

## Prediction of elementary school academic performance abilities for young children's academic abilities and preparation for learning, which the mothers and the teachers rated

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### Abstract

*This study was conducted by researchers to compare the differences between the ratings of mothers and teachers on young children's academic ability and learning ability, and to confirm their influence on elementary school academic performance ability. This study was conducted using data from the 7th year(2014) and 10th year(2017) of the panel study on Korean children. The analysis data were individual basic background, academic ability, preparation for learning, and academic performance ability. 600 children were used for the study. We suggests that close interaction and cooperation between mother and teacher are necessary to support young children's academic ability and learning preparation.*

**Keywords:** Prediction, Academic performance ability, Preparation for learning, Young children, Elementary student

## 1. INTRODUCTION

Young children during the growth process are limited in their accurate self-awareness because their cognitive abilities are not fully developed [1]. Mothers and teachers are the subjects of care for young children[2], and are important beings who can accurately know and deliver information on infants [3]. As such, among the human factors surrounding young children, mothers and teachers, who are the main others, play important information providers in research related to infants and toddlers.

Most mothers have been with their children from birth, watching all the growth processes, so they have a deep understanding of individual young children. On the other hand, it is argued that mothers' understanding of their young children's abnormal development is relatively insufficient compared to that of teachers [3]. Many teachers have acquired knowledge about development, and because they continue to teach and care for many young children of the same age, it is possible to understand young children more objectively than their mothers. On the other hand, teachers are with young children only in early childhood education institutions and must solve various problems encountered in early childhood education institutions [4]. Most teachers have fewer individual interactions with young children than their mothers. The point is, mothers and teachers are very important to young children, and their perspectives can be different.

Since the child's development is on a continuous line, it is predicted that early childhood academic ability and learning preparation have an effect on elementary school children's academic performance. As discussed through previous studies, there may be differences in the ratings of mothers and teachers about early childhood academic ability and learning preparation. According to a preceding study[5] conducted on children with

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attention deficit hyperactivity disorder(ADHD), the degree of agreement between parents and teachers was low. Studies on problem behavior, temperament, and kindergarten adaptation[6-8] also showed differences in the ratings of mothers and teachers.

In this study, researchers try to compare whether there is a difference between the ratings of the mothers and the teachers on the academic ability and learning ability in young children. Next, researchers would like to examine the degree of prediction of the young child's academic ability and learning preparation, which were rated by the mothers and the teachers, on the academic performance of elementary school. The research questions of this study are as follows.

Research Question 1. What is the difference between the mothers' and the teachers' ratings on young children's academic ability and learning preparation?

Research Question 2. What is the prediction of the young children's academic ability and preparation for learning, which the mothers and the teachers rated, for the elementary school academic performance?

## 2. METHODOLOGY

### 2.1. Research subject

This study was conducted using data from the 7th year (2014 year's survey) and 10th year (2017 year's survey) of the Panel Study on Korean Children(panel.kicce.re.kr/panel) from Korea Institute of Child Care and Education(KICCE). This study used data from 2014 and 2017 among the longitudinal research data conducted by the panel study on Korean children. Each of these periods was the period immediately before the child under investigation was enrolled in elementary school and in the third year of elementary school. The data used in this study was downloaded from the panel of the Korean children's website in December 2020. The analysis data were individual basic background, academic ability, preparation for learning, and academic performance ability. Only subjects with scores for all items were used. 600 children were used for the study. Based on the 7th year survey, the average month of the study subjects were 75.1 months. The gender was 51.7% (N=310) for boys and 48.3% (N=290) for girls. The specific background of the study subject is shown in Table 1.

**Table 1. Individual background of the analyzed subject (N=600)**

Individual variable		property	Frequency(Percent)
Mother	Age	26-30 years old	15(2.5)
		31-35 years old	195(32.5)
		36-40 years old	306(51.0)
		41-51 years old	83(13.8)
		No response	1(0.2)
Early childhood teacher	Age	20-25 years old	97(16.2)
		26-30 years old	373(62.2)
		31-35 years old	84(14.0)
		36-40 years old	68(11.3)
		41-55 years old	86(14.3)
Gender	Gender	Women	512(85.3)
		Men	2(0.3)
		No response	86(14.3)
Elementary school teacher	Age	20-25 years old	38(6.3)
		26-30 years old	103(17.2)
		31-35 years old	63(10.5)
		36-40 years old	100(16.7)
		41-50 years old	193(32.2)
Gender	Gender	Women	490(81.7)
		Men	110(18.3)

