JOURNAL OF ASIAN SOCIOLOGY
Volume 51 | Number 1 | March 2022, 67-96
DOI 10.21588/dns.2022.51.1.003 **Article**

The Widening Gap of Academic Achievement Between the Rich and the Poor in Korea*

Sang-soo Chang | Sunchon University

This study deals with the effects of parental socioeconomic status on children's academic achievement, which is referred to as the socioeconomic gradient or as the socioeconomic achievement gap, in Korea. The study differs from previous ones on the same topic in two aspects: First, it views Korea's socioeconomic achievement gap in the context of international comparison. Second, it investigates the temporal change of Korea's socioeconomic gradient, which has taken place during the last two decades, and identifies reasons for such a change. Analyzing PISA (Programme for International Student Assessment) data, which the OECD has collected every three years since 2000, the study found the following: First, the socioeconomic gradient in reading and math literacy scores in Korea was lower in the early 2000s than that in other OECD countries. However, these have since approached or exceeded the OECD average in the late 2010s. Second, the socioeconomic gradient has increased in reading literacy during the last two decades, although it has not changed in math literacy during the same period. This implies that the inequality of academic achievement has deteriorated in Korea. The degeneration seemed to arise both from the increase of differentiation in secondary schools, which neoliberal governments have actively driven since 1995, and from the consequent growth of parents' school choices.

Keywords: *inequality of academic achievement, socioeconomic gradient, socioeconomic achievement gap, differentiation of secondary education, school choice*

*This work was financially supported by the Research Promotion Program of Sunchon University.

Introduction

The inequality of educational opportunity refers to the effect of an individual's innate attributes (e.g., sex, race, family background) on educational outcomes (e.g., cognitive outcomes, emotions, organization skills, graduating schools, advancing educational career). This study will investigate the effect of parental socioeconomic status on children's academic achievement in Korea. If this effect is large enough in society, educational opportunities can be said to be unequal.

Research dealing with such a topic in Korea has been plentiful. Most of these studies have attempted to explain the association between parental socioeconomic status and children's academic achievement by mobilizing the concepts of social capital or cultural capital. The academic achievement of children from intact families was higher than that of children from single-parent families. Children in a family having fewer siblings had higher achievement than those in a family having more siblings (Oh and Kim 2001; Lee 2002; Kim 2005; Kim and Lee 2007; Park 2014). The more attention parents paid to their children's education, the higher the children's academic achievement (Ju 1998; Kim 2000; Byun and Kim 2008; Park, Byun, and Kim 2011). Parents' and children's consumption of aesthetic high culture affected children's academic achievement (Chang 2002; Kim and Byun 2007; Byun and Kim 2008; Chang 2008a; Byun, Schofer, and Park 2012).

However, prior research on the inequality of academic achievement featured several limitations. First, with the exception of a few studies, most research did not compare inequality in Korea with that in other countries. Analyzing the data from Third International Mathematics and Science Study (TIMSS), a study showed that the inequality in Korea was not lower than that in other countries. Controlling for sex and family characteristics, it demonstrated significant effects of parental socioeconomic status on the math achievement of eighth-grade students in United Kingdom, Hungary, and Germany. Socioeconomic gradient was not so small in Korea, either (Schütz, Ursprung, and Wößmann 2008). Conversely, the official report of the Organisation for Economic Co-operation and Development (OECD), which designed and supervised the Program for International Student Assessment (PISA), reported that the effect of parental socioeconomic status on reading literacy of 15-year-old students was much lower in Korea than that in other OECD countries (OECD 2010a).

Second, just as there has not been much research comparing the

inequality of academic achievement in Korea with that in other countries, only a few studies have dealt with temporal changes in Korea's inequality. These works consistently reported that the inequality of academic achievement has deteriorated since the mid-1990s in Korea. Analyzing TIMSS data, Byun and Kim (2010) found that the effect of parental socioeconomic status on math achievement of the eighth-grade Korean students was larger in 2007 than in 1997. Using PISA data, a few works reported that the socioeconomic achievement gap among 15 years old Korean students was larger in 2009 than in 2000 (Kim 2012; Chang 2013, 2016). Analyzing the same data, another study added a new finding to these reports that the socioeconomic gradient was much sharper in 2018 than in 2009 (Byun and Lee 2021). Combining 30 international large-scale assessments available over 50 years, a study showed that socioeconomic achievement gap has increased in the majority of sample countries including Korea (Chmielewski 2019). Why has the inequality of academic achievement increased in Korea? Several researchers have speculated that it might have gradually increased since "the troubling turn" in 1995 when neo-liberal governments actively carried out educational policies promoting the differentiation of secondary schools and allowing the expansion of parents' school choice (Byun and Kim 2010; Byun, Kim, and Park 2012; Park 2013).

This study differs from prior research in that it tries to overcome the limitations mentioned above: First, this study looks at Korea's inequality of academic achievement from the perspective of international comparison. It will compare the inequality in Korea with those in the other OECD countries. Second, it will show the temporal changes of the inequality during the last two decades in Korea.

In the next section, I look at previous studies that portrayed the relationship between the educational system and the inequality of academic achievement under the assumption that the changes in the secondary educational system would determine the direction of changes in the inequality of academic achievement. In the third section, I will explore the changes in the educational system during the past several decades in Korea and thereby predict the changes in the inequality of academic achievement. The fourth section describes the data, the variables, and the methods utilized in this study. In the following section, I will show the results of my analysis, which reveal both the comparative differences of Korea's inequality and the temporal changes of such inequality during the past two decades. The final section will summarize the findings and seek a direction for future studies.

Educational System and the Inequality of Academic Achievement

Studies on the inequality of academic achievement can be classified into four streams: the status attainment model, school effects studies, research on the organization of schools and instruction, and research on school and classroom processes (Hallinan 1988). It was not the status attainment model but the school effects studies that paid the most attention to students' academic achievement in the 1960s and 70s. The school effects studies tried to explain students' academic achievement by the school system and school resources. They found that multiracial schools outperformed single-race schools. They also reported that families had a greater effect on children's academic achievement than schools and that schools did not significantly reduce the effect of families (Coleman et al. 1966).

On the other hand, research on the effect of school and classroom organization on students' cognitive development has grown rapidly since the 1970s. The primary factors that these studies focused on were curriculum and instruction. These studies saw the curriculum and instruction as having a great impact on a student's cognitive development by defining or limiting the type and amount of knowledge taught by schools. When transferring knowledge, schools usually divide it into subjects and courses. The most common form of this division is between-school tracking. One type of school teaches general or academic education, for example, while another type of school might provide vocational education. Another form of division is within-school tracking, which divides students into several ability groups based on their cognitive levels or abilities within a comprehensive school and differentiates the curriculum and instruction for each group. The latter division represents internal differentiation, while the former is external differentiation (Kerckhoff 1995, 2001).

Whether internal or external, differentiation affects a student's academic achievement. Empirical research has shown that the effect of differentiation on test scores differ from school to school or from track to track. In general, the effect of differentiation is known to negatively affect students in the lower track or in vocational schools. Research has found that differentiation harms the learning attitude, educational aspiration, career choices, and educational attainment of the students in lower ability groups or vocational schools (Hauser and Featherman 1976; Alexander, Cook, and McDill 1978; Van de Werfhorst and Mijs 2010). On the other hand, the effect of differentiation for

the higher track or group was positive but weak, while differentiation did not exert much influence on students in the middle track (Alexander and McDill 1976; Hauser and Featherman 1976; Sørenson and Hallinan 1986; Hallinan and Sørenson 1987; Hanushek and Wößmann 2005). The meaning of this finding is two-fold: First, the inequality of academic achievement is larger in a society in which differentiation of secondary education is higher. The gap in test scores between students is larger when the differentiation is higher. Second, the average academic achievement is lower in a society in which differentiation is higher; the *efficiency* of academic achievement is lower. Looking at the temporal changes in the same countries, several studies supported this conclusion. The test score average rose when and where the tracked educational system was replaced with a comprehensive school system, and gender inequality in test scores also decreased in those times and countries (Gamoran 1996; Gamoran and Weinstein 1998; Duru-Bellat and Kieffer 2000; Kerr, Pekkarinen, and Uusitalo 2013).

