http://dx.doi.org/10.20880/kler.2017.52.5.93

Examining Common and Differential Influences of Factors on Low Reading Performers in PISA 2012 Results
: Cases of Korea, Japan and Singapore

Park, Hyeyoung Korea Institute for Curriculum and Evaluation (1st author)
Kim, Junyeop Hongik University (Corresponding Author)
Kim, Sungsook Korea Institute for Curriculum and Evaluation

I. Introduction

According to the OECD report analysis of the PISA 2012 results, more than one out of four 15 year-old students in OECD countries fail to reach a basic level in reading, mathematics and science (OECD 2016). Reading is the basic ability of "the educated" and one of 3Rs (i.e., reading, writing and arithmetic) that are key objectives of public education. In particular, as the focus of the reading changes from the "learn to read" to the "read to learn" for 3rd graders and beyond, reading becomes a major learning tool and the foundation for learning competencies (Chall 1967). Thus, an accumulation of low reading performance will adversely affect other subject areas such as social or science studies. Furthermore, this can also have a negative impact on advancement to school of higher education or finding future employment. In today's digital era, reading is a key competency in accessing the flood of knowledge and information provided by the Internet and social networking service and essential in evaluating reliable and appropriate materials in order to accomplish specific tasks. Hence, reading is a core competency for lifelong learners in order to successfully thrive in the 21st century (OECD 2009; WEF 2015).

One of the important duties of school education in preparation for the future of individuals and society is to diagnose the degree of

low reading performance and seek to support the students. Research on reading has shown that the low performers are caused not only by cognitive reading skills and affective factors of an individual, but also more encompassing factors. The accumulative defects in various issues interplayed by family backgrounds, school, and educational system have shown to impact low reading performance (Kucan & Palincsar 2010; Langer 2009; OECD 2015). This study examines the educational context variables that affect low performing students in reading through a multi-level analysis by comparing PISA 2012 results in Korea, Japan and Singapore. In this study, following research questions were investigated:

- What educational contextual variables in PISA 2012 results have a significant effect on low reading performers in Korea, Japan and Singapore?
- Which are the educational context variables that are country-common and country–differential factors that influence low reading performers in Korea, Japan and Singapore?

II. Literature Review

1. Educational policies: Korea, Japan and Singapore

With the exception of Shanghai and Hong Kong, who are city participants, Korea, Japan and Singapore represent three East Asian countries that have the highest level of reading in PISA 2012. These countries not only demonstrate a high level of achievement, but also strive to enhance the quality of education by putting a great deal of effort to actualize educational equality through bridging the educational gap between students and schools (OECD 2012; OECD 2014). For reading achievement, Korea, Japan and Singapore have adopted and implemented country-specific reading policies to promote aca-

demic achievement.

For instance, the Korean government initiated the "Zero Plan for Below-basic Student" in 2008 to enhance struggling readers who were identified at the below basic level in reading and other subjects by the National Assessment of Educational Achievement (hereafter NAEA). With this educational policy, schools with a large number of below basic students from NAEA results were designated as "schools for improvement" and encouraged with financial and special programs to promote students' academic achievement. In addition, since 2009, online student support system for struggling learners has been developed and provided to schools .The "Do Dream School" is a program in which school teachers are organized as teams and intensive assistance to students who are below basic in academic difficulties (KICE 2017).

As for Japan, in the aftermath of "PISA 2003 shock" in which Japan's ranking in reading dropped from 8th in PISA 2003 to 14th in PISA 2006, several policies have been adopted and implemented to support struggling readers (Breakspear 2012). The ongoing implementation of the so-called "morning reading" has been widely conducted across elementary and junior high schools in Japan, where students are required to read a book for ten minutes before the beginning of first class. In addition, Japan's Ministry of Education, Culture, Sports, Science and Technology emphasized the need to improve reading skills by publishing the Program for improving the Reading Literacy (2005) and Guidelines for Improving Reading Literacy – Analysis of PISA results and Hints for Improvement (2006) (Ninomiya & Urabe 2011).

In the case of Singapore, it has been stepping up its efforts to minimize the number of low performance students through the multilingual education policy. In contrast to Korea and Japan that use a single, native language, Singapore has several home languages (i.e. English, Chinese, Malay or Tamil for Dravidian-speaking Indians) and the official language is English (OECD 2010). Since English is the official communication tool, the government has consistently provided

reading support programs to help students from other home languages enhance their English literacies so that those students do not fall behind. Initiatives such as "READ! Singapore", "MOE initiated the Extensive Reading (ER)" and "STELLA (STrategies for English Language Learning and Reading)" were launched as support programs to help students engage with and improve in reading (Curdt-Christiansen & Silver 2012; Wolf & Bokhorst-Heng 2008).

