages. By 21-24 months, infants can reach the level of reading at which linguistic skills such as speaking while remembering and describing pictures while looking at them are acquired. Twenty-four to thirty-six-month-old infants in the preparatory period to be a careful listener in picture book reading are able to express their own idea (Kim, 2000).

The first age at which adults read aloud books to children has an effect on language development of young children (Bruner, 1978; Debaryshe, 1993). Debaryshe (1993) showed that the best predictor of language development in two years was the first age at which adults began reading to infants, at seven months in average, which was more effective than the variables such as the frequency of reading per week or the number of books read to them. Moreover, Bruner (1978) claimed that the more opportunities provided for infants to handle and interact with books, the earlier reading behaviour including naming pictures was shown. Therefore, the earlier the first reading begins, the more proficient the language development of children can be.

The role of parents, which has a positive effect in children's language and cognitive development, is highly important in initiating reading from early life. Many studies presented that family environment is a key predictor of language development in early childhood (Lee, 1992; Lee & Lee, 1996). Studies on 1-, 2-, 3-year old infants have showed that various literacy skills are found in infancy (Bus & Van Ijendoorn, 1988; Debaryshe, 1993; Sulzby & Teale, 1987; Whitehurst et al., 1988). Infants can experience literacy with mothers in a variety of situations, as parents provide scaffolding to children considering their ages and abilities. Vygotsky (1978) and Brown (1973)'s language acquisition theory argued that interaction with mother in early life is fundamental to language development as well as socio-emotional development. From social interactionist perspective, it has been argued that interaction with mother in early ages play an important role in language acquisition based on the concept of ZPD (Zone of Proximal Development) and mothers act as a critical mediator in children's language development (Koh & Oh, 2006). Mother's language response to 12-month infants predicted their vocabulary development in 15 months (Kim & Kwak, 2010).

Infancy is a critical period of language development. Furthermore, language development accounts for a significant part in early childhood education due to its extensive effects on child development. From this perspective, it is worth investigating the relationship between the reading experiences with a mother as a main caregiver and affective and cognitive variables related to reading. This study can provide implications on early and middle childhood education in terms of the value of family literacy based on the evidences to underscore the importance of parental role in reading with children from early years.

This study aims to analyze the structural relationships between elementary first grader's first reading, reading motivation, reading ability, and academic achievement. The specific research questions are as follows.

Research question 1. Are there differences in first reading, reading motivation, reading ability, and academic achievement in elementary first year by socio-demographic variables (sex, birth order, and mother's employment status)?

Research question 2. Are first reading, reading motivation, reading ability, and academic achievement in elementary first year related?

Research question 3. How is the structural relationship between first reading, reading motivation, reading ability, and academic achievement of elementary first graders?

## METHOD

### Participants

Participants were 248 first graders in elementary schools and their mothers, 117 boys and 131 girls, in four elementary schools randomly selected in Gyeonggi province, South Korea.

### Measures and Materials

#### *Reading fluency*

'A test of reading fluency' in the battery of Kim (2008)'s 'Basic Academy Skills Assessment: Reading Participants' was used to measure reading fluency of first graders. It is an individual test consisting of two reading materials, 1-(1) and 1-(2), to measure how many letters children can read aloud correctly. The medium score among three scores of reading in the sequence of 1-1(1), 1-(2), and 1-(1) was included in the final score.

#### *Reading comprehension*

'A test of sentence comprehension' in the battery of Kim (2008)'s 'Basic Academy Skills Assessment: Reading Participants' was used to measure children's reading comprehension. Children were asked to read sentences and choose a correct word among three words suitable for a context. The test was conducted to a group of children at the same time and took about three minutes to complete total 23 items. The number of correct items children chose was analyzed as scores for reading comprehension.

#### *Reading motivation*

The Jung & Choi (2012)'s revised version of Wigfield & Guthrie (1997)'s 'The Motivation for Reading Questionnaire (MRQ)' scale was used to measure reading motivation. MRQ consists of total 53 items and can be divided into two subscales, internal factor and external factor: internal factor is composed of six variables including efficacy, challenge, curiosity, involvement, importance, and avoidance and external factor consists of five variables including competition, academic achievement, recognition, interaction, and conformity. After conducting item quality analysis and exploratory factor analysis, reading motivation was analysed as a single factor, composed of 20 items of four-point Likert's scale. Higher scores meant that children had higher reading motivation. Cronbach's coefficient was .85.