If such differentiation lowers the efficiency of academic achievement, how does it affect the *equity* of cognitive achievement? While there was a long-standing study showing that countries with higher levels of differentiation had greater inequality of opportunity (Husen 1973), recent studies also supported this conclusion in several directions. A study showed that the effect of family income on students' academic achievement was greater when differentiation was higher (Schütz et al. 2008). Another study found that the effect of social class on reading literacy was larger in countries in which there were more tracks in secondary school when students were 15 years old. The same study said that the class effect was larger in countries in which tracked schools appeared earlier in the educational system, in which the variance of academic achievement among schools was larger, and in which the income inequality was greater (Marks 2005). Other research discovered that even in the same country, the effect of parent's socioeconomic status on children's academic achievement was stronger in regions where the level of differentiation in secondary schools was higher and weaker in regions where the differentiation was lower (Bauer and Riphahn 2006; Horn 2009; Bol and van de Werfhorst 2011; Byun et al. 2012). These studies demonstrated that the equity of academic achievement was worse when differentiation in secondary school was higher.[1]

[1] However, a few studies reached the opposite conclusions. While a study showed that the effect of parents' socioeconomic status on educational outcomes was independent of differentiation (Waldinger 2006), another study found that the effect of family background on the literacy of students when they became adults was rather small and negligible (Brunello and Checchi 2007).

Summing up the above discussion, we can say that the educational system was neither efficient nor equitable when secondary schools were highly differentiated.

Comparative research has increased since the 1990s, when data on the relationship between family background and academic achievement was collected. Along with this, there has been a resurgence of attention to the association between the educational system and the inequality of academic achievement. Apart from differentiation, research on such an association has also focused on *standardization*, which is another dimension of the educational system. Standardization refers to the way of dealing with curricula, tests, and educational resources in a country (Van de Werfhorst and Mijs 2010). It can be said that standardization is high in a society in which the curricula are common to all students, in which tests are taken nationwide, and in which the central government, rather than local governments and individual schools, controls both the human resources development such as teachers training and financial resources such as school budgets. What is the effect of this standardization on educational efficiency? Prior research has shown different results. While several studies found that the standardization of outputs such as centralized tests raised the average scores of students (Bishop 1997; Hanushek and Raymond 2004; Fuchs and Wößmann 2007; Horn 2009), other research found that the standardization of inputs, such as the intensive management of curricula and school resources, lowered average scores (Wößmann 2003). At the same time, one study demonstrated that standardization, irrespective of whether it was an input or output, did not affect the academic achievement of students (Bol and Van de Werfhorst 2011). While research investigating the effect of standardization on educational efficiency has not shown consistent results, research focusing on the effect of standardization on educational equity reached similar conclusions. Higher standardization (that is, the lower autonomy of individual schools) resulted in smaller effects of parents' socioeconomic status on children's academic achievement. This effect was especially small when students were younger (Muller and Schiller 2000; Wößmann 2005; Schütz et al. 2008; Horn 2009).

Summarizing the above discussion, we can say that standardization of the educational system contributes more equity to students' academic achievement, although we cannot be sure whether the standardization is efficient for student's academic achievement.

So far, this study has investigated the link between the educational system and inequality in academic achievement. To predict the direction of

temporal change in Korea's inequality of academic achievement, it is necessary to know the changes in the educational system that have occurred during the past few decades. In the next section, I will look at historical changes in Korean secondary education.

Changes in Secondary Education in Korea

After World War II, Korea imported its educational system from the United States. However, the ways of organizing classes and curricula in secondary schools were quite different from those in the United States (Kim 1985; Lee 1996; OECD 1998; Chang 2008b). Unlike the United States, first, the Korean central government strongly regulated the curricula, the quality of teachers, and educational resources; standardization in secondary education was much higher in Korea than in the United States. Second, the differentiation of secondary education in Korea was also quite different from that in the United States. While secondary education in the United States was differentiated by the several ability groups in comprehensive schools, Korea's secondary education was differentiated into two different curricular schools; that is, vocational high school and academic high school. The reason why Korea's secondary education was differentiated between schools can be easily found in the inertia that had been passed down since the period of Japanese rule (Ghang 2015).

The first characteristic, which is related to standardization, has persisted until today. The Korean government has never given up its leading role in organizing curricula for various schools during the past decades, nor has it abandoned its centralized control over recruiting and training of teachers. The government has controlled educational resources and has taken care of educational administration. For example, the government has even intervened in setting the dates for university entrance exams.

However, the second characteristic, which is related to the differentiation of secondary schools, has changed considerably since the 1950s. The most striking change was the reduction of vocational education. During the period of Japanese colonial rule of Korea (1910-1945), upper secondary schools were mostly vocational. Even during the reign of U.S. Army Military Government in Korea (1945-1948), vocational high school students overwhelmingly outnumbered academic high school students. However, the situation has dramatically changed since the Land Reform Act of 1950. To avoid selling the land at a low price, many land proprietors began to establish private schools.

This occurred because schools and the lots they were on were not subject to the Land Reform Act. At this time, land proprietors did not establish vocational schools but academic high schools and universities because it cost much less to invest in the latter. As a great number of private secondary and tertiary schools were established, the proportion of vocational school students in secondary schools began to drastically drop. The proportion fell below 50 % in 1955 when the Land Reform Act was nearly completed. It dropped to 40 % in the 1970s. It sharply decreased again in the 1980s when the New Military Government initiated educational reforms and allowed universities to increase their student enrollment. Students who decided to go to college did not go to vocational high school (*see* Figure 1). Since 1995, when the government lifted regulations on the entrance quota of universities through the New Educational Reform, universities have once again increased their student numbers. This resulted in the further reduction of vocational high school students. The proportion of vocational students among high school students fell to 20 % in the mid-2000s (Seth 2002; Chang 2008b). As seen in Figure 1, it was only in the range of 10 % in 2020.

If we judge from these changes alone, it seems that the differentiation of

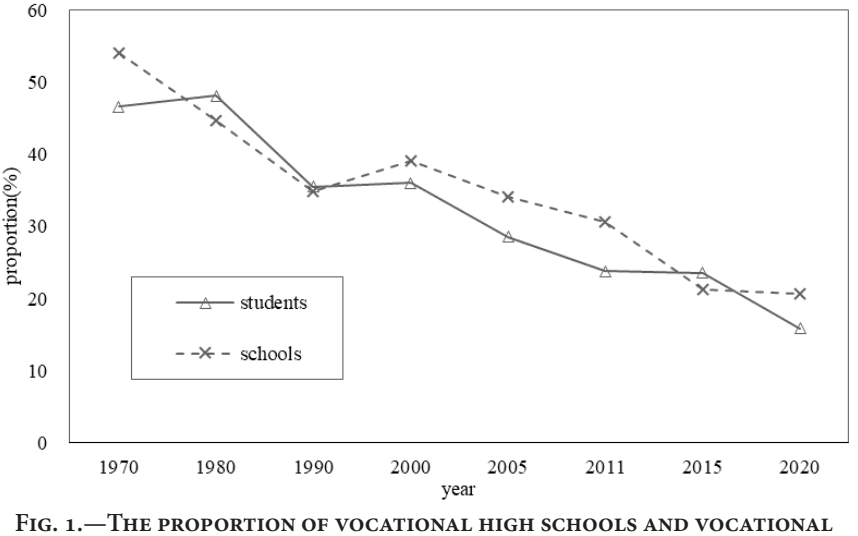

Fig. 1.—The proportion of vocational high schools and vocational school students in Korea

source: http://www.index.go.kr/portal/main/EachDt;PageDetail.do?idx_cd=1541

secondary education in Korea has steadily declined over the past decades and that the level of differentiation is very low at present. However, this is not true. Although the differentiation between academic high schools and vocational high schools has decreased, differentiation among academic high schools has steadily increased. Following the High School Equalization policy, which was introduced in 1973, all academic high schools were forced to randomly select new entrants among middle school graduates in their school catchment area. This policy made every high school similar to each other, at least in the composition of their student body. However, a reaction to this policy started in 1983. The government established science high schools across the country under the slogan of gifted education. These schools, which were called special-purpose high schools at the time, have the privilege of selecting students first before general academic high schools recruited their students under the equalization policy. Not long after that, the government declared both foreign-language high schools and international schools as special-purpose high schools and allowed them priority selection of new entrants. As is shown in Figure 2, these schools have increased rapidly since the early 2000s (Lee 2015, p. 200).

The New Educational Reform in 1995 sought to introduce the market principle into education. This reform diversified upper secondary education and ensured students' right of school choice, further reinforcing and accelerating this kind of differentiation. With this reform, many autonomous private high schools, which enjoyed the privilege of earlier selection of excellent students, have been established since the late 1990s. The neo-liberal educational policy reached its peak in the mid-to-late 2000s. During the period, the government even allowed the establishment of 'autonomous' public high schools and permitted these schools to select new entrants before other schools (Ghang 2015). As a result of the neo-liberal policy, high school equalization came to an end in the mid-2000s. The differentiation of upper secondary education became more and more obvious at that time.