2. Research on factors related to reading achievement

Researchers have been seeking ways to verify the factors that influence reading attainment of students. Numerous findings have been derived from previous research with focus on internal and external variables of individuals in reading performance. In PISA, students are requested to respond to questionnaires that are composed of variables related to students' background, process of teaching and learning across the level of student, school, and educational system (OECD 2013a; OECD 2013b). Based on the PISA questionnaire scheme, this study reviewed literature focusing on the variables related to reading achievement.

Student backgrounds: Gender and ESCS[1]

It has been shown that gender is a crucial factor for predicting students' achievement in reading. OECD PISA has also reported that gender greatly affects reading achievement (OECD 2015). Studies have revealed that the difference in reading achievement depends on identity formation as a reader based on gender (McGeown et al. 2012). Based on empirical studies, Topping et al. (2008) reported that girls reveal a higher ratio of participation and quantities to the level of understanding in reading compared to boys. This is in connection to the results of different reading achievement between boys

1 ESCS : index of economic, social and cultural status

and girls, although it has not been verified if the gender differences are innate or socio-culturally constructed. On the other hand, other research explains the achievement gap between genders as a difference of taste and choice in reading materials (Coles & Hall, 2002; Katz, H and Sokal, L., 2003; Oakhill & Petrides, 2007). For instance, Connell & Gunzelmann (2004) examined effective reading teaching strategies for boys. Reading was improved when complicated visual and physical activities were provided for the boys. This study implies that reading materials and topics in class maybe more geared toward girls, calling for further research on the topic.

Studies reported that students from socio-economically disadvantaged families tend to have lower reading performance compared to their peers (OECD, 2016). Furthermore, Parent's commitment to education has a positive impact on students' reading achievement (Alexander et al. 2007; Hallinger, Bickman & Davis 1996; Hill & Craft 2003; Keith et al. 1993). Similar findings that parent's commitment to education influenced reading achievement have also been observed in the work of Rowe (1995). According to Rowe, The core factor affecting reading achievement, including reading attitude and activities at school, heavily depends on reading activities at home, which are subsequently related to family SES.

Learning time, engagement and motivation

Learning time refers to the opportunities for participatory learning and its limitations connected to restrictions of learning chances (OECD 2013a, pp. 181-182). In general, students' learning time at school is extended to homework or extracurricular activities. Prior research has revealed that both learning time at school and task performance have a significant effect on students' achievement (Lee and Burkam 2003; McCluskey et al., 2004). Also, extracurricular learning time has a positive impact on learning achievement (Baker & LeTendre 2005; McComb & Scott-Little 2003). As a result, PISA has been measuring students' learning time including extracurricular studies in

addition to the regular school time.

Reading engagement refers to affective behavioral features of readers in reading performance, which comprise of interest in reading, perceived autonomy and social interaction reading practices (Guthrie & Wigfield 2000; McKenna, Kear, & Ellsworth 1995). In the case of low performance students, cognitive drawbacks as well as the lack of motivation for reading achievement held a considerable percentage (Guthrie 2008). As such, PISA has concluded that reading engagement is strongly related to students' reading achievement. From an extended perspective, the notion of reading engagement as a comprehensive concept is examined by the behavioral and affective participation such as tardiness and absence from school, inattentiveness during lessons, learning effort, attitude towards learning outcomes at school or learning activities (e.g., "trying hard at school is important,") and sense of belonging to school (OECD 2013).

School ESCS, school climate and extracurricular

Students enrolled in higher ESCS schools have more advantages compared to those in lower ESCS schools, and prior research has revealed a correlation between school ESCS and students' achievement in reading (OECD 2009; OECD 2013a). Therefore, it may be safe to conclude that school ESCS serves as one of the main causes for students' low achievement (Zimmer & Roma 2000). Higher ESCS schools' preference for teachers or school parents has "a compositional or peer effect," which enhances better learning atmosphere. In essence, the higher expectation for learning achievement from teachers and school, parents, and neighborhoods have a positive impact on students.

Meanwhile, the dialogical relationships between teacher, student and student academic performance or activities affecting the school climate are considered to be central features of a successful school. Literature has identified a range of features associated with greater success on academic achievements (Sammons 1999; Scheerens & Bosker 1997). School climate is also a strong predictor for student read-

ing success (Taylor, Pressley & Pearson, 2002). For instance, student-related factors (e.g. truancy, skipping classes, tardiness, not attending compulsory school events such as sports day or excursions), lack of respect for teachers, disruption of class, student use of alcohol or illegal drugs, and intimidating or bullying other students) are significant to estimating school climate for academic success. In addition, the role of the teacher as a "significant others" in school life has a tremendous impact on reading achievement. According to Guthrie's research (2008), teachers who neglect instructional practices undermine students' efforts to become self-directing that result in students who are disengaged from reading and fail to progress in reading achievement. Similar evidence from the works of Langer (2001; 2009) points out interactive relationships between teacher and student or among peers and those of school climate enhances students' achievement.