#### *Academic achievement*

The children's achievements in Korean Language and Math were evaluated by teachers of children. The achievement in Korean was estimated in the fields of writing, grammar, speaking, literature, reading, and listening. The achievement in Math was assessed in the fields of figures, sequence and function, number and arithmetic, probability and statistics, and estimation. Three-point Likert's scale was used and higher scores meant children's higher achievement in subjects.

### Statistical Analysis

IBM SPSS 21.0 and AMOS 21.0 software were used to conduct analysis on independent t-test, Pearson's product-moment correlation, and Structural Equation Model (SEM). Based on two-step approach, exploratory factor analysis was conducted to verify fitness of a measurement model, convergent validity, and discriminant validity in the first step. The goodness of fit indices was produced and the direct and indirect effects of path coefficients were analysed to verify the research hypothesis in the second step. As the goodness of fit indices, CFI (comparative fit index),

TLI (Tucker-Lewis index), NFI (normed fit index), RMSEA (root mean square error of approximation), and SRMR (standardized root mean square residual) were used. CFI, TLI, and NFI higher than .9, RMSEA below .05, and SRMR below .08 were considered acceptable. Bootstrapping was conducted to test the significance of entire indirect effects and Sobel test was used to test the significance of separate indirect effects.

## RESULTS

### Difference in Variables by Demographic Factors

The differences in first reading, reading motivation, reading ability, and academic achievement by sex, birth order, and mother's employment status were verified by conducting independent t-test. First, the results showed that differences in reading motivation ( $t = .23, p < .05$ ) and academic achievement ( $t = -2.71, p < .01$ ) were significant. In specific, girls' reading motivation ( $M = 3.45, SD = .44$ ) and academic achievement ( $M = 2.78, SD = .26$ ) were higher than boys' reading motivation ( $M = 3.32, SD = .48$ ) and academic achievement ( $M = 2.67, SD = .33$ ). Second, it was shown that differences in first reading ( $t = 2.20, p < .05$ ), reading motivation ( $t = 2.46, p < .05$ ), and academic achievement ( $t = 2.06, p < .05$ ) were significant between the child's birth orders. Specifically, only children's first reading ( $M = 5.92, SD = .128$ ), reading motivation ( $M = 3.46, SD = .45$ ), academic achievement ( $M = 2.77, SD = .28$ ) were higher than middle and last children's first reading ( $M = 5.54, SD = 1.44$ ), reading motivation ( $M = 3.32, SD = .46$ ), academic achievement ( $M = 2.69, SD = .32$ ). Lastly, the difference in reading ability between working and not working mothers was only significant ( $t = 2.02, p < .05$ ). Unemployed mothers' children ( $M = 99.88, SD = 29.23$ ) had higher reading ability than employed mothers' children ( $M = 92.90, SD = 24.86$ ).

**Table 1.** Difference in variables by child's sex and birth order and mother's employment status

		First reading			Reading motivation			Reading ability			Academic achievement		
		$\bar{X}$	SD	T	$\bar{X}$	SD	T	$\bar{X}$	SD	T	$\bar{X}$	SD	T
Child's sex	Boy	5.6	1.39		3.32	.48		93.46	27.6		2.6	.3	-
	Girl	5.7	1.36	-.83	3.45	.44	-.23*	100.1	27.3	-1.90	2.7	.2	*
Child's birth order	First/only	5.9	1.28		3.46	.45	2.46	100.3	27.2		2.7	.2	
	Middle/last	5.5	1.44	2.20*	3.32	.46	*	93.69	27.7	1.92	2.6	.3	2.06*
Mother's employment status	Unemployed	5.7	1.28		3.39	.47		99.88	29.2		2.7	.3	
	Employed	5.7	1.28	.63	3.39	.47	.10	99.88	29.2	2.02*	2.7	.3	.47
	Employed	5.6	1.50		3.38	.45		92.90	24.8		2.7	.2	
	Unemployed	5.6	1.50		3.38	.45		92.90	24.8		2.7	.2	

\* $p < .05$ , \*\* $p < .01$ .

### Descriptive Statistics and Correlations between Measurement Variables

Table 2 presents the correlations for measurement variables. It was found that the correlations between all variables were significant and positive ( $r = .15-.42, p < .05-.001$ ), except for the relationship between reading motivation and reading ability. The correlation coefficient between reading ability and academic achievement was highest among correlations coefficients ( $r = .42, p < .001$ ). The variables correlated with first reading, presenting from highest correlation to lowest

correlation, were academic achievement ( $r = .25, p < .001$ ), reading ability ( $r = .21, p < .01$ ), and reading motivation ( $r = .18, p < .01$ ).

