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Relation of Reading Skills and Smart Device Experience at Home among Korean Kindergartners: the Mediation Effect of Vocabulary

Jun-Yeong Kim[1], Jeung-Ryeul Cho[1] and Soon-Gil Park[2]

[1]Kyungnam University, [2]Nambu University
Email:[1]jrcho@kyungnam.ac.kr

Abstract

This study tested eighty children with the tasks of vocabulary and reading skills (word reading and reading comprehension) and their mothers responded to home questionnaires regarding children's use of smart device at home. The purposes of this study were about how 5-year old children used smart devices at home and how their use of smart devices at home was related to children's vocabulary and reading skills. Results were as follows: First, 77.2% of children used smart device at home. Second, the often use of communication applications by children was associated with vocabulary, and vocabulary was related to word reading and reading comprehension. According to mediation analysis, the use of communication applications contributed to word reading and reading comprehension by the mediation of vocabulary among Korean children.

Keywords: *Smart device experience, vocabulary, reading, mediation analysis*

1. Introduction

1.1 Need for the Study

Young children have grown up in very different environment from previous generations by the use of digital technologies including computers and smart devices. Children who encounter digital technologies in daily life are called digital natives or digital kids [1, 2]. Children prefer using computers, games, DVD players, smart phones, tablet personal computers and digital cameras. Digital devices change learning conditions in terms that they give strong visual-auditory effects and fast responses to the users, which boosts motivation and learning interest. It is accepted as a new learning device [3].

In Korea, 78% of young Korean children aged 4 and 5 use computer and 64% of computer users at home utilize internet at home [4]. Also most mothers (94%) in the survey recognized computer as an important education tool [4]. In Korea, smart device (tablet pc or smart phone) supply ratio has been dramatically increased from 2.0 in 2009 to 38.3% in 2011 and 67.6% in 2013 according to the survey of the U.S. Strategy Analytics in 2013. Recently, many young children use smart phone and smart devices at home. For example, 64.4% children of grade 4-6 in Korea have smart phone [5] and 78% of children aged 5 sand 6 use internet for 1-2 hours every day [6]. The use of digital media and digital devices is getting more popular these days [2]. Children use many different types of applications such as communication applications (e.g., SNS, Kakao Talk, band), education media applications (*e.g.*, Junior Naver), and entertainment applications (camera, music, game).

Recently, digital devices are considered as the medium for transmitting educational content such that using the media affect children's linguistic abilities,

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understanding stories, thinking skills and creativity [7]. Recent studies reported that media experience and reading and vocabulary skills are positively related. For example, children of grades 2 and 3 who know more internet site names and more internet experience have better reading skills [8]. The use of computer enhances visual discrimination, emergent reading, and writing skills and improves social interaction and language skill among preschool children in Korea [8]. Burg (1984) also reported that 5-year old children who had less skill in vocabulary improved vocabulary and language skills after training with computer programs [9]. Training children aged 3-6 with education programs by tablet computers improved motivation to write, interest in science, scientific attitude and problem solving skills [10].

Recent studies reported that home experience such as reading books at home every day enhanced growth in vocabulary and reading-related skills in kindergarten children [11]. School experience such as teachers' use of novel and sophisticated vocabulary was also related to child's vocabulary growth, which was important in reading of children [12]. In particular, Dickinson & Porche reported that teacher's vocabulary predicted reading comprehension by the mediation of kindergarten emergent literacy [12, 13].

In Korea, there is little research regarding the use of smart devices of young Korean children although their use dramatically increases these days. This study examined the use of smart devices among young children and their relation with vocabulary, word reading and reading comprehension. In particular, we examined the mediation effect of vocabulary between the use of smart devices and reading skills in Korean young children.

1.2 Purposes

First, how long did children use smart devices and smart device applications every day?

Second, would children's use of smart devices and applications be related to vocabulary, word reading and reading comprehension?

Third, did the use of smart device applications contribute to word reading and reading comprehension by the mediation of vocabulary?

2. Methods

2.1 Participants

Participants were 80 5-years old children in a Children's House located in the city of Changwon and their mothers.

2.2 Measures

Children were tested with vocabulary, word reading, and reading comprehension tests at their school. Mothers reported their children's use of smart devices at home in a questionnaire brought to home.

■ **Mother Questionnaires**

①Mother education: Mothers were asked to report their education level on a 4 point categorical scale: 1: graduation of high school; 2: graduation of junior college; 3: graduation of 4-year university; 4: graduate school.

②The time of using smart devices at home was measured on a 5 point scale: 0: no use; 1: less than 1 hour; 2: 1-2 hours; 3: 2-3 hours; 4: more than 4 hours.