The quality of extracurricular activities in school can also contribute to reading achievement. The school's provision of various qualified extracurricular activities such as drama, theatre, journalism, creative writing, band, orchestra, and others has proven to help enhance students' reading achievement. Increased involvement in school attracts students to participate in lessons and activities (America Federation of Teacher 2001). All in all, various creative extracurricular activities at school can be a good strategy to draw participation in school work for low performing students.

III. Research Method

1. Sample

This study analyzes and compares data of the three countries from PISA 2012. The international PISA target population consists of 15-year-old students attending educational institutions in grade 7 and higher. The two-stage stratified sampling design is applied to

table 1. Final sample size

	Korea	Japan	Singapore
School	154	190	163
Student	4,964	6,316	5,265
Excluded schools	2	1	9

construct a national representative sample of 15-year olds in the three countries. More detailed sampling strategy can be found in the PISA2012 technical report (OECD 2014, pp. 70-87). The final sample size included in the actual analysis is presented in Table 1. Note that, as shown in the last row of Table 1, some schools were excluded in the analysis due to non-response in school-level questions.

2. Dependent Variable

The purpose of this study is to compare how the low performing status correlates variables related to reading attainment among the three countries. Therefore, the outcome variable is defined as a binary status of low performers in reading (coded as 1) or not (coded as 0). We followed the definition and classification rule provided by the OECD (OECD 2016) to define the low performing status. PISA defines "low performers" as those students who score below Level 2 on the PISA mathematics, reading and/or science. For reading, scaled score below 407 corresponds to this category. Level 2 is considered the baseline of proficiency that is required to participate fully in society. Those students whose reading scores were at Level 1a, 1b or below Level 1 are considered unable to engage in more complex reasoning to solve the kinds of problems that are routinely faced by today's adults in modern societies (OECD 2016). Table 2 shows the proportion of low performers in reading in each country.

table 2. Proportion of low performers in reading

	Low performers in reading		Total sample size (N)
	Number	Proportion (weighted)	
Korea	368	7.4% (7.3%)	4,964
Japan	584	9.2% (9.1%)	6,316
Singapore	527	10.0% (9.3%)	5,265

3. Independent Variables

The independent variables below are determined by a scaled score provided by PISA and are not arbitrarily created by this study.

Student Background: gender and ESCS

Student gender (coded 1 for girls, 0 for boys) and three components of the Economic, Social and Cultural Status (ESCS) scale, namely the highest educational level of parents (PARED), Home Education Resources (HEDRES) and Cultural Possessions (CULTPOS) are considered to be variables for student background. These three components are used separately instead of a single ESCS scale in order to investigate how these different aspects impact the three countries.

Learning time

To evaluate the impact of various kinds of learning time, we considered learning time of test language at school (LHOURS), time spent on homework or other study set by school teachers (ASHOURS) and time spent on working with a personal tutor or commercial company paid for by their parents (PTHOURS). All three learning time variables were converted to hours per week scale.

Engagement and motivation

Six variables were considered as indicators of student engagement and motivation.

TRUANCY was an average of three truancy measures—the frequency (in weeks) of school tardiness, skipping a whole school day and skipping classes within a school day. BELONG measured the sense of belonging to school through nine variables such as "I feel like an outsider at school' and 'I feel lonely at school." Attitude towards school on learning outcomes (ATSCHL) consisted of five items including "School has been a waste of time" and "School has taught me things which could be useful in a job." Attitude towards school on learning activities (ATTLNACT) was a scaled score with four items such as "I enjoy receiving good grades" and "Trying hard at school is important." Openness for problem solving (OPENPS) was measured with 5 items such as "I can handle a lot of information" and "I like to solve complex problems". Finally, EFFORT was measured as the extent to which students put effort into doing the PISA test compared to an actual important situation where they try their best.

School ESCS

PISA's student level index of economic, social and cultural status (ESCS) was aggregated on a school level to measure average level of student ESCS in each school (MESCS). Variables comprising ESCS included home possessions (HOMEPOS), books in the home (ST28Q01), the highest parental occupation (HISEI) and the highest parental education (PARED).

School Climate

School climate was measured through two scaled variables on student-teacher relationship (STUDREL) and student climate (STUDCLIM). The STUDREL scale provided information on student's perceived teacher's interest in student performance from five questions such as "Most teachers are interested in students' well-being", "Most of my teachers treat me fairly." STUDCLIM was another scaled measure on student related factors affecting school climate. PISA uses eight factors including "student truancy", "disruption of classes by students",

"students intimidating or bullying other students" that comprise the STUDCLIM scale.

Extracurricular at school

To measure the extent of which schools provided extracurricular creative activities to students, a composite variable of CREACTIV is considered. CREACTIV was a sum of three yes (1)/no (0) questions asking if the school offers (1) band, orchestra or choir, (2) school play or school musical class, (3) art club or art activities last school year.