**Table 2.** Descriptive statistics and correlations between measurement variables

	1	2	3	4
1. First reading	1			
2. Reading motivation	.18**	1		
3. Reading ability	.21**	.11	1	
4. Academic achievement	.25***	.15*	.42***	1
<i>M</i>	5.73	3.39	96.98	2.73
<i>SD</i>	1.37	.46	27.66	.30
<i>Skewness</i>	-.95	-.81	-.12	-1.62
<i>Kurtosis</i>	.15	-.05	-.38	2.69

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

## Structural Equation Model

### *Fitness of a measurement model*

The measurement model showed an acceptable fit to the data (CFI = .99, TLI = .99, NFI = .96, RMSEA = .02, SRMR = .03).

### *Construct validity*

The convergent validity was used to test whether the measures of constructs expected to be related in theory were related (Table 3). As a rule of thumb, factor loadings over .4 indicate convergent validity (Cabrera-Nguyen, 2010). Factor loadings and *C.R.* (composite reliability) were produced for verification. The factor loadings were over .4 ( $\beta^2 = .49-.86$ ) and *C.R.* values were over 4.322 ( $C.R. > 1.965$ ), showing that the measures of constructs satisfied the criteria of convergent validity.

The discriminant validity was used to verify whether the measures of constructs supposed not to be related were not related. The 95% confidence intervals were calculated based on correlation coefficients and standard errors for verification. The 95% confidence interval of first reading and reading motivation [- .30, - .54], first reading and reading ability [.38, .98], first reading and academic achievement [- .36, - .47], reading motivation and reading ability [.03, .65], reading motivation and academic achievement [- .42, - .48], and reading ability and academic achievement [- .36, - .76] did not include 1, thus showing that discriminant validity was confirmed.

## Verification of Structural Equation Model

### *Fitness of structural model*

The goodness of fit indices of structural model between the age of first reading, reading motivation, reading ability, and academic achievement in the first grade showed a good fit showing CFI = .99, TLI = .98, and NFI = .95, RMSEA = .03 and SRMR = .04.

**Table 3.** Factor loadings and C.R. values

	Parameter	$\beta$ ( $\beta^2$ )	C.R.
<b>First reading</b>	→	.72 (.52)	
	<b>Reading motivation 1</b>	.57 (.32)	
<b>Reading motivation</b>	→ <b>Reading motivation 2</b>	.51 (.26)	4.369***
	<b>Reading motivation 3</b>	.49 (.24)	4.322***
	<b>Reading fluency</b>	.83 (.69)	6.149***
<b>Reading ability</b>	→ <b>Reading comprehension</b>	.66 (.44)	
	<b>Korean language grades</b>	.74 (.55)	
<b>Academic achievement</b>	→ <b>Math grades</b>	.86 (.78)	7.987***
<b>Acceptance criteria</b>		> .4	> 1.965, $p < .05$

\*\*\* $p < .001$ .**Paths of structural model**

First, to estimate the explanatory power of first reading on reading motivation, reading ability, and academic achievement,  $R^2$  (Squared Multiple Correlations) was computed. As a result, first reading explained 25% of reading motivation, 14% of reading ability, and 42% of academic achievement (Table 4). The direct effects were significant in paths of first reading → reading motivation ( $\beta = .50, p < .001$ ), first reading → reading ability ( $\beta = .37, p < .001$ ), reading motivation → academic achievement ( $\beta = .35, p < .01$ ), and reading ability → academic achievement ( $\beta = .49, p < .001$ ). To verify the significance of indirect effects through reading motivation and reading ability, bootstrapping analysis was executed. It was shown that the indirect effects between first reading and academic achievement were significant. Reading motivation and reading ability showed a full mediation effect between first reading and academic achievement ( $\beta = .36, p < .01$ ) (Table 4).

**Table 4.** Result of bootstrapping analysis (Verification of total effect, direct effect, and indirect effect)

	Parameter	Direct effects	Indirect effects	Total effects
<b>First reading</b>	→ <b>Reading motivation</b>	.50***	-	.50***
	<b>Reading ability</b>	.37***	-	.37***
	<b>Academic achievement</b>	-	.36**	.36***
<b>Reading motivation</b>	→ <b>Reading ability</b>	-	-	-
	<b>Academic achievement</b>	.35**	-	.35**
<b>Reading ability</b>	→ <b>Academic achievement</b>	.49***	-	.49***
<b>Acceptance criteria</b>				
<b>SMC : Reading motivation = .25, Reading ability = .14, Academic achievement = .42</b>				

\*\* $p < .01$ , \*\*\* $p < .001$ .