ȣThe time of using smart device applications (e.g., communication, education and entertainment)was measured on a 8-point scale: 0: no use; 1: 1-10 minutes; 2: 11-20

minutes; 3: 21-30 minutes; 4: 31-40 minutes; 5: 41-50 minutes; 6: 51-60 minutes; 7: more than 61 minutes.

■ **Vocabulary**

Twenty-one items of expressive vocabulary were created by the experimenters. Children were presented each word and were to answer its definition. Children's response was scored as 1-3 based on the scoring scheme of the task. The maximum score was 36.

■ **Word Reading**

Korean word reading task consists of 90 questions. One point was allotted if children correctly read a word. The maximum number was 90.

■ **Reading Comprehension**

A picture reading comprehension task was used [14]. In this task, children read a sentence and were to find a correct answer representing the sentence among 4 pictures. Children were presented with 31 pictures and finished the task for 7 minutes.

3 . Results

3.1 Descriptive Statistics

Regarding mother education, mothers reported that 13.8% of them graduated high school, 39.9% from junior college; 45% from 4-year university and 2.5% from graduate school. The education level of the participating mothers of this study represented the average level of education in young women in Korea [15].

Table 1 showed the percentage of children who used smart devices at home. Mothers reported that 22.8% of children did not use smart device; 65.8% used it for less than one hour; 10.1% used it for 1-2hours; 1.3% used it for 2-3 hours.

Table 1. The Percentage of Children who Used Smart Device at Home for a Particular Time Duration

Category	Percentage (%)
No use	22.8
Less than 1 hour	65.8
1-2 hours	10.1
2-3 hours	1.3
Total	100.0

Table 2. Percentage of Children who Used Each Application for a Particular Time Duration (minutes) per Day

applications/time	No use	1-10 min	11-20 min	21-30 min	31-40 min	41-50 min	51-60 min	Over 60 min	Total
Communication	93.8	4.6	1.5						100%
Camera, picture	47.1	44.1	8.8						100%
Cartoon	54.4	17.6	7.4	7.4	10.3	1.5	1.5		100%
Music	59.7	23.9	16.4						100%
Game	39.4	21.1	15.5	9.9	8.5	4.2	1.4		100%
TV, movie, video	48.6	19.4	13.9	5.6	4.2	5.6	1.4	1.4	100%

Table 2 showed the percentage of children's spending time of smart device applications. About60.6 % of children used game applications for less than 50 minutes a day; 51.4% used TV and movie applications and 1.4% of children watched over 1 hour;52.9% used camera and picture applications for less than 20 minutes; 45.6% used children's cartoon applications for less than 60 minutes;40.3% used music applications for less than 20 minutes a day; and 6.2% used communication applications for less than 20 minutes per day.

3.2 Correlations Among Variables

Table 3 showed that mother education was significantly related to children's reading (r=.324, p<.05) and reading comprehension (r=.271, p<.05). The time duration of using communication application was associated with children's vocabulary (r=.308, p<.05) but not with other vocabulary and reading measures. However, the time duration of using game application was statistically marginally and negatively associated with word reading (r=-.210, p<.08) and reading comprehension (r=-.219, p<.08). Vocabulary was related with word reading (r=.432, p<.01) and reading comprehension (r=.324, p<.05).Word reading was associated with reading comprehension (r=.798, p<.001). The time of using mart device was significantly related with time of using cartoon app.(r=.444, p<.01), music app.(r=.329, p<.01), game app. (r=.447, p<.01), and TV, movie and video app.(r=.555, p<.01), but not with the time of using communication app. and camera and picture app.

Table 3. Correlations between Variables

	1	2	3	4	5	6	7	8	9	10
1 Mother education										
2 Time of using smart device	-.116									
3 Time of using communication app.	.195	.135								
4 Time of using camera, picture app.	-.021	.186	.159							
5 Time of using cartoon app.	-.220	.444**	-.002	.229						
6 Time of using music	-.008	.329**	.362**	.638**	.124					

app.										
7 Time of using game app.	-.166	.447**	-.029	.003	.262*	.014				
8 Time of using TV, movie, video app.	-.118	.555**	.042	.103	.371**	.289*	.508**			
9 Word reading	.324**	-.018	.148	.038	-.137	.077	-.210+	-.197		
10 Vocabulary	.136	.041	.308*	.092	.012	.056	-.015	-.112	.432**	
11 Reading comprehension	.271*	-.029	.101	.099	-.058	.106	-.219+	-.182	.798**	.458**

+p<.08; * P<..05; ** p<.01

3.3 Mediation Analysis

We employed a single mediation analysis to show the use of smart phone application contributed to word reading by the mediation of vocabulary [16]. Results were shown in Table 4. The time of using communication application directly contributed to word reading (*B*=.32, *p*<.05) and vocabulary directly contributed to word reading (*B*=.42, *p*<.001). Bias-corrected confidence interval (CI) indicated that the indirect effect of the time duration of using communication application on word reading through the mediator of vocabulary was significant, as the 95% CI for the indirect effect did not contain zero. The indirect effect was shown in Figure 1.