4. Analysis Strategy

To increase the content coverage of questionnaire topics, PISA 2012 adopted a rotation design to the student context questionnaire. As a result, questions were divided into two parts—common and rotated. Questions in the common part were answered by all students while questions in the rotated parts were answered by two-thirds of the student sample (OECD 2014, pp 58-61). To properly address the problem of missing data due to this rotation design, multiple imputations were used, following the suggestions from OECD (2013b) and Raghunathan & Grizzle (1995). More specifically, using the Markov Chain Monte Carlo approach, missing values were replaced with five plausible values that represent the uncertainty of the right value to impute. The five imputed data sets were separately analyzed with standard multi-level procedure and the results from these analyses were combined to produce appropriate standard errors. The multilevel analyses and combining procedure were performed with HLM (Raudenbush et al. 2011)

To address the non-linear nature of outcome variable (binary status of low performance) and a nested data structure, a multilevel model with logit link function was applied for each imputed dataset and each country as follows:

$$\text{logit}(\text{Low performance})_{ij}$$

$$= \beta_{0j} + \sum_{k=1}^{4} \beta_{kj}(Background) + \sum_{k=5}^{7} \beta_{kj}(Learning\ Time)$$

$$+ \sum_{k=8}^{13} \beta_{kj}(Engagement\ and\ Motivation)$$

$$\beta_{0j}$$

$$= \gamma_{00} + \gamma_{01} MESCS + \sum_{q=2}^{3} \gamma_{0q}(School\ climate)$$

$$+ \gamma_{04} Extracurricular\ at\ school + u_{0j}, u_{0j} \sim \mathrm{N}(0, \tau_{00})$$

$$\beta_{kj} = \gamma_{k0}\ for\ k = 1,2,\cdots,13.$$

Note that all the explanatory variables were grand-mean centered. Coefficients in logit scale as well as odds-ratios were reported. Intra-class Correlation (ICC), or the proportion of total variation attributable to the difference among schools, was calculated as follows (Goldstein, Browne, & Rasbash 2002):

$$\mathrm{ICC} = \frac{\tau_{00}}{\tau_{00} + \pi^2/3}$$

IV. Results

Descriptive statistics for student- and school-level correlates of low performance in reading are presented in Table 3. The three countries showed clear distinction in some of the explanatory variables. Of the home background factors, PARED, HEDRES and CULTPOS were higher in Japan, Singapore and Korea, respectively. Singapore scored high in in-school learning time (LHOURS) and after-school homework time (ASHOURS). On the other hand, Korean students had the

table 3. Descriptive statistics

	Korea		Japan		Singapore	
	Mean	SD	Mean	SD	Mean	SD
Student						
Reading	535.791	83.169	538.052	94.183	542.216	97.308
GIRL	0.466	0.499	0.474	0.499	0.490	0.500
PARED	14.001	2.204	14.121	1.931	12.362	2.867
HEDRES	-0.095	0.962	-0.554	0.843	0.142	0.970
CULTPOS	0.264	0.946	-0.487	0.952	-0.406	1.027
LHOURS	3.388	0.967	3.388	0.973	3.715	0.749
ASHOURS	2.856	3.183	3.762	4.326	9.430	7.616
PTHOURS	2.478	3.018	0.339	0.924	1.529	1.943
TRUANCY	1.142	0.309	1.056	0.197	1.192	0.331
BELONG	-0.319	0.844	-0.158	0.980	-0.156	0.926
ATSCHL	-0.279	0.911	-0.125	0.964	-0.061	0.915
ATTLNACT	-0.363	1.030	-0.553	1.008	0.068	0.956
OPENPS	-0.373	0.852	-0.731	1.008	0.001	0.877
EFFORT	7.430	2.255	6.270	2.352	7.530	1.852
School						
MESCS	0.006	0.366	-0.091	0.367	-0.283	0.464
STUDREL	-0.121	0.316	-0.172	0.323	0.358	0.287
STUDCLIM	0.056	1.120	0.292	0.966	0.423	0.939
CREACTIV	2.030	0.883	2.210	0.787	2.440	0.676

longest private education time (PTHOURS) out of the three countries. Overall, engagement and motivation were the highest among Singaporean students. Sense of belonging to school (BELONG) and attitude towards school on learning outcomes (ATSCHL) were the lowest in Korea. Students' attitude towards school on learning activities (ATTLNACT) and openness for problem solving (OPENPS) were the lowest in Japan. School-level factors such as student-teacher relation, student climate and extracurricular activities were also the highest in Singapore.

The model with no predictor (a null model) showed that the school-level variations were 1.691 for Korea, 2.338 for Japan and 1.067 for Singapore. This result implied that the proportions of low-performing students in reading fluctuates across schools the most in Japan, followed by Korea and Singapore.