## **2.2. Investigation tool**

### **2.2.1. Academic ability**

The early childhood academic ability used in this study is a tool modified and supplemented by the panel of Korean children's researchers translated 『NICHHD study of Early Child Care and Youth Development (SECCYD) Phase II Data Collection Instruments: 54 months.』. This tool consisted of 13 questions for language and literacy abilities and 15 questions for mathematics abilities. The mother responded, cronbach's  $\alpha$  of language and literacy abilities were .924, and cronbach's  $\alpha$  of mathematical abilities were .947. The teachers responded, cronbach's  $\alpha$  for language and literacy abilities were .905 and cronbach's  $\alpha$  for mathematical abilities were .937.

### **2.2.2. Preparation for learning ability**

Early childhood preparation for learning used in this study was a tool that was modified and supplemented by the panel of Korean children researchers translated the tool developed by Murphey and Burns(2002) [9]. This tool consisted of 6 questions for social-emotional development, 8 questions for learning attitude, 3 questions for communication, and 5 questions for cognitive development and general knowledge. The mother responded, cronbach's  $\alpha$  of preparation for learning was .921. The teacher responded, cronbach's  $\alpha$  of preparation for learning was .929.

### **2.2.3. Academic performance ability**

The academic performance of elementary school children used in this study was a tool that was revised and supplemented by the panel of Korean children researchers on the scale used by Lee and her colleagues (2010)[10]. It was conducted in which the homeroom teacher responded to 3 questions in Korean language, 4 questions in mathematics, 1 question in science, 1 question in social studies, 3 questions in arts and sports, and 1 question in overall academic performance. It was composed on a 5-point likert scale.

## **2.3. Analysis method**

Descriptive statistics were used for mean, standard deviation, skewness, and kurtosis for each variable. In this study, the correspondence sample t-test was used to compare the differences in the academic ability and learning preparation of young children rated by mothers and teachers, respectively. Also, hierarchical regression analysis was used. Because, to find out the predictive and explanatory power of early childhood academic ability and learning preparation for elementary school academic performance. Also, hierarchical regression analysis was used. This was to find out the predictive explanatory power that early childhood academic ability and learning preparation have for elementary school academic performance.

The independent variables of the step-by-step model are as follows. In the first step, language and literacy abilities and mathematical ability, which are the sub-elements of early childhood academic ability, were inserted. In the second step, social emotions, learning attitudes, communication, and cognitive development, which are sub-elements of early childhood learning preparation, were additionally inserted. For statistical processing, the Spss 21.0 program was used.

## **3. RESULTS**

### **3.1. Differences between mothers' and teachers' ratings on early childhood academic ability and preparation for learning**

Descriptive statistical analysis was performed for each variable used in the analysis of this study to confirm

the distribution and basic statistics. Looking at each variable, it can be confirmed that it is a normal distribution. The absolute value of skewness was 3 or less, and kurtosis was 9 or less.

Significant differences ( $t=-.2670, p<0.001$ ) were found in the responses of the mothers ( $M=48.616, SD=10.492$ ) and the teachers ( $M=49.913, SD=10.890$ ) about early childhood language and literacy abilities. The teacher's rating was 1.3 points higher. There was also a significant difference ( $t=-9.149, p<0.001$ ) between the mothers ( $M=49.904, SD=13.679$ ) and the teachers ( $M=59.056, SD=13.199$ ) on the mathematics ability in the young children. The teacher's rating was higher by 7.1 points. There was no statistically significant difference in the response to social emotion, communication, and cognitive development among the preparation for learning. In terms of the learning attitude, the rating score of the mother ( $M=27.980, SD=3.185$ ) was higher than that of the teacher ( $M=27.144, SD=4.130$ ), and there was a significant difference ( $t=4.127, p<0.001$ ).

In other words, it was found that there was a difference in the standards of the mothers and the teachers rating academic ability (language, literacy, mathematics) and learning attitudes in early childhood. Among them, it was found that the teachers value academic ability and the mothers value learning attitude. The analysis results of descriptive statistics including independent and dependent variables are shown in Table 2.