Although upper secondary education has been greatly differentiated in Korea since the mid-1990s, this is not the end of the story. Policymakers have encouraged organizing the ability groups in primary and secondary schools since then. As a natural result of the policy, classes based on student's learning ability or their prior academic achievement in some subjects such as English and mathematics have significantly increased. By 2004, when the so-called 7th New Curriculum was widespread in primary and secondary schools, 34.3 % and 38.8 % of lower secondary schools organized the ability grouping and offered the ability-based classes in English and mathematics, while 62.5 %

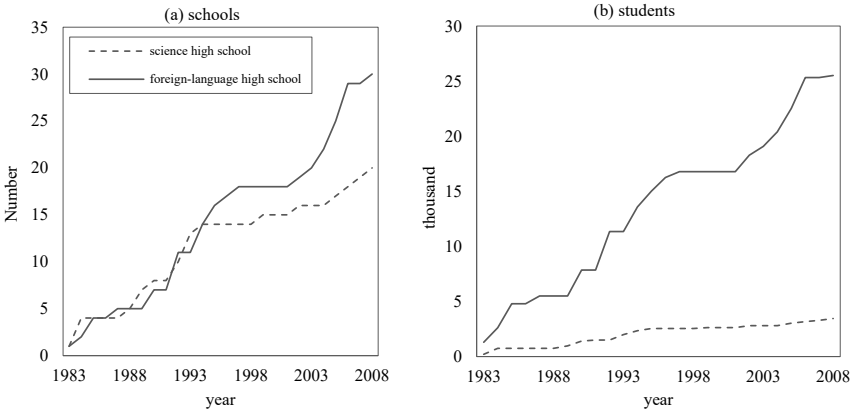

Fig. 2.—The trends in the number of special-purpose high schools and their student body

source: https://m.blog.naver.com/PostView.naver?isHttpsRedirect=true&blogId=kedi_cesi&logNo=30115151822

and 65.5 % of upper secondary schools provided these tracks in English and mathematics (Park et al. 2005). In the late 2000s, 90.1 % of students nationwide had participated in ability-based classes in upper secondary schools (Kim and Cho 2013), and 95.3 % of lower and upper secondary schools organized the ability grouping system in 2012 (Hong et al. 2012).

The above discussion on Korea's educational system can be summarized as follows; First, standardization in the educational system has not changed significantly over the past decades. The implications of this fact are clear. Standardization must not have made a big difference in the efficiency or equity of education over the past decades but might have contributed to Korea's distinctive characteristics. Second, both internal and external differentiation have sharply intensified in secondary education since the mid-1990s. What would this intensification have changed in the inequality of academic achievement? Based on the discussion in the previous section, we raise the following hypotheses:

1) The disparity of academic achievement among students and schools would have increased since 1995.
2) The efficiency of education would have been lowered in Korea; The average scores of students would have decreased.
3) The equity of academic achievement would have deteriorated; The

effect of parents' socioeconomic status on their children's academic achievement must have increased.

Are these hypotheses correct? Has both the efficiency and equity of education deteriorated in Korea? These questions will be answered in the next sections.

Data, Analysis Methods, and Variables

Data

This study used PISA data, which OECD has collected every three years since 2000. PISA measures the reading and math literacy of 15-year-old (ninth or tenth grade) students.[2] Reading literacy was measured mainly in 2000, 2009, and 2018, while math literacy was surveyed in 2003 and 2012. For the convenience of comparison, the study also used the supplementary math scores collected in 2018. When dealing with the Korean data, it excluded ninth-grade students (middle school students) from the analysis.

Method

As noted above, this study focused on two research questions. First, how does the effect of parental socioeconomic status on children's academic achievement in Korea differ from that in other countries? Second, how much has such an effect changed during the past several decades? Although there are many ways to answer these questions, this study uses the standard gradient model shown in Equation (1), where y is the reading literacy or math literacy of each respondent, and ESCS and SEX represent their parent's economic, social, and cultural status and gender, respectively.[3]

---

[2] PISA did not measure the curricular knowledge of students but their literacy. The concept of *literacy* is concerned with the capacity of students to apply knowledge and skills and to analyze, reason, and communicate effectively as they pose, solve and interpret problems in a variety of situations (OECD 2004, p. 23). However, I regarded this literacy of students simply as their academic achievement.

[3] Although Equation (1) appears to be simple, it is not so easy to estimate the parameters. It is because PISA did not present a single-point estimate of literacy but five or ten plausible values of it, the latter of which was derived from a posterior distribution. Therefore, we have to go through quite complex procedures to estimate the parameters by Equation (1). For example, we have to estimate the coefficients 405 times and then process them in a given manner in order to obtain a coefficient

$$y=b_0+b_1ESCS+b_2SEX+\varepsilon \quad (1)$$

We used Equation (1) when comparing the gradient (b_1) in Korea with that in other countries. Equation (2) was used to compare the gradients of different years with each other in Korea. In Equation (2), PRIOR represents the academic achievement that each student had in lower secondary school.

$$y=b_0+b_1ESCS+b_2SEX+b_3PRIOR+\varepsilon \quad (2)$$

Identifying the statistical significance of ESCS in a country is straightforward. It is not difficult to figure out the significance of coefficient differences among countries, either. However, it is not so easy to check the significance of trends in the coefficient of ESCS because such trends are usually estimated with multiple samples collected in at least two different periods. To calculate the significance of trends, it is necessary to know both the difference of two parameters ($T=\theta_t-\theta_{t-1}$) and its standard error (σ_T), where θ_{t-1} and θ_t represent the parameter estimate of $t-1$ period and t period, respectively. We can calculate the standard error using Equations (3) and (4) (OECD, 2005: Ch. 12; OECD, 2010b: 112-114). The standard error of a trend in the attributes representing the position of a specific group (e.g., country, region, sex, immigrant group, and socioeconomically privileged group) can be estimated using Equation (3), where $\sigma_{\theta_{t-1}}$ and σ_{θ_t} are respectively the standard errors of estimated parameters, and where σ_{link} is a link error that should be considered when comparing samples from two periods. For example, the standard error of trends in the average scores of two-period samples can be calculated using Equation (3). However, the standard error of a trend in the attributes representing not the position but the relation (e.g., variance, regression coefficient, and correlation) should be estimated using Equation (4).

$$\sigma_T = \sqrt{\sigma^2_{\theta_{t-1}} + \sigma^2_{\theta_t} + \sigma^2_{link}} \quad (3)$$

$$\sigma_T = \sqrt{\sigma^2_{\theta_{t-1}} + \sigma^2_{\theta_t}} \quad (4)$$

---

and its standard error in the regression of Equation (1) (OECD 2005).

If we can calculate the standard error of trends, it is not difficult to test the significance of such a trend. We can judge it from the z statistic in Equation (5).[4]

$$z = \frac{T}{\sigma_T} \tag{5}$$

Variables

The dependent variables in Equations (1) and (2) were reading and math literacy. The independent variables were ESCS, SEX, and PRIOR. ESCS is an index that PISA created by simultaneously considering parental education, parental occupation, and a family's home possessions. The index was standardized in the way that means and standard deviation across OECD countries were adjusted to zero and one, respectively.[5] PRIOR is a variable representing the type of high school. This indicates whether or not a student attended a vocational high school. We regarded this variable as a proxy for the academic scores that a student achieved in lower secondary school. Why did we consider this variable not as the tracked school system itself but as a proxy for the academic scores that a student achieved in lower secondary school? PISA measured the literacy of tenth-grade students early in the survey year in Korea. Given the fact that students entered high school in March, it is not wise to regard PRIOR as a factor showing that a school affected students' academic achievement. Rather, it is better to think of it as the result of the academic scores the students achieved in lower secondary school because it is quite natural to assume that students who went to vocational high school had lower achievement in lower secondary school. The reference categories of SEX and PRIOR are girls and academic high school, respectively.

Table 1 shows the summary statistics of these variables. Notable in this

[4] The reason why we use z instead of t is quite straightforward. It is because we can assume that the sample is large enough for T to approximate the normal distribution.

[5] PISA constituted the index of ESCS as follows:

$$ESCS = \frac{\beta_1 HISEI + \beta_2 PARED + \beta_3 HOMEPOS}{\varepsilon_j},$$

where βs are factor loadings and ε_j is the eigenvalue of the first principal component, while HISEI, PARED, and HOMEPOS represent parental occupational status, parental education, and a family's home possessions, respectively (OECD 2005, p. 316).

table are the standard deviations of students' literacy and school means. On one hand, even though the average reading scores of Korean students showed significant fluctuation (these were 525.0, 540.5, and 515.3 in 2000, 2009, and 2018, respectively), the standard deviation of students' reading scores consistently increased. They were 69.5 in 2000, 78.0 in 2009, and 102.3 in 2018. The same was true for the standard deviation of math scores, meaning that the number of students having scores distant from the average had steadily increased. On the other hand, the standard deviation of school means of reading literacy also continuously increased. They were 55.1 in 2000, 61.5 in 2009, and 81.5 in 2018. We will discuss the meaning of these increases in the standard deviations of student's literacy and of school means in the next section.