Table 4. Results of Mediation Analysis between the Time of using Communication Application and Word Reading by the Mediation of Vocabulary

Path	coefficient	se	t	BC 95% CI	
				Lower	Upper
Communication application →vocabulary	.32	.13	2.6*		
Vocabulary →word reading	.42	.11	3.75***		
Communication application →vocabulary →word reading	.13	.09		.02	.39

* p<..05; ** p<.01; *** p<.001

We also used a single mediation analysis to show the use of smart phone application contributed to reading comprehension by the mediation of vocabulary [16]. Results were shown in Table 5. Vocabulary directly contributed to word reading (*B*=.42, *p*<.001). Bias-corrected confidence interval (CI) showed that the indirect effect of the time duration of using communication application on reading comprehension by the mediator of vocabulary was significant, as the 95% CI for the indirect effect did not contain zero. The indirect effect was shown in Figure 1.

Table 5. Results of Mediation Analysis between the Time of using Communication Application and Reading Comprehension by the Mediation of Vocabulary

Path	coefficient	se	t	BC 95% CI	
				Lower	Upper
Communication application →vocabulary	.32	.13	2.6*		
Vocabulary → reading comprehension	.42	.11	3.74***		
Communication application →vocabulary → reading comprehension	.14	.07		.01	.27

* p<..05; ** p<.01; *** p<.001

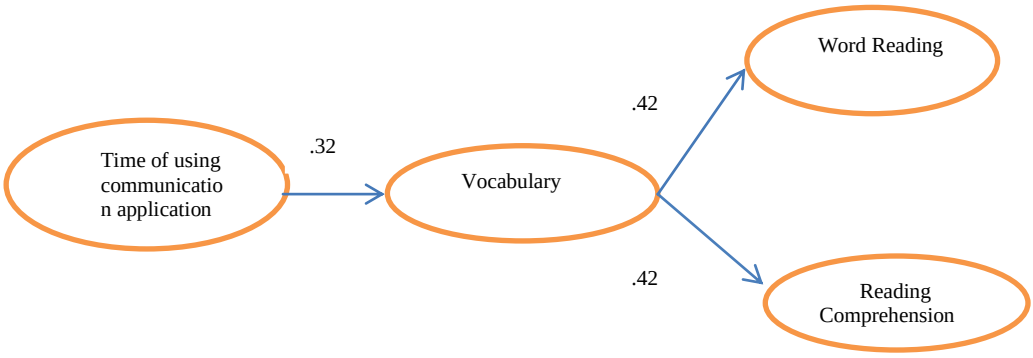

Figure 1. Indirect Mediation Effect of Time of using Communication Application on Word Reading and Reading Comprehension by the Mediation of Vocabulary

4. Conclusion

First, 22.9% of participating children in this study did not use smart devices but 77.1% of children used them. Many of children (65.8%) aged 4 and 5 in our study used for less than one hour. Our result is similar to the report that 78% of children aged 5-6 used internet for 1-2 hours [5].

Second, the highest percentage of children (60.6 %) used game applications; 51.4% used TV and movie applications; 52.9% used camera and picture applications; 45.6% used children's cartoon applications; 40.3% used music applications; and the lowest percentage of children (6.2%) used communication applications. Children tended to use the applications of cartoon, TV and video and game for about 1 hour or so; but they used the applications of camera and picture, communication, and music for less than 20 minutes. Most early studies dealt with children's use of games, TV, and video. Our result is worthwhile in the sense that we measured young children's use of diverse applications including cameras, music and communications.

Third, correlation data showed that children's vocabulary was significantly correlated with only the time of using communication application but not with other applications. Vocabulary was related with word reading and reading comprehension. However, the time of using game application tended to be negatively associated with word reading and reading comprehension. Previous studies reported about the negative effects of game addiction among children in primary and secondary schools. Our data support the previous results in terms that often use of game applications was negatively related to literacy development in preschool children in this study. In addition, our study showed positive effects of smart devices: the often use of communication application was positively related with vocabulary development in preschool children as well.

Fourth, the time of using communication application contributed to word reading and reading comprehension by the mediation of vocabulary.

Our results suggest that some smart device applications such as communication enhance children's cognitive and language skills. That is, media experiences such as using communication applications enhance vocabulary and reading skills among young kindergarten children [17-20]. In particular, media experience such as using communication application enhanced reading by the mediation of children's vocabulary [12,13]. Our results are worthy in terms of showing some positive effects of using smart devices among young children. However, some applications such as games tended to be negatively related to word reading and reading comprehension in this study. Parents and educators need to select good smart device applications for the education of young children.