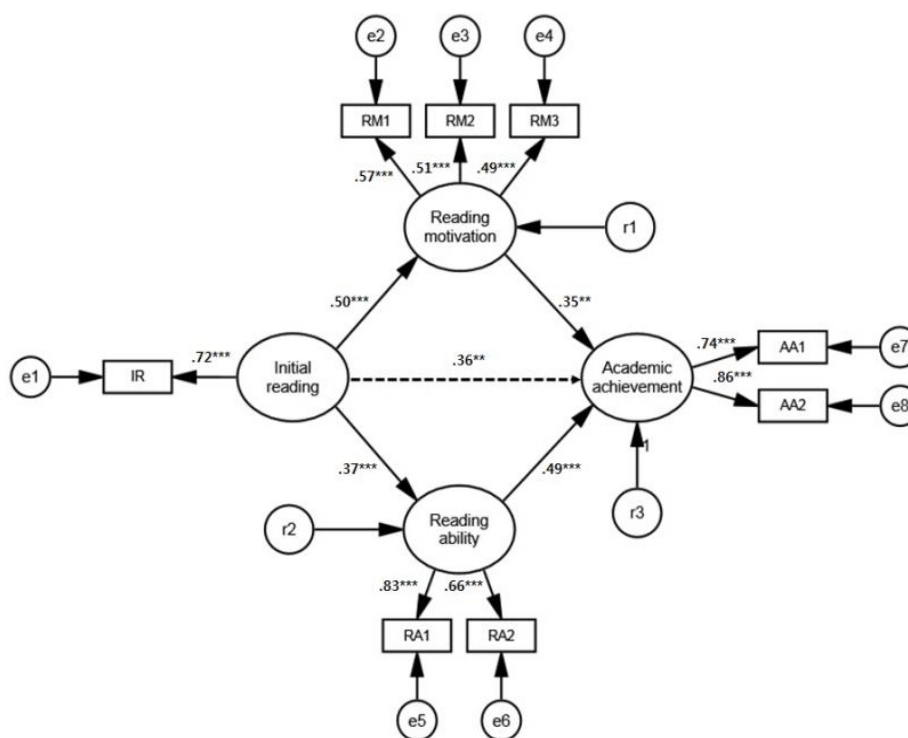
Second, Sobel test was conducted to test the significance of indirect effects of each path (Table 5). The indirect effects of reading motivation ( $Z = 2.06, p < .05$ ) and reading ability ( $Z = 2.16, p < .01$ ) were significant between first reading and academic achievement

In summary, the results showed that first reading was directly related to reading motivation and reading ability in their first grade of elementary schools. In addition, reading motivation and reading ability respectively had full mediation effects between first reading and academic achievement of the first graders.

**Table 5.** Result of Sobel test (Verification of indirect effect)

Parameter				Z	
First reading	→	Reading motivation	→	Academic achievement	2.06*
First reading	→	Reading ability	→	Academic achievement	2.16**

\* $p < .05$ , \*\* $p < .01$ .



**FIGURE 1.** Standardized estimates of parths of structural model

## DISCUSSION and CONCLUSION

This study aimed to verify the effect of first age at which mothers read books to their children on reading motivation, reading ability, and academic achievement in elementary first grade children. We analyzed the results on whether these variables were different by sex, birth order, and mother' employment status, whether they were correlated or had causal relationship to provide implications for children's reading development and academic achievement.

Independent t-test showed that there were some differences on first reading, reading motivation, reading ability, and academic achievement by socio-demographic variables. Firstly, it was presented that girls' reading motivation and academic achievement were higher than boys. It supports the results of previous studies that girls' reading motivation was higher than boys (Baker & Wigfield, 1999; Brown, 1992; Guthrie & Wigfield, 1997; Kim, 2000; Kwon, 2002; Jeong & Choi, 2012). This result can be explained in relation to reading model. Brown (1992) argued that boys

can form a negative view on reading owing to the lack of male reading models in families and elementary schools. Finn, Dulberg, and Reis (1979) reported that there were not enough male models in reading activities. These arguments seem to be persuasive as research on South Korean families also showed the similar result that mothers read to their children more frequently than fathers (Kim & Kwon, 2002). In addition to unbalanced proportion of reading model in terms of gender, cultural approval, and gender biases on reading activities can influence children's reading. For example, teachers or parents who regard reading as an activity for females can guide girls to commit more effort and time to reading than boys (Marsh, 1989; Nicholls, 1979), leading to boost more girls' confidence and improve their reading motivation.