Table 1
Summary Statistics

	2000	2009	2018
Means of reading score[1)]	525.0(2.44)	540.5(3.57)	515.3(3.43)
S.D. of reading score[1)]	69.5(1.66)	78.0(2.18)	102.3(1.97)
Means of ESCS[1)]	-.390(.029)	-.164(.030)	.071(.022)
S.D. of ESCS[1)]	.846(.017)	.822(.013)	.768(.009)
School means of reading score[1)]	519.7(4.17)	541.8(4.07)	515.4(4.79)
S.D. of school means[1)]	55.1(3.99)	61.5(4.15)	85.1(4.80)
School means of ESCS[1)]	-.445(.000)	-.157(.000)	.072(.000)
S.D. of school means in ESCS[1)]	.722(.000)	.693(.000)	.673(.000)
SEX			
Boys[2)]	.553(.497)	.516(.500)	.517(.500)
PRIOR			
Vocational school[2)]	.358(.479)	.236(.425)	.191(.393)
N[3)]	4,917(133)	4,666(137)	5,748(154)
	2003	2012	2018
Means of math score[1)]	542.6(3.30)	556.1(4.79)	527.9(3.69)
S.D. of math score[1)]	92.2(2.17)	98.4(2.19)	100.9(2.31)
Means of ESCS[1)]	-.104(.025)	.009(.028)	.071(.022)
S.D. of ESCS[1)]	.852(.016)	.746(.010)	.768(.009)
School means of math score[1)]	539.6(4.41)	554.7(4.73)	527.6(7.28)

S.D. of school means[1)]	69.7(4.84)	74.8(5.16)	81.8(6.64)
School means of ESCS[1)]	-.131(.000)	.004(.000)	.072(.000)
S.D. of school means in ESCS[1)]	.708(.000)	.652(.000)	.673(.000)
SEX			
Boys[2)]	.591(.492)	.532(.499)	.517(.500)
PRIOR			
Vocational schoo[2)]	.287(.452)	.207(.405)	.191(.393)
N[3)]	5,346(137)	4,729(139)	5,748(154)

Note: 1) The numbers outside parentheses are means and standard deviations, while those in parentheses are the standard errors.

2) The numbers outside parentheses represent the means, while those in parentheses are standard deviations.

3) The number outside parentheses stands for the number of students, while that in parentheses is the number of schools.

Parental Socioeconomic Status and Children's Academic Achievement

Distribution of Scores

It would be better to first review the distribution of reading and math literacy scores before investigating the effect of parental socioeconomic status on children's academic achievement. It is quite useful to overview the distribution of literacy scores by cumulative distribution (Raudenbush and Kim 2002; Park 2013). Figure 3 shows the cumulative distributions of reading and math literacy scores in each year in Korea.

The dotted lines in Figure 3 represent the cumulative distributions for 2000 and 2003, the dashed lines for 2009 and 2012, and the solid lines for 2018. The intersections between the horizontal dotted line and cumulative distributions show the median scores each year, while the intersections between the vertical lines and cumulative distributions show the proportions of top performers and low performers.[6] Several findings are shown in Figure

[6] PISA classified the academic scores of students into seven proficiency levels (1b, 1a, 2, 3, 4, 5, 6), in which the highest 5 and 6 levels in reading literacy represented the scores above 626 and 698, respectively (the highest 5 and 6 levels in math literacy were 607 and 669, respectively). PISA refers to students who reached these two levels (5+6) as *top performers,* while it refers to students who

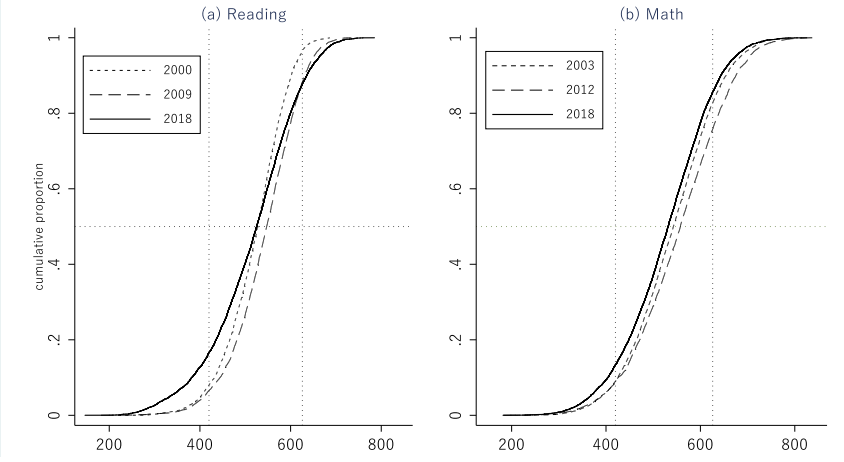

Fig. 3.—Temporal changes of the cumulative distribution in Korea

3. First, the median score in reading literacy was higher in 2009 than in 2000, but it declined to the level of 2000 in 2018. The average score in reading literacy showed the same pattern (see also Table 1). The changes in the median score and average score of math literacy was similar.[7] This means that the efficiency of Korea's education increased in the later 2000s but sharply declined in the later 2010s. Second, both top performers and lower performers in reading literacy increased over time. Unlike in reading literacy, top performers decreased in math literacy, while low performers significantly increased. In any event, these changes mean that the *polarization* of academic achievement has increased during the last two decades in Korea.

However, the polarization of academic achievement is not clear in Figure 3. We can show it more clearly in Figure 4 and Figure 5, the former of which shows the dispersions in school means of academic achievement, while the latter of which represents the dispersions of student's test scores. The following facts are evident in Figure 4: First, the school means of reading

belonged to proficiency level 1 (below 420 literacy score) as *low performers*.

[7] The median scores of reading literacy were respectively 530.6, 545.6, and 523.3 in 2000, 2009, and 2018. The standard deviations of them were respectively 2.44, 3.78, and 3.46. The link error was 4.94 when comparing the samples collected in 2000 and 2009 (OECD 2010b, p. 113). It is therefore that $T_{2009\text{-}2000}$=14.4 and $\sigma_{T_{2009\text{-}2000}}=\sqrt{2.44^2+3.78^2+4.94^2}$=6.68. Substituting these figures into Equation (5), z=2.16 and p=.039. On the other hand, the link error was 3.52 when comparing the samples collected in 2009 and 2018. $T_{2018\text{-}2009}$=-22.3, $\sigma_{T_{2008\text{-}2009}}=\sqrt{3.78^2+3.46^2+3.52^2}$=6.22, z=3.59, and p=.000. Thus, the difference between the median scores of 2000 and 2009 is significant at the 95 % confidence level. The difference between those of 2009 and 2018 is also significant at that level.

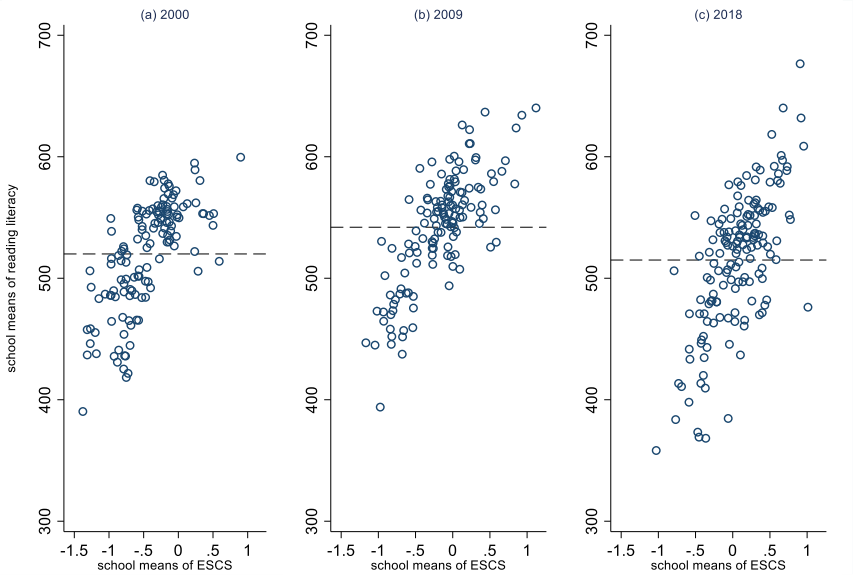

Fig. 4.—Dispersion in school means of reading literacy score

literacy have increasingly dispersed from the baseline score (the horizontal dashed line, the average of the school means) over time. This fact can be ascertained in Table 1, in which the standard deviations of the school means have gradually increased during the last decades (55.1 in 2000 and 85.1 in 2018). What was the cause of such an increase in the dispersion of the school means? Such an increase was likely to be due to the expansion of differentiation in secondary education. Second, schools with lower means have greatly increased during the last two decades, while schools with higher means have slightly increased.