**Table 2. Statistics of mother and teacher ratings by variable and verification of differences (N=600)**

Variable	Subelement	Respondent	M	SD	Skewness	Kurtosis	t	
Academic ability	Language /literacy	Mother	48.616	10.492	-0.583	-0.278	-2.670***	
		Teacher	49.913	10.890	-0.906	0.409		
	Mathematics	Mother	49.904	13.679	-0.293	-0.572	-9.149***	
		Teacher	57.056	13.199	-0.833	0.594		
Early Childhood	Social emotion	Mother	20.936	2.277	-0.501	-0.495	-0.865	
		Teacher	21.064	2.600	-1.011	0.843		
	Preparation for learning	Learning attitude	Mother	27.980	3.185	-0.655	-0.111	4.127***
			Teacher	27.144	4.130	-0.875	0.390	
Elementary school academic performance	Communication	Mother	10.792	1.376	-0.650	-0.886	1.747	
		Teacher	10.646	1.617	-1.066	0.427		
	Cognitive development	Mother	18.232	1.871	-0.926	0.309	-0.785	
		Teacher	18.317	1.866	-1.135	0.711		
Elementary school academic performance			60.223	11.668	-1.711	2.826		

\*\*\* $p<0.001$

**3.2. Predictions of children's academic abilities and learning preparations that the mothers and teachers have rated on elementary school academic performance**

There was a positive correlation between the mothers and the teachers' ratings of early childhood academic ability with early childhood learning preparation and elementary school academic performance. In the rating performed by the mothers, learning attitude, communication, and cognitive development, which are sub-variables of early childhood learning preparation, were positively correlated with elementary school academic performance. The relationship between social emotion and academic performance was not statistically significant. In the rating performed by the teachers, it was found that social emotion, learning attitude, communication, and cognitive development, which were the sub-variables of early childhood learning preparation, had a positive correlation with elementary school academic performance. The detailed analysis contents are shown in Table 3 below.

**Table 3. Correlation between early childhood of academic ability, preparation for learning and elementary academic performance ability (N=600)**

	Early childhood (6 years old)						Later childhood (9 years old)
	Academic ability		Preparation for learning				⑦
	①	②	③	④	⑤	⑥	
<b>Mother rating</b>	①	1					
	②	0.696***	1				
	③	0.319***	0.309***	1			
	④	0.454***	0.437***	0.651***	1		
	⑤	0.346***	0.354***	0.514***	0.684***	1	
	⑥	0.405***	0.422***	0.505***	0.689***	0.724***	1
	⑦	0.216***	0.200***	0.066	0.148**	0.073*	0.161***
<b>Teacher rating</b>	①	1					
	②	0.775***	1				
	③	0.327***	0.334***	1			
	④	0.511***	0.487***	0.710***	1		
	⑤	0.447***	0.409***	0.603***	0.696***	1	
	⑥	0.487***	0.483***	0.509***	0.640***	0.707***	1
	⑦	0.213***	0.181***	0.110**	0.160***	0.143**	0.194**

① Language/ literacy ability, ② Mathematics ability, ③ Social emotion, ④ Learning attitude,

⑤ Communication, ⑥ Cognitive development, ⑦ Academic performance

\*\* $p < 0.01$ , \*\*\* $p < 0.001$

A hierarchical regression analysis was conducted to examine the predictive power of elementary school performance in early childhood academic ability and learning preparation. In the first step model, scores for each sub-factor of early childhood academic ability were inserted. In the second step model, preparation for early childhood learning was additionally inserted. Durbin-Watson was 1.931-1.997, which was close to 2, and the VIF coefficient was 1.754-3.019, showing no multicollinearity problem.

As a result of examining the influence on the total score of elementary school academic performance, the first-step model rated by the mothers ( $F=12.238$ ,  $p < 0.001$ ) and the teachers ( $F=12.234$ ,  $p < 0.001$ ) were statistically significant. The two-step model in which the mothers ( $F=5.452$ ,  $p < 0.001$ ) and the teachers ( $F=5.055$ ,  $p < 0.001$ ) rated learning preparation was also statistically significant.