Boys were more likely to be low reading performers in all three countries. Among the home background factors, PARED and HEDRES were highly associated with a less chance of being a low performer in

table 4. Effect of student- and school- factors on students' low performing status on reading

	Korea			Japan			Singapore		
	coefficient	Odds Ratio	*p*-value	coefficient	Odds Ratio	*p*-value	coefficient	Odds Ratio	*p*-value
Intercept(γ_{00})	-3.642***	0.026	<0.001	-3.134***	0.044	<0.001	-3.236***	0.039	<0.001
Student									
GIRL(γ_{10})	-1.091***	0.336	<0.001	-0.903***	0.405	<0.001	-0.858***	0.424	<0.001
PARED(γ_{20})	0.048	1.049	0.171	0.013	1.013	0.652	-0.071***	0.932	<0.001
HEDRES(γ_{30})	-0.101	0.904	0.192	-0.033	0.968	0.618	-0.230***	0.795	<0.001
CULTPOSS(γ_{40})	-0.236**	0.790	0.003	-0.253***	0.776	<0.001	0.150*	1.162	0.042
LHOURS(γ_{50})	-0.024	0.976	0.805	-0.265***	0.767	<0.001	0.583***	1.791	<0.001
ASHOURS(γ_{60})	-0.056	0.946	0.157	-0.092*	0.912	0.016	-0.099***	0.906	<0.001
PTHOURS(γ_{70})	0.023	1.024	0.475	0.161*	1.175	0.048	0.058	1.060	0.087
TRUANCY(γ_{80})	0.752***	2.122	<0.001	1.506***	4.510	<0.001	0.463***	1.588	<0.001
BELONG(γ_{90})	0.051	1.052	0.706	0.179**	1.196	0.007	0.060	1.062	0.452
ATSCHL(γ_{100})	0.012	1.012	0.926	-0.123	0.885	0.120	-0.218*	0.804	0.023
ATTLNACT(γ_{110})	-0.525***	0.592	<0.001	-0.019	0.982	0.767	0.122	1.130	0.211
OPENPS(γ_{120})	-0.533***	0.587	<0.001	-0.178*	0.837	0.019	-0.180*	0.835	0.025
EFFORT(γ_{130})	-0.151***	0.859	<0.001	-0.090***	0.914	<0.001	-0.201***	0.818	<0.001
School									
MESCS(γ_{01})	-1.060***	0.346	0.001	-1.811***	0.163	<0.001	-1.850***	0.157	<0.001
STUDREL(γ_{02})	-0.577	0.561	0.197	-0.625*	0.535	0.026	-0.045	0.956	0.880
STUDCLIM(γ_{03})	-0.323***	0.724	<0.001	-0.253*	0.776	0.012	-0.125	0.882	0.241
CREACTIV(γ_{04})	-0.436***	0.646	0.001	-0.387***	0.679	<0.001	0.034	1.034	0.790
% reduction of between school variance		68.65%			68.22%			56.98%	

*: p<.05, **:p<.01, ***:p<.001

Singapore. On the other hand, in Korea and Japan, CULTPOSS was a significant factor for predicting low performance in reading.

In Korea, none of the three types of learning time was a significant factor in predicting low performer status. In Japan, students with more in-school learning (LHOURS) and afterschool homework (ASHOURS) time tended to be less likely to be a low performer. However, private tutoring (PTHOURS) seemed to be more intense among low performers than high performers. In Singapore, in-school learning time and afterschool homework time showed opposite directions. An increased chance of being in the low performer status was associated with more in-school learning time and less afterschool homework time in Singapore.

Regarding student engagement and motivation, students with lower TRUANCY and higher ATTLNCT, OPENPS and EFFORT level were less likely to be low performers in Korea and Japan. However in Japan, students with a higher sense of belonging to school (BELONG) were more likely to be in the lower performer status. Positive attitude towards school on learning outcomes (ATSCHL) lowered the chance of being a low performer in Singapore, which was different from Korea and Japan. Attitudes towards school on learning activities, however, (ATTLNCT) were not a significant factor in predicting low performance.

As for school climate, the average level of ESCS (MESCS) was significant in all the three countries. STUDCLIM and CREACTIV were positive in Korea. In addition, STUDREL was positive in Japan. In Singapore, no school level factor except MESCS was significant.

V. Discussion and Conclusion

In our analysis results, gender (girl), truancy, student effort and school ESCS were discovered as country common factors that affected low performance readers in Korea, Japan and Singapore. On a school

level, only the average ESCS schools were the country-common factor that affected low reading achievement. The average school ESCS was highly correlated to the student's ESCS (student family ESCS). Previous studies have revealed that students from low family ESCS are at a disadvantage since they do not have the same reading experience in the family (e.g., bedtime storytelling, support for homework) or parental involvement in school which affects reading achievement in school (Fan & Chen 2001, Chiu & McBride-Chang 2006). Improved educational policies must not be limited to merely providing financial support, but a more aggressive support system that extends to educational culture needs to be implemented. This system would include learning coaching program, university student mentoring program, and connecting schools to local resources.