Figure 5 represents the dispersions of reading literacy scores in the samples of randomly selected 5 % of students across selected years (the dispersions of math literacy scores, not shown here, similar to those of reading literacy scores). Several things can be identified in this figure: First, students' reading literacy has been more widely scattered from the baseline score (horizontal dashed line, the Korean average) over time. This change can also be confirmed in Table 1, in which the standard deviation of reading literacy increased from 69.5 in 2000 to 100.3 in 2018. Second, lower performers have greatly increased, while top performers have slightly grown over time (remember that the individuals above the upper dotted line are top performers, while the ones below the lower dotted line are low performers).

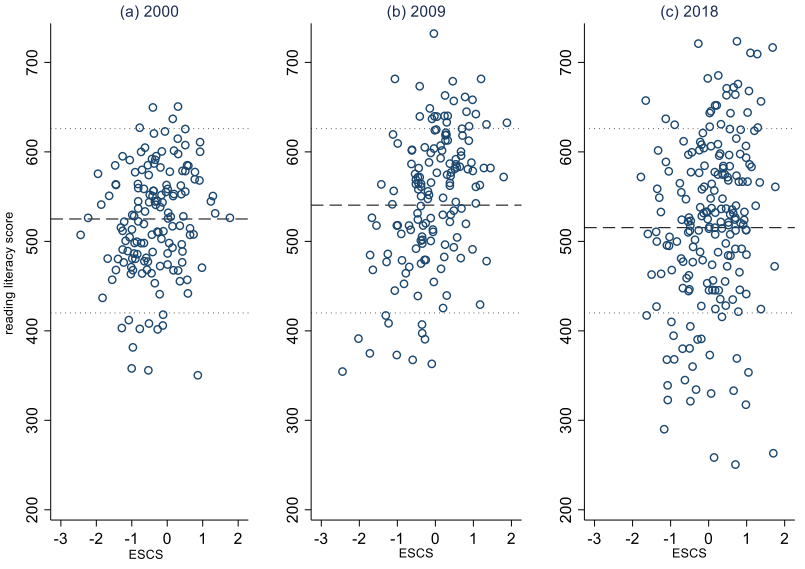

Fig. 5.—Dispersion of reading literacy scores in selected years

This means that the polarization of academic achievement has intensified over the past 20 years. Third, as a result of the fact that low performers outnumbered top performers, the average score in 2018 (the dotted line in the middle) became significantly lower than that in 2009.

By Table 1, Figure 4 and Figure 5, we can prove the plausibility both of our first hypothesis that the disparity of academic achievement among students and schools would have increased over the past two decades, and of our second hypothesis that the efficiency of education has been lowered over about 20 years. In next section, we will test our third hypothesis that the equity of academic achievement has deteriorated during the same period.

Trends of Socioeconomic Gradient

Now it is time to examine the effect of parental socioeconomic status on children's academic achievement. When exploring the gradient, it is important to consider the strength, slope, height, length, and linearity of the regression line (OECD 2010a, pp. 52-57). Most notable among these is the slope, however, which corresponds to the coefficient of the ESCS. In Figure 6, which shows the coefficients of OECD countries in their order of size, we can find two things. First, Korea's socioeconomic gradient in reading literacy was

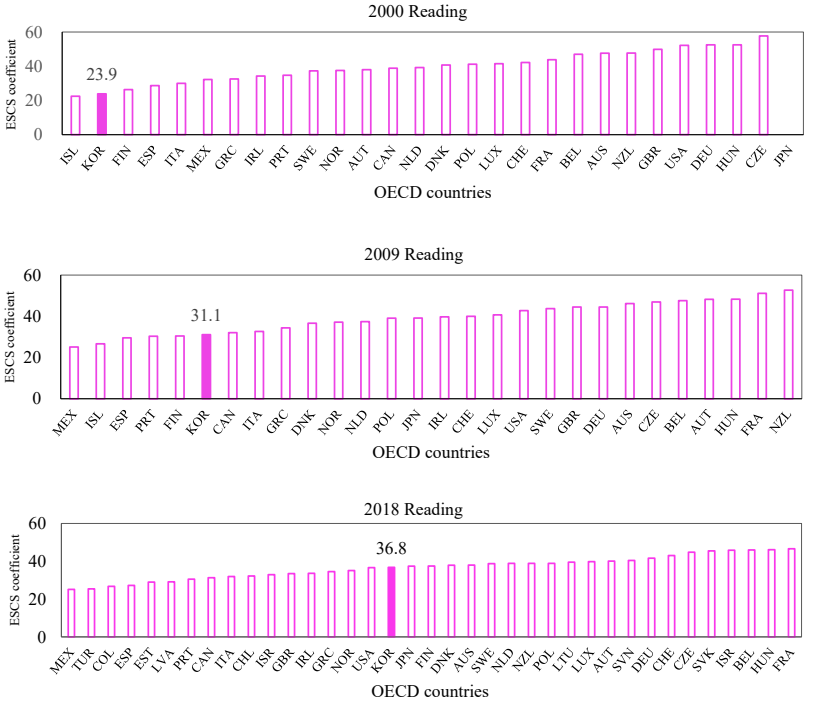

Fig. 6.—Comparison of ESCS coefficients across OECD countries in reading literacy

smaller in the early 2000s than that in other OECD countries (socioeconomic gradients in math literacy was not shown here). Second, it has increased to the OECD average in the later 2010s.

Before looking at the temporal changes in the socioeconomic gradient in Korea, we need to pay attention to the difference between Model 0 (M0) and Model 1 (M1), which represent Equation (1) and (2), respectively. In Table 2, which includes M0 and M1, several things are worth noting. First, the change in the coefficients of determination (R^2) is significant. When PRIOR was added to the baseline M0 model, the coefficient of determination significantly increased. For M0, the independent variables (ESCS and SEX) accounted for only 9.3% of the variation in the reading literacy in 2018. When PRIOR was included, however, the independent variables explained 16.3 % of the variation. This means that the academic score a student achieved in the past was a much important factor in determining the present academic achievement. Second, the decrease in the coefficient of ESCS is also

noteworthy. When PRIOR was included, the coefficient of ESCS significantly decreased. The coefficient of ESCS in M1 was much smaller in 2000 than that in M0. It decreased by 53 [=100*(24.1-11.2)/24.1] percent more than that in M0. These decreases in 2009 and 2018 were 42 % and 33 %, respectively. This means that children's past academic achievement intermediated the association between parental socioeconomic status and children's present academic achievement.[8] While we use the coefficients of M0 when comparing each country, we will utilize the coefficients of M1 when investigating the temporal changes in Korea.

Table 2
Determinants of Academic Achievement in Korea

Reading literacy						
	2000		2009		2018	
	M0	M1	M0	M1	M0	M1
ESCS	24.1(2.29)***	11.2(1.88)***	30.9(2.45)***	18.0(2.10)***	37.5(3.08)***	26.2(2.95)***
SEX						
Boys	-16.1(5.29)***	-25.5(3.85)***	-32.2(5.00)***	-28.4(4.47)***	-22.2(4.81)***	-17.2(4.27)***
PRIOR						
Vocational	–	-65.0(4.69)***	–	-66.0(3.46)***	–	-72.1(7.67)***
Constant	543.4	565.0	562.5	575.0	524.2	536.5
R^2	.096	.258	.153	.269	.093	.163
N	4,917		4,666		5,748	

Math literacy						
	2013		2012		2018	
	M0	M1	M0	M1	M0	M1
ESCS	40.4(3.25)***	25.7(3.05)***	41.7(3.34)***	28.6(2.85)***	43.3(3.56)***	32.6(3.51)***
SEX						
Boys	22.3(5.38)***	18.6(3.69)***	15.3(5.65)**	18.4(5.11)***	6.9(5.17)	11.6(4.66)*

[8] If the tracked high school is not considered as a characteristic of an individual but of a school, the results of the mentioned models in the main text can be differently interpreted. Relying on the fact that the effect of parental socioeconomic status on children's academic achievement decreased when adding the variables representing school factors such as high school track into the socioeconomic gradient model, a study showed that the school factors mediated the association between family background and children's academic achievement. It interpreted that poor students chose poor schools and that these poor schools lowered students' academic achievement (Freeman and Viarengo 2014). However, for the reasons stated above, this study assumed that the tracked high school was a variable representing not a characteristic of a school but of a student. Therefore, this study chose the interpretation that past achievement intermediated the relationship between family background and the present academic achievement.