Secondly, children's first reading, reading motivation, and academic achievement were different by their birth orders. First or only children showed higher level of first reading, reading motivation, academic achievement than children below second place. Previous studies argued that children without siblings or with fewer siblings can be faster in language abilities than children with more siblings. In addition, other research found that first child can show more proficient language skills than children born later than first child (Jeong & Choi, 2012; Nelson & Bonvillain, 1978). However, as researchers generally more agree with the argument that differences in reading development are affected by the environmental factors which parent and siblings contribute to, not owing to birth order itself, we suggest that the result is due to family environment conditioned by the number of siblings.

Lastly, reading ability was different between children of working and not working mothers. This result was consistent with the previous result that housekeeping mothers were more willing to do more reading aloud activities and had more time to spend with children (Colewinski & Holliday, 1979; Lee, 2006). However, the large amount of time and experience with mothers is not necessarily guarantee language development. More importantly, it is claimed that not the amount but the quality of time with children is more crucial in reading development and parents' ability to present proper language input has more impact on reading development (Colewinski & Holliday, 1979). Therefore, how parents spend quality time with children can bring more positive impact on children's language development. Thus, it is necessary for working mothers to put efforts in planning effective ways to have more quality interaction with children. Moreover, the supports for reading development from other family members, childcare centres, and preschools are also necessary. Social support for reading development from entities other than parent is needed to be investigated more specifically in further studies.

The correlation analysis found that first reading, reading motivation, reading ability, and academic achievement were positively related, indicating that earlier a child starts reading with parents, higher the level of reading motivation, reading ability, and academic achievement. This result can be supported by the research which showed the positive relations between the amount of reading, reading proficiency, reading comprehension ability, and reading motivation (Ahn, 2008; Cipielewski & Stanovich, 1992; Guthrie, Wigfield, Metsala, & Cox, 1999; Kim, 2005; Kim & Hong, 2009; Rosenshine & Stevens, 1984; Stanovich & Cunningham, 1992; Walberg & Tsai, 1984). When reading with children, adults can establish proper scaffolding and interaction, improving children's reading ability in the realm of ZPD. However, the relation between reading motivation and reading ability was not found, which is not consistent with theory that motivation plays a significant role in reading as motivated behaviour accompanies voluntary involvement, effort, and amusement for reading (Grambrell, 1996). As a few research on reading in early childhood found similar results (Baker & Wigfield, 1999; Guthrie et al., 1999; Jeong & Choi, 2012), we argue that the validity of measurement on reading motivation should be reconsidered.

Based on results of correlation analysis, the structural equation model between first reading, reading motivation, reading ability, and academic achievement were tested. The result showed that first reading affected academic achievement through reading motivation and reading ability. There was the direct effect of first reading on reading motivation and reading ability which, in turn, had the direct effects on academic achievement. It was also shown that reading motivation and reading ability had a full mediation effect between how early reading began and academic achievement. This indicates that the reading experience is an important predictor of reading development, which supports the results of previous research on the relationship between



reading experience and reading ability (Cipielewski & Stanovich, 1992; Guthrie et al., 1999; Jeong & Choi, 2012; Jordan, Snow, & Porche, 2000; Kim & Hong, 2009; Martinez, 2005; Stanovich & Cunningham, 1992) and on the relationship between reading experience and reading motivation (Baker & Wigfield, 1999; Guthrie et al., 1999; Jeong & Choi, 2012; Wigfield, 1996; Wigfield & Guthrie, 1997). As reading motivation and reading ability contribute to academic performance (Jeong & Choi, 2013), early reading experience from infancy can be influential not only in reading development but also in academic achievement.

Given that the previous studies children's reading attitudes were positive when parents read books to children regularly and become a desirable reading model with a positive literacy attitude (DeBaryshe, 1993; Kim & Kwon, 2002; Whitley, 1994), the results of this study can give an educational implication in terms of the importance of family literacy from the earliest age. Reading development begins from the earliest stage of life, which can be facilitated by positive parent-child interaction in daily lives. Based on the account of emergent literacy that an appropriate and ample environment for young children is crucial to literacy development, the experience of reading books in real life should be valued in the literacy instruction for young children. Parents can provide the context conducive to development of emergent literacy by reading books to infants, leading to promote linguistic and cognitive development later in school.

This paper shed light on the importance of reading with parents from early infancy to improve academic achievement in elementary school closely related to well-being of Korean children. The results of the study can be used as resources for parent education program to promote family literacy for young children.

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