Based on the results, it can be safe to assume that boys in Korea, Japan, and Singapore attending low ESCS schools with little participation and effort in school lessons have a higher probability to become low achievers in reading compared to girls attending high ESCS schools with good engagement in school lessons. This is also consistent with the research findings of the OECD member states (OECD 2016). Therefore, the combination of country-common factors must be taken into consideration for educational support and policy making for low reading achievers.

This research not only discovered country-common factors, but also country-differential factors which are unique to Korea, Japan and Singapore. For the student background, out of the three factors that comprise an objectified cultural capital of the student ESCS (parent's education level, educational asset and cultural possession), cultural possessions influenced low reading achievement in Korea and Japan, whereas Singapore was unaffected. However, low reading achievement in Singapore was mainly influenced by the social-economic status, which consists of parent's education level and family educational assets.

There was also a difference in how low reading achievement was

affected by learning time and engagement. For Korea, Korean class, homework, and private education (e.g., tutoring and academies) had no significant impact on low reading achievement. In contrast, learning time related to public education such as Japanese class and homework had a positive relationship with low reading achievement. Interestingly enough, in Singapore, homework and private education had a positive influence, but English class at school had negative correlations with low reading achievement. According to descriptive statistics, an initial prediction can be made that low reading achievers in Singapore spends more time in English class compared to their counterparts in Korea and Japan. It could also be that despite Singapore's best attempts to increase English class time for low reading achievers, the outcome has not been as conducive.

Factors related to student engagement also had a different effect on low reading achievement. The main factors were the sense of belonging to school for Japan and the recognition of the importance and meaning of school learning activities for Korea. However, none of these were influential factors in Singapore. It implies that educational intervention that increases the sense of school belonging in Japan and cultivating an attitude that considers the importance and meaningfulness of school learning activities in Korea can help low reading achievers successfully improve their reading performance.

Meanwhile, according to our analysis based on preceding research and theoretical background, student-teacher relationship, school climate (i.e. student compliance to school rules) and provision of creative extra-curriculum such as orchestra, band and musical all had different effects on a school level. In Japan, the student-teacher relationship, school climate and provision of creative extra-curriculum influenced low reading achievement. However, in Korea, the student-teacher relationship did not have an effect, but school climate and the availability of creative extra-curriculum did. In the case of Singapore, aside from the country-common factor such as school average ESCS, none of the other school factors affected low reading achievement.

Through this research, we were able to confirm our hypothesis that in addition to country-common factors, country-differential factors exists for each country. There is a high probability that the country-differential factors may result from a direct or indirect distinction in each country's education system, education environment, and socio-cultural environment. For instance, compared to Korea and Japan, which had relatively similar results, Singapore differed in many aspects. As already mentioned in previous research (Byun et al., 2012; Yamamoto 2010), Korea and Japan's educational policy is based on a single language and both countries have similar school systems. Even though all three countries have been characterized as becoming successful and established largely due to high educational fervor, Singapore is a multi-lingual country that uses English as its official language. Hence Singapore has a unique educational climate where it combines the strengths of the Western and Asian education. After elementary school, students take the national Primary School Leaving Examination and are placed in educational tracks such as the academic preparation and career preparation tracks. In contrast, Korean and Japanese students have the option to choose the college preparation or career preparation tracks after ninth grade and when choosing high schools.

There are limitations as this comparative study of the three countries is solely based on the utilization of the PISA 2012 results. Considering the limitations, however, this current study sheds light on country-differential factors for low reading achievers in addition to the country-common factors. Also, this study highlighted the measurement of the quality of education must be carried out based on a full exploration of each country's education culture and characteristics rather than taking a country-neutral perspective. Only then can evidence-based policies be made for low-reading achievers. For instance, in Korea, student attitude that considers school learning activities significant, school atmosphere comprised of students who comply well to school rules, and an open school environment that

provides creative club activities such as orchestra and band are considered to be factors that will help with low reading achievers. Also in the case of Japan, we expect that school atmosphere of obedience to rules and creative activities will assist low reading achievement. The need for the sense of belonging to school and good teacher relationships may especially have a positive influence. In discovering the reasons, a more in-depth research is needed based on Singapore's overall school situation, trend and other data.

* Submitted 2017.10.30.
First revision received 2017.12.13.
Accepted 2017.12.13.

REFERENCES

Alexander, K. L., Entwistle, D. R., & Olson, L. S. (2007). Lasting consequences of the summer learning gap. *American Sociological Review, 72*(2), 167-180.

American Federation of Teachers. (2001). *Making standards matter*. Washington, DC: American Federation of Teachers.

Baker, D. P., & LeTendre, G. K. (2005). *National differences, global similarities: World culture and the future of schooling*. CA: Stanford University Press.