PRIOR						
Vocational	–	-80.1(6.50)***	–	-76.1(9.81)***	–	-68.5(7.60)***
Constant	533.5	555.8	547.6	562.1	521.2	532.9
R^2	.155	.285	.108	.198	.109	.174
N	5,346		4,729		5,748	

Note: 1) Numbers in parentheses are standard errors.
2) Reference categories of SEX and PRIOR are respectively Girls and Academic school.
3) *p<.05, **p<.01, ***p<.001

Let us take a look at the temporal change in the socioeconomic gradient. As shown in Table 2, the coefficients of ESCS in the regression on reading literacy were 11.2, 18.0, and 26.2 in 2000, 2009, and 2018, respectively. The coefficients of ESCS in the regression on math literacy were 25.7, 28.6, and 32.6 in 2003, 2012, and 2018, respectively. Substituting these coefficients and their standard errors of each year into Equation (4), we find that the change of socioeconomic gradient in reading literacy was significant at the 95 % confidence level. For example, while the coefficients of ESCS in 2009 and 2018 were 18.0 and 26.2, respectively, and their standard errors were 2.10 and 2.95, respectively. Therefore, the difference between the two coefficients is significant at the 95 % confidence level (T=8.2, σ_T=3.62, z=2.26, p=.031). However, the change in the coefficients of ESCS on math literacy was not significant. For example, the difference between the coefficients of 2012 and 2018 was not significant (T=4.0, σ_T=4.52, z=.884, p=.269).

These changes were graphically shown in Figure 7. Let us note a few things. First, the socioeconomic gradient in reading literacy has steadily increased over time. This means that the equity of academic achievement has deteriorated during the last two decades. Second, the regression line itself remarkably moved downward at the same time that the slope of the line became steeper, resulting in the drop of the y-intercept (*see* the intersections between the vertical dotted line and the regression lines). This means that the test scores of Korean students have generally declined. We can say in other words that the efficiency of Korean education has deteriorated over time. Although slopes in math literacy have become steeper over time, and regression lines in math literacy have also shifted downward over time, these changes in math literacy were not significant. Hereafter, therefore, we will turn our focus away from math literacy.

Has inequality of academic achievement increased in other countries during the same period as well? Let us look at trends of the socioeconomic

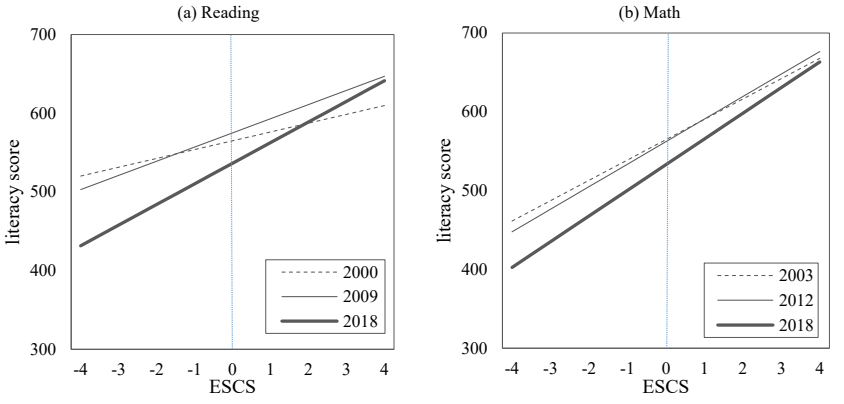

Fig. 7.—Temporal changes of regression lines

gradients in other OECD countries. As is clearly illustrated in Figure 8, only Korea and Finland showed increasing trends in the socioeconomic gradient. Up to now, we have explained the increase in the socioeconomic gradient in Korea both by the increase in differentiation of secondary education and by the growth of students' school choice. However, why has the socioeconomic gradient increased in Finland? Research shows that like Korea, Finland has also propelled the neo-liberal and market-oriented educational policy since the early 1990s (García et. al. 2021). In Finnish comprehensive schools, there had been a rule of neighborhood school attendance. Thus, children enrolled at the closest school in the area they lived in. However, an educational policy was introduced in 1998 to allow the parental choice of schools outside of the assigned catchment area as a part of a larger school reform promoting freedom, decentralization, and choice in education. This policy of school choice resulted in the increase both of socioeconomic segregation and of the socioeconomic achievement gap and caused the decline of average achievement scores at the same time (Salmela-Aro and Chmielewski 2019).[9]

[9] On the contrary to Korea and Finland, some countries such as the Czech Republic, Germany, the United States, the United Kingdom, Australia, and Canada showed decreasing trends, while the other OECD countries revealed no substantial trend. As a result, in 2018, Korea and Finland had a higher socioeconomic gradient than the so-called market-based economies such as the United States, the United Kingdom, and Canada. Why has the socioeconomic gradient decreased during the last two decades in some market-based capitalist countries like the United States? The answer to this question is beyond the scope of this study. Another research is needed for answering such a question.

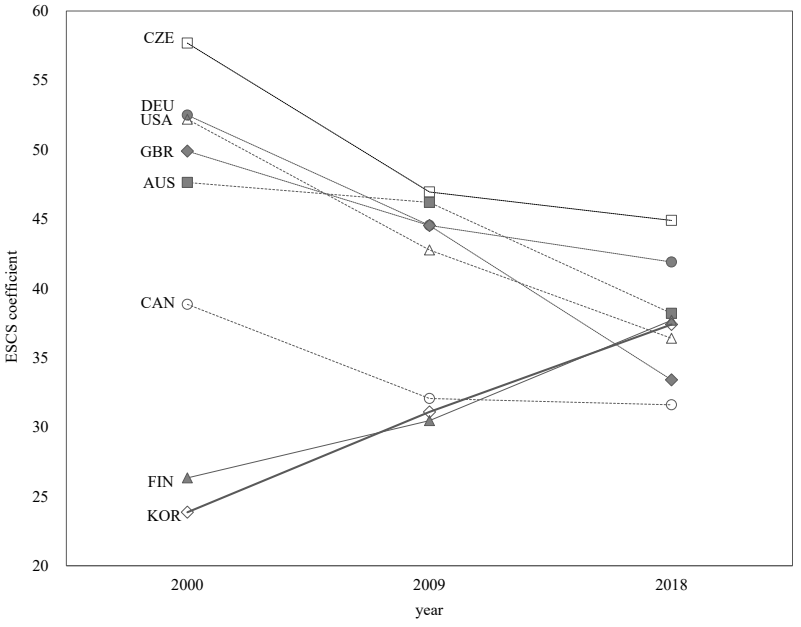

Fig. 8.—Temporal changes of regression lines

Conclusion

This study has hitherto investigated Korea's inequality of academic achievement from a comparative and temporal perspective. It has also tried to connect the inequality of academic achievement with changes in the secondary educational system. Showing that secondary education in Korea has increasingly differentiated over the past few decades, this study derived the following hypotheses: First, the disparity of academic achievement both between students and between schools would have widened during the past few decades. Second, the average scores students achieved would have been lower in recent years. Third, the effect of parents' socioeconomic status on children's academic achievement would have been greater over the last decades. Analyzing PISA data collected in 2000, 2009 and 2018, this study found that these three hypotheses were consistent with the empirical results.