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References

[1] M. Prensky, Digital Natives, Digital Immigrants, On the Horizon, vol. 9, no. 5, **(2001)**, pp. 1-9.
[2] C. Shuler, "D is for Digital: An analysis of the children's interactive media environment with a focus on mass marketed products that promote learning", The Joan Canz Cooney Center at Sesame Workshop **(2007)**.
[3] T. Mardigian, Young children and the technology trend: Toddlers and tablets unite. http://www.webroot.com/us/en/home/resources/articles/digital-family-life/family-youngchildren-and-the-technology-trend-toddlers-and-tablets-unite, **(2012)**.
[4] S.-O. Kim, "A survey on computer activities at home among young preschool children", Unpublished Master's Thesis at Ducksung Woman's University, **(2002)**.
[5] Y.-P. Bang, "A study on the reducing methods of negative effects of smart phone use in primary school children", Unpublished Master's Thesis at Sogang University, **(2013)**.
[6] Korea National Information Society Agency, A survery on the internet addiction in 2012, http://www.nia.or.kr /bbs/board_view.asp?boardid=20111128132107445 8&Order=010200&id=11189 **(2012)**.
[7] H.-S. Jeung, "Literature review of the research on media in early childhood education focusing on the perspectives on the relationship between media and education", Korean Journal of Children's Media, vol. 11, no. 2, **(2012)**, pp. 45-67.
[8] M. G. Kwon, "The interrelatedness of children's internet experiences and reading ability", Korean Journal of Child Studies, vol. 25, **(2004)**, pp. 31-46.
[9] K. Burg, "The microcomputer on the kindergarten: A magical, useful, expensive toy", Young Children, vol. 39, **(1984)**, pp. 28-33.
[10] L. J., Couse and D. W. Chen, "A tablet computer for young children? Exploring its viability for early childhood education", Journal of Research on Technology in Education, vol. 43, no. 3, **(2010)**, pp. 75-98.
[11] C. M. Connor, F. J. Morrison, & L. Slominski, "Preschool instruction and children's emergent literacy growth", Journal of Educational Psychology, vol. 98, **(2006)**, pp. 665-689.

[12] D. K. Dickinson, & M. V. Porche, "Relation between language experiences in preschool classrooms and children's kindergarten and fourth-grade language and reading abilities", Child Development, vol. 82, **(2011)**, pp. 870-886.
[13] J.-Y. Kim, J.-R. Cho, & S.G. Park, "Smart Device Experience at Home, Vocabulary and Literacy Skills among Korean Children", International workshops on the Convergent Research Society among Humanities, Sociology, Science and Technology (HSST), **(2015)**.
[14] Y.-T. Kim, H.-S. Chang, S.-S. Lim, & H.-J. Paek, "Picture vocabulary test", Seoul, Korea: Special Education Publications, **(2004)**.
[15] OECD, "Education at a Glance 2009: OECD Indicators", Retrieved from http://www.oecd.org /edu/eag2009, **(2011)**.
[16] K. J. Preacher, & A. F. Hayes, "SPSS and SAS procedures for estimating indirect effects in simple mediation models", Behavior Research Methods, Instruments, & Computers, vol. 36, **(2004)**, pp. 717-731.
[17] H. S. Goh, & M.-G. Kwon, "Differences in reading abilities and vocabulary depending on young children's experiences in the media at home", Kwahaknongip, vol. 34, **(2008)**, pp. 129-142.
[18] M. J. Bishop, & W. M. Cates, "Theoretical foundations for sound's use in multimedia instruction to enhance learning", Educational Technology Research and Development, vol. 49, **(2001)**, pp. 5-22.
[19] A. Hibbing, & J. Rankin-Erikson, "A picture is worth a thousand words: using visual images to improve comprehension for middle school struggling readers", The Reading Teacher, vol. 56, **(2003)**, pp. 758-770.
[20] E. Segers, & L. Verhoeven, "Multimedia support of early literacy learning", Computers & Education, vol. 39, **(2002)**, pp. 207-221.

Authors

Jeung-Ryeul Cho
Author's profile.: Professor
Air-mail address : Dept. of Psychology, Kyungnam University
7 Kyungnamdaeharo, Masanhappo-gu,
Changwon, 631-701, Republic of Korea

Jun-Yeong Kim[1]
Author's profile.: Graduate student
Air-mail address : Dept. of Psychology, Kyungnam University
7 Kyungnamdaeharo, Masanhappo-gu,
Changwon, 631-701, Republic of Korea

Soon-Gil Park[2]
Author's profile.: Professor
Air-mail address : Dept. Elementary Special Education, Nambu University, 23
Chumdan Jungang-ro, Gwangsan-gu,
Gwangju, 506-706, Republic of Korea