Breakspear, S. (2012). The policy impact of PISA: An exploration of the normative effects of international benchmarking in school system performance. *OECD Education Working Papers*, 71, 1-31. OECD Publishing.

Byun, S., Schofer, E., & Kim, K. (2012). Revisiting the role of cultural capital in East Asian educational system: The cases of South Korea. *Sociology of Education, 85*(3), 219-239.

Chall, J. S. (1967). *Stages of reading development*. New York, NY: McGraw-Hill.

Chiu, M. M., & McBride-Chang, C. (2006). Gender, context and reading: A comparison of students in 43 countries. *Scientific Studies of Reading, 10*(4), 331-362.

Coles, M., & Hall, C. (2002). Gendered readings: Learning from children's reading choice. *Journal of Research in Reading, 25*(1), 96-108.

Connell, D., & Gunzelmann, B. (2004). The next gender gap: Why are so many boys floundering while so many girls are soaring? *Instructor*, March, 14-17.

Curdt-Christiansen, X. L., & Silver, R. E. (2012). Educational reforms, cultural clashes and classroom practices. *Cambridge Journal of Education, 24*(2), 151-161.

Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational Psychology Review*, 13, 1-22.

Goldstein, H., Browne, W., & Rasbash, J. (2002). Partitioning variation in multilevel models. *Understanding Statistics, 1*(4), 223-231.

Guthrie, J. T. (2008). *Engaging adolescents in reading*. CA: Thousand Oaks.

Guthrie, J. T., & Wigfield, A. (2000). Engagement and motivation in reading. In M. L. Kamil, & P. B. Mosenthal (Eds.), *Handbook of reading research (Vol 2)* (3rd ed., pp. 403-422). NJ: Lawrence Erlbaum.

Halling, P., Bickman, L., & Davis, K. (1996). School context, principal leadership, and student reading achievement, *The Elementary School Journal, 96*(5), 527-549.

Hill, N. E., & Craft, S. A. (2003). Parents-school involvement and school performance: Mediated pathways among socioeconomically comparable African American and Euro-American families. *Journal of Educational Psychology, 95*(1), 74-83.

Keith, T. Z., Keith, P. B., Troutman, G. C., Bickley, P. G., Trivette, P. S., & Singh, K. E. (1993). Does parental involvement affect eighth-grade student achievement? Structural analysis of national data, *School Psychology Review, 22*(3), 474-496.

Katz, H., & Sokal, L. (2003). Masculine literacy: One size does not fit all. *Reading Manitoba, 24*(1), 4-8.

Korea Institute for Curriculum and Evaluation. (2017). Website for supporting students below basic. http://www.basics.re.kr/main.do?s=kucu

Kucan, L., & Palincsar, A. S. (2011). Locating struggling readers in a configured landscape: A conceptual review. In M. L. Kamil, P. D. Pearson, E. B. Moje, & P. P. Afflerbach (Eds.), *Handbook of reading research* (Vol 4, pp. 341-358). New York: Routledge

Langer, J. (2001). Beating the odds: Teaching middle and high school students to read and write well. *American Educational Research Journal, 38*(4), 837-880.

Langer, J. (2008). Contexts for adolescent literacy. In L. Christenbury, R. Bomer, & P. Smagorinsky (Eds.), *Handbook of adolescent literacy research* (pp. 49-64). NewYork: Guilford.

Lee, J., & Shute, V. J. (2010). Personal and social-contextual factors in K-12 academic performance: An integrative perspective on student learning, *Educational Psychologist, 45*(3), 185-202.

Lee, V. E., & Burkam, D. T. (2003). Dropping out of high-school: The role of school-organization and structure. *American Educational Research Journal, 40*(2), 353-393.

McCluskey, C. P., Bynum, T. S., & Patchin, J. W. (2004). Reducing chronic absenteeism: An assessment of an early truancy initiative, *Crime and Delinquency, 50*(2), 214-234.

McComb, E. M., & Scott-Little, C. (2003). A review of research on participant outcomes in after-school programs: Implications for school counselors. *ERIC Digest. NC: ERIC Clearinghouse on Counseling and Student Services*. ED482765.

McGeown, S., Goodwin, H., Henderson, N., & Write, P. (2012). Gender differences in reading motivation: Does sex or gender identity provide a better account? *Journal of Research in Reading, 35*(3), 328-336.

McKenna, M., Kear, D. J., & Ellsworth, R. A. (1995). Children's attitudes toward reading: A national survey. *Reading Research Quarterly, 30*(4), 934-956.

Ninomiya, A., & Urabe, M. (2011). Impact of PISA on education policy: The case of Japan. *Pacific-Asian Education, 23*(1), 23-30.

Oakhill, J. V., & Petrides, A. (2007). Sex differences in the effects of interest on boys' and girls' reading comprehension. *British Journal of Psychology, 98*(2), 223-235.