Prior studies on Korea's inequality of academic achievement speculated that the greater differentiation in secondary education resulted both in lower educational efficiency and in lower equity. Following these, this study tried to find the reason for Korea's increasing inequality of academic achievement in

the changes of its secondary education system. Although this kind of explanation is persuasive to some extent, however, it is not perfect. After finding the growing increase in socioeconomic achievement gaps over the recent 50 years across the majority of countries examined, Chmielewski (2019) concluded that changes in tracking policies could not explain the global trend of increasing gaps in socioeconomic achievement. She explained that socioeconomic achievement gaps have increased despite more countries having moved the age of track selection later rather than earlier and more countries having chosen the various de-tracking policies in recent years. If the differentiation of secondary education was not the main driver that had caused the increase in the socioeconomic achievement gaps, what would have given rise to the increase in socioeconomic gradient? She extracted and summarized the three candidates for answering the above question in the relevant literature: the expanding diversity of students, the increasing positional inequality, and the widening disparity in parental investments of time and energy in children. Let us look at these one by one. The enrollment of more diverse students in schools, which may be caused either by the rapidly expanding school access especially in less developed countries, or by global migration in developed countries, may lead to growing socioeconomic achievement gaps due to the low test scores of the relatively disadvantaged population (Baker, Gosling, and LeTendre 2002). The greater inequality of economic conditions may result in greater variability and disparity in the family environment, and the wider disparity in the family environment may result in larger differences in the cognitive development of children. Greater inequality in parents' income may cause stronger effects of parental education and family income on children's academic achievement (Esping-Andersen 2004; Reardon 2011; Sørenson 2006). The more disparities in parental investments of time and energy in children, which may be due either to the increasing competitive college admissions or to the increase of competition caused by de-tracking reforms which leave a growing share of students potentially eligible for university admission, may lead to the increase in socioeconomic achievement gaps (Alon 2009). Which sounds more plausible? Further research is required to assess the significance of these possibilities for explaining the growing inequality of academic achievement in Korea.

(*Submitted*: September 28, 2021; *Revised*: December 20, 2021; *Accepted*: February 21, 2022)

References

Alon, Sigal. 2009. "The Evolution of Class Inequality in Higher Education: Competition, Exclusion, and Adaptation." *American Sociological Review* 74(5): 731-755.

Alexander, Karl L., Edward L. McDill. 1976. "Selection and Allocation within Schools: Some Causes and Consequences of Curriculum Placement." *American Sociological Review* 41(6): 963-980.

Alexander, Karl L., Martha Cook, and Edward L. McDill. 1978. "Curriculum Tracking and Educational Stratification: Some Further Evidence." *American Sociological Review* 43(1): 47-66

Baker, David P., Brian Goesling, and Gerald K. LeTendre. 2002. "Socioeconomic Status, School Quality, and National Economic Development: A Cross-National Analysis of the 'Heyneman-Loxley Effect' on Mathematics and Science Achievement." *Comparative Education Review* 46(3): 291-312.

Bauer, Philipp and Regina T. Riphahn. 2006. "Timing of School Tracking as a Determinant of Intergenerational Transmission of Education." *Economic Letters* 91(1): 90-97.

Bishop, John H. 1997. "The Effect of National Standards and Curriculum-Based Exams on Achievement." *The American Economic Review* 87(2): 260-264.

Bol, Thijs and Herman G. van de Werfhorst. 2011. "Measuring Educational Institutional Diversity: External Differentiation, Vocational Orientation, and Standardization." Amsterdam Centre for Inequality Studies(AMCIS) Working Paper 2011/1.

Brunello, Giorgio and Daniele Checchi. 2007. "Does School Tracking Affect Equality of Opportunity? New International Evidence." *Economic Policy* 52: 781-861.

Byun, Soo-yong and Sung-kyun Lee. 2021. (In Korean) *Bumoui sahoegyeongjejeog jiwiwa janyeoui gyoyug gyeolgwa* [*Parental Socioeconomic Status and Children's Educational Outcomes: Has the Educational Inequality Increased in Korea?*]. Seoul: Pak-yong Story.

Byun, Soo-yong and Kyung-keun Kim. 2008. (In Korean) "Hangug godeung-hagsaengui gyoyug gyeolgwae daehan munhwajabonui yeonghyang [The Impact of Cultural Capital on Educational Outcomes of High School Students in South Korea]." *Gyoyugsahoehagyeongu* [*Korean Journal of Sociology of Education*] 18(2): 53-82.

Byun, Soo-yong and Kyung-keun Kim. 2010. "Educational Inequality in South Korea: The Widening Socioeconomic Gap in Student Achievement." *Research in Sociology of Education* 17: 155-182.

Byun, Soo-yong, Evan Schofer, and Kyung-keun Kim. 2012. "Revisiting the Role of Cultural Capital in East Asian Educational Systems: The Case of South Korea."

Sociology of Education 85(3): 219-239.

Byun, Soo-yong, Kyung-keun Kim, and Hyun-joon Park. 2012. "School Choice and Educational Inequality in South Korea." *Journal of School Choice* 6(2): 158-183.

Chang, Mi-hye. 2002. (In Korean) "Sahoegyegeubui munhwajeog jaesaengsan [Cultural Reproduction of Social Class: Effects of Cultural Capital on Student Ability Test]." *Hangugsahoehag* [*Korean Journal of Sociology*] 36(4): 223-252.

Chang, Sang-soo. 2008a. (In Korean) "Gajogbaegyeong, munhwajabon, seongjeog [Family Background, Cultural Capital, and Academic Achievement]." *Hangugsahoehag* [*Korean Journal of Sociology*] 42(3): 63-85.

_____. 2008b. (In Korean) "Cheongnyeoncheungui haggyojigjang ihaeng [The Transition from School to Work in Korea]." *Hangugsahoehak* [*Korean Journal of Sociology*] 42(6): 106-139.

_____. 2013. (In Korean) "Yeoseongui gyoyug gihoe byeonhwa [Changes in Educational Opportunities for Women: Academic Achievement and College Education]." Pp, 194-237, in *Hangugsahoeui gongjeongseong* [*Fairness in Korea 1990-2011*], edited by Sang-wook Kim. Seoul: Sungkyunkwan University Press.

_____. 2016. (In Korean) "Beoleojineun teumsae [A Widening Gap: The Increasing Influence of Parental Socioeconomic Status on Children's Academic Achievement in Korea]." *Hanguksahoehag* [*Korean Journal of Sociology*] 50(5): 107-140.

Chmielewski, Anna K. 2019. "The Global Increase in the Socioeconomic Achievement Gap, 1964 to 2015." *American Sociological Review* 84(3): 517-544.

Coleman, James S. Ernest Q. Campbell, Carol J. Hobson, James McPartland, Frederic D. Weinfeld, Robert L. York. 1966. *Equality of Educational Opportunity*. National Center for Educational Statistics Report, No. OE-38001. Washington, DC: U.S. Government Printing Office.

Duru-Bellat, Marie and Annick Kieffer. 2000. "Inequalities in Educational Opportunities in France: Educational Expansion, Democratization or Shifting Barriers?" *Journal of Education Policy* 15(3): 333-352.

Esping-Andersen, Gøsta. 2004. "Untying the Gordian Knot of Social Inheritance." *Research in Social Stratification and Mobility* 21: 115-138.

Freeman, Richard B. and Martina Viarengo. 2014. "School and Family Effects on Educational Outcomes across Countries." *Economic Policy* 29(79): 395-446.

Fuchs, Thomas and Ludger Wößmann. 2007. "What Accounts for International Differences in Student Performance? A Re-examination Using PISA Data." *Empirical Economics* 32: 433-464.

Gamoran, Adam. 1996. "Curriculum Standardization and Equality of Opportunity in Scottish Secondary Education: 1984-90." *Sociology of Education* 69(1): 1-21.

Gamoran, Adam and Matthew Weinstein. 1998. "Differentiation and Opportunity in Restructured Schools." *American Journal of Education* 106(3): 385-415.

García, José Saturnino Martínez, Eriikka Oinonen, Rafael Merino, and Graziela Perosa. 2021. "Education and Inequality in Finland, Spain, and Brazil." Pp. 105-

140, in *Towards a Comparative Analysis of Social Inequalities between Europe and Latin America*, edited by Pedro López-Roldán and Sandra Fachelli. New York: Springer.

Ghang, Tae-joong. 2015. (In Korean) "Hangug godeunghaggyo cheje nonuiui yangsanggwa teugjil [A Review of the Discourses in South Korea on the High School System]." *Gyoyugyeonguwa silcheon* [*Educational Research and Practice*] 81: 1-25.

Hallinan, Maureen T. 1988. "Equality of Educational Opportunity." *Annual Review of Sociology* 14: 249-268.

Hallinan, Maureen T. and Aage B. Sørenson. 1987. "Ability Grouping and Sex Differences in Mathematics Achievement," *Sociology of Education* 60(2): 63-72.

Hanushek, Eric A. and Ludger Wößmann. 2005. "Does Educational Tracking Affect Performance and Inequality? Differences-in-Differences Evidence across Countries" *The Economic Journal* 116: C63–76.

Hanushek, Eric A. and Margaret E. Raymond. 2004. "The Effect of School Accountability Systems on the Level and Distribution of Student Achievement." *Journal of the European Economic Association 2*(2-3): 406-415.

Hauser, Robert M. and David Featherman. 1976. "Equality of Schooling: Trends and Prospects." *Sociology of Education* 49(2): 99-120.