As a prediction of elementary school academic performance, the mother's rating was 5.5% and the teacher's rating was 4.5%, indicating that the mother's rating was high. When examining the absolute value of  $\beta$  in the mother's rating, language and literacy abilities ( $\beta = 0.149$ ,  $t = 2.533$ ), communication ( $\beta = -0.137$ ,  $t = -2.095$ ) were significant in order. When looking at the absolute value of  $\beta$  in the teacher's evaluation, only language and literacy abilities ( $\beta = 0.149$ ,  $t = 2.092$ ) were significant. The detailed analysis contents are shown in Table 4.

**Table 4. Prediction of academic ability and preparation for learning in early childhood and academic performance ability in later childhood (N=600)**

		Later childhood (9 years old)		Academic performance ability	
		Mother rating		Teacher rating	
		$\beta$	$t$	$\beta$	$t$
<b>Step 1 model</b>					
<b>(constant)</b>		21.935***		19.981***	
<b>Academic ability</b>	<b>Language/ literacy</b>	0.174	3.051**	0.182	2.659**
	<b>Mathematics ability</b>	0.041	0.715	0.041	0.593
<b>R<sup>2</sup></b>		0.042		0.042	
<b>F</b>		12.238		12.341	
<b>Step 2 model</b>					
<b>(constant)</b>		8.853***		7.087***	
<b>Academic ability</b>	<b>Language/ literacy</b>	0.149	2.533*	0.149	2.092*
	<b>Mathematics ability</b>	0.027	0.466	0.008	0.107
<b>Preparation for learning</b>	<b>Social emotion</b>	-0.059	-1.085	-0.004	-0.060
	<b>Learning attitude</b>	0.121	1.717	0.022	0.293
	<b>Communication</b>	-0.137	-2.095*	-0.028	-0.395
	<b>Cognitive development</b>	0.108	1.632	0.125	1.907
<b>R<sup>2</sup></b>		0.055		0.045	
<b><math>\Delta R^2</math></b>		0.013		0.003	
<b>F</b>		5.452***		5.055***	

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

#### 4. DISCUSSION

First, there was a significant difference in the rating of the mothers and the teachers about language/literacy and mathematics abilities among young children's academic abilities. Among the teachers' rating average scores, language/literacy and mathematics were high. In particular, the teachers rated young children's mathematical ability very high compared to their mothers. Among young children's learning preparation, there was a significant difference in the ratings of learning attitude. It was found that the mothers rate higher than the teachers. Among the ratings performed by the mothers and the teachers, there were no significant differences in social emotion, communication, and cognitive development. The results of this study are similar to the results that mothers viewed children's play interactions more positively than teachers about peer interactions at the age of 3 years [4]. In addition, it is in a similar context to the result that there was a difference in the evaluation of children's ADHD between mothers and teachers [3].

Second, in the predictive power of elementary school academic performance, the mothers showed higher explanatory power than the teachers. When examining the predictive power of elementary school academic performance, the mother's rating was 5.5% of the explanatory power. Among the academic abilities, language/literacy and communication during preparation for learning were found to have a significant effect. In the teacher's rating, 4.5% of explanatory power was found. Among early childhood academic abilities, only language/literacy was found to have a significant effect on elementary school academic performance. This research result is contrary to the result [4] that the teacher's rating has a higher influence than the mother's rating.

The teacher's rating can be objective as it is observed while living with a large number of young children. On the other hand, the mother's rating seems to show higher predictions than the teacher because they watched the growth and development of their children for a long time. Therefore, it is necessary for a teacher with a high professional knowledge of early childhood education and a mother with a high understanding of children to actively exchange information and communicate with each other about individual young children.

## 5. CONCLUSION

As a result of this study, it was found that there was a difference in the ratings of the mothers and the teachers in the overall academic ability in early childhood and learning attitude, a sub-factor of learning preparation. The teachers rated young children's academic ability higher than that of the mothers. The mothers rated their children's learning attitudes higher than the teachers.

It was found that the mothers had higher predictive power for elementary school academic performance than the teachers. These results show that the perceptions of young children's learning ability and preparation differ between the mothers and the teachers. Therefore, it suggests that close interaction and cooperation between mother and teacher are necessary to support young children's academic ability and learning preparation.

The results of this study are meaningful in that mothers and the teachers rated and compared them for the same young children with the same tool. In addition, it is meaningful that the longitudinal influence on elementary school academic performance was examined based on the ratings of academic ability and preparation for learning in early childhood. Afterwards, additional studies focusing on individual variables need to be conducted.

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