OECD. (2009). *PISA 2009 assessment framework: Key competencies in reading, mathematics and science*. Paris: OECD Publishing.

OECD. (2010). *Strong performers and successful reformers in education: lessons from PISA for the United States*. Paris: OECD Publishing.

OECD. (2012). *Equity and quality I education: Supporting disadvantaged students and schools*. Paris: OECD Publishing. Retrieved 17 May 2013 from www.oecd.org/edu/school/50293148.pdf .

OECD. (2013a). *PISA 2012 assessment and analytical framework: Mathematics, reading, science, problem solving and financial literacy*. Paris: OECD Publishing.

OECD. (2013b). *PISA 2012 results: Ready to learn: Students' Engagement, drive and self-Beliefs (Vol 3)*. Paris: OECD Publishing. Retrieved 20 January 2017 from http://dx.doi.org/10.1787/9789264201170-en.

OECD. (2014). *PISA 2012 technical report*. Paris: OECD Publishing.

OECD. (2015). *The ABC of gender equality in education: Aptitude, behavior, confidence*. Paris: OECD Publishing.

OECD. (2016). *Low-performing students: Why they fall behind and how to help them succeed*. Paris: OECD Publishing.

Raghunathan, T. E., & Grizzle, J. E. (1995). A split questionnaire survey design. *Journal of American Statistical Association, 90*(429), 55-63.

Raudenbush, S. W., Bryk, A. S., Cheong, A. S., Fai, Y. F., Congdon, A. R. T., & du StataCorp. (2011). *STATA, Release 12: Statistical Software*. TX: StataCorp Lp.

Rowe, K. L. (1995). Factors affecting students' progress in reading: Key findings from a longitudinal study, *An International Journal of Early Literacy, 1*(2), 58-110.

Sammons, P. (1999) *School effectiveness: Coming of age in the twenty first century*. PA: Swets and Zeitlinger Publishers.

Scheerens, J., & Bosker, R. J. (1997). *The foundation of educational effectiveness*. UK: Pergamon.

Taylor, B. M., Pressley, M., & Pearson, P. D. (2002). *Research-supported characteristics of teachers and schools that promote reading achievement*. Washington, D.C.: National Education Association.

Topping, K. J., Samuels, J., & Paul, T. (2008). Independent reading: The relationship of challenge, non-fiction and achievement. *British Educational Research Journal, 34*(4), 505-524.

Tse, S., & Xiao, X. (2014). Differential influences of affective factors and contextual factors on high-proficiency readers and low-proficiency readers: A multilevel analysis of PIRLS data from Hong Kong. *Large-scale Assessment in Education, 2*(6). Retrieved 29 January from http://www. Largescaleassessmentsineducation.

com/contents/2/1/6.

Wolf, J. M., & Bokhorst-Heng, W. (2008). Polices of promise and practices of limit: Singapore's literacy education policy landscape and its impact on one school programme. *Education Research Policy Practice,* 7(3), 151-164.

World Economic Forum. (2015). *New vision for education-unlocking the potential of technology*. Retrieved 31 January, 2017 from http://www3.Weforum.org/docs/WEFUSA_NewVisionforEducation_Report2015.pdf.

Yamamoto, Y., & Brinton, M. C. (2010). Cultural capital in East Asian educational systems: The case of Japan. *Sociology of Education, 83*(1), 67-83.

Zimmer, R., & Roma, E. (2000). Peer effects in private and public schools across countries. *Journal of Policy Analysis and Management, 19*(1), 75-92.

ABSTRACT

Examining Common and Differential Influences of Factors on Low Reading Performers in PISA 2012 Results

: Cases of Korea, Japan and Singapore

Park, Hyeyoung
Kim, Junyeop
Kim, Sungsook

Along with writing and arithmetic, reading is essential for building learning competencies. Not only the accumulation of low reading achievements can adversely affect additional subject areas, but it can also prevent students from entering into higher education and impede future employment. As a whole, low reading achievements will deteriorate the quality of national education that may eventually deepen social inequality. This study analyzes the educational context variables affecting the reading achievement level in Korea, Japan and Singapore by utilizing the reading results of PISA 2012. We attempt to identify country-common and country-differential factors that result in low reading achievements in these three countries. All three countries are located in East Asia, and these countries are exam-oriented with a high priority on education. They also scored very highly on the PISA 2012 reading. However, the educational contexts placed in such diverse socio-cultural backgrounds inevitably resulted in discrepant factors for low reading achievements. Based on these outcomes, this study suggests that first; there must be educational support for the "students vulnerable to low reading achievement", who are equally affected by country-common factors. Also, school educational policy needs to support low reading achievers in Korea, Japan and Singapore by carefully considering the country-differential factors according

to each country.

KEYWORDS Reading achievement, Low performer in reading, PISA, Contextual variables, Korea, Japan, Singapore