Hong, Hu-jo, Dae-seok Kim, Ho-je Jo, Bu-ja Min, Hyeong-jeong Cho, Jeong-il Kim, and Ho-seop Ryu. 2012. (In Korean) *Haggyo majchumhyeong gyogwagyosil silje unyeong mohyeong gaebal* [*Development of Operation Model for School Customized Curriculum*]. Seoul: Korea Educational Development Institute.

Horn, Daniel. 2009. "Age of Selection Counts: A Cross-country Analysis of Educational Institutions." *Education Research and Evaluation* 15(4): 343-366.

Husen, Torsten. 1973. "The Standard of the Elite: Some Findings from the IEA International Survey in Mathematics and Science." *Acta Sociologica* 16(4): 305-323.

Ju, Dong-beom. 1998. (In Korean) "Hagsaengbaegyeonggwa hageobseongchwi [Student Background and Academic Achievement: Does Mother's Involvement in Children's Education Matter?]" *Gyoyugsahoehagyeongu* [*Korean Journal of Sociology of Education*] 8(1): 41-56.

Kerckhoff, Alan C. 1995. "Institutional Arrangements and Stratification Processes in Industrial Societies." *Annual Review of Sociology* 15: 323-347.

_____. 2001. "Education and Social Stratification Processes in Comparative Perspective." *Sociology of Education* 74(Extra Issue): 3-18.

Kerr, Sari Pekkala, Toumas Pekkarinen, and Roope Uusitalo. 2013. "School Tracking and Development of Cognitive Skills." *Journal of Labour Economics* 31(3): 577-602.

Kim, Dae-seok and Ho-jae Jo. 2013. (In Korean) "Sujunbyeol sueobi hageobseongchwidoe michineun yeonghyang [The Effects of Ability Grouping on Students' Math Achievement]." *Gyoyugmunjeyeongu* [*Educational Research*]

26(2): 1-24.

Kim, Hyun-joo and Byung-hoon Lee. 2007. (In Korean) "Janyeoui hageobseongchwie michineun gajogbaegyeong, sahoejabon mit munhwajabonui yeonghyang [Effects of Family Background, Social Capital and Cultural Capital on the Children's Academic Performance]." *Hanguginguhag* [*Korea Journal of Population Studies*] 30(1): 125-148.

Kim, Kyung-keun. 2000. (In Korean) "Gajognae sahoejeog jabongwa adongui hageobseongchwi [Family's Social Capital and Children's Academic Achievement]." *Gyoyugsahoehagyeongu* [*Korean Journal of Sociology of Education*] 10(1): 21-40.

_____. 2005. (In Korean) "Hangugsahoe gyoyuggyeogchaui siltae mit gyeoljeongyoin [Educational Gap in Korea and Its Determinants]." *Gyoyugsahoehagyeongu* [*Korean Journal of Sociology of Education*] 15(3): 1-27.

Kim, Kyung-keun and Soo-yong Byun. 2007. (In Korean) "Hangugsahoeeseoui hageobseongchwie daehan munhwajabonui yeonghyang [The Impact of Cultural Capital on Student Achievement in South Korea]." *Gyoyugsahoehagyeongu* [*Korean Journal of Sociology of Education*] 17(1): 23-51.

Kim, Shin-il. 1985. (In Korean) *Gyoyugsahoehag* [*Sociology of Education*]. Seoul: Education and Science.

Kim, Wui-jeong. 2012. (In Korean) "Gyecheunggan haglyeog gyeogchaui byeonhwa [The Trend in Socioeconomic Inequalities in Student Achievement: Focusing on the Effects of School Policy]." *Gyoyugsahoehagyeongu* [*Korean Journal of Sociology of Education*] 22(3): 49-76.

Lee, Don-hee. 2015. (In Korean) *Hangugui gyoyug 70 nyeon* [*Korean Education: 70 Years*]. Sung-nam, Korea: The Academy of Korean Studies Press.

Lee, Jeong-hwan. 2002. (In Korean) "Gajoghwangyeong gwaoe seongjeog [Family Environment, Private Tutoring, and School Grades]." *Hangugsahoehag* [*Korean Journal of Sociology*] 36(6): 195-214.

Lee, Joo-ho. 1996. (In Korean) *Goyongdaechaeggwa injeogjawon gaebal* [*Employment Policy and Human Resource Development: An Institutional Approach*]. Seoul: Korea Development Institute.

Marks, Gary N. 2005. "Cross-National Differences and Accounting for Social Class Inequalities in Education." *International Sociology* 20(4): 483-505.

Muller, Chandra and Kathryn S. Schiller. 2000. "Leveling the Playing Field?: Student's Educational Attainment and States' Performance Testing." *Sociology of Education* 73(3): 196-218.

OECD. 1998. *Reviews of National Policies for Education: Korea*. Paris: OECD.

_____. 2004. *Learning for Tomorrow's World: First Result from PISA 2003*. Paris: OECD.

_____. 2005. *PISA 2003 Data Analysis Manual: SPSS Users*. Paris: OECD.

_____. 2010a. *PISA 2009 Results: Overcoming Social Background. Equity in Learning Opportunities and Outcomes*. Paris: OECD.

_____. 2010b. *PISA 2009 Results: Learning Trends. Changes in Student Performance since 2000*. Paris: OECD.

Oh, Gye-hoon and Kyung-keun Kim. 2001. (In Korean) "Gajoggujoga adongui hageobseongchwie michineun yeonghyang [Effects on Children's Academic Achievement of Family Structure]." *Gyoyugsahoehagyeongu* [*Korean Journal of Sociology of Education*] 11(2): 101-123.

Park, Hyun-joon. 2013. *Re-evaluating Education in Japan and Korea: Demystifying Stereotypes*. Oxford: Routledge.

_____. 2014. "Single Parenthood and Children's Education in the Republic of Korea." Pp. 153-171, in *Korean Education in Changing Economic and Demographic Contexts*, edited by Hyunjoon Park and Kyung-keun Kim. Singapore: Springer.

Park, Hyun-joon, Soo-yong Byun, and Kyung-keun Kim. 2011. "Parental Involvement and Students' Cognitive Outcomes in Korea: Focusing on Private Tutoring." *Sociology of Education* 84(1): 3-22.

Park, Seon-hwa, Soon-kyung Park, Moon-bok Lee, Eui-gap Lee, and Young-geun Jeong. 2005. *Sujunbyeol sueob hwalseonghwa bangan yeongu* [*A Study on Activating Plan for Ability Grouping*]. Seoul: Korea Institute of Curriculum and Evaluation.

Raudenbush, Stephen W. and Ji-Soo Kim. 2002. "Statistical Issues in Analysis of International Comparisons of Educational Achievement." Pp. 267-294, in *Methodological Advances in Cross-National Surveys of Educational Achievement,* edited by Andrew C. Porter and Adam Gamoran. Washington, D.C.: National Academy Press.

Reardon, Sean F. 2011. "The Widening Academic Achievement Gap between the Rich and the Poor: New Evidence and Possible Explanations." Pp. 91-116, in *Wither Opportunity? Rising Inequality, Schools, and Children's Life Chances*, edited by Greg J. Duncan and Richard J. Murnane. New York: Russell Sage Foundation.

Salmela-Aro, Katariina and Anna K. Chmielewski. 2019. "Socioeconomic Inequality and Student Outcomes in Finnish Schools." Pp. 153-168, *in Socioeconomic Inequality and Student Outcomes: Cross-National Trends, Policies, and Practices*, edited by Louis Volante, Sylke V. Schnepf, John Jerrim, and Don A. Klinger. Singapore: Springer.

Schütz Gabriela., Heinrich W. Ursprung, and Ludger Wößmann. 2008. "Education Policy and Equality of Opportunity." *Kyklos* 61(2): 279-308.

Seth, Michael J. 2002. *Education Fever: Society, Politics, and the Pursuit of Schooling in South Korea*. Honolulu: University of Hawaii Press.

Sørenson, Aage B. and Maureen T. Hallinan. 1986. "Effects of Ability Grouping on Growth in Academic Achievement." *American Educational Research Journal* 23(4): 519-542.

Sørenson, Annemette. 2006. "Welfare States, Family Inequality, and Equality of Opportunity." *Research in Social Stratification and Mobility* 24(4): 367-375.

Van de Werfhorst, Herman G. and Jonathan J. B. Mijs. 2010. "Achievement Inequality and the Institutional Structure of Educational Systems: A Comparative Perspective." *Annual Review of Sociology* 36: 407-428.

Waldinger, Fabian. 2007. "Does Ability Tracking Exacerbate the Role of Family Background for Students' Test Scores?" Retrieved on Feb. 13, 2021 (http://www.fabianwaldinger.com/research).

Wößmann, Ludger. 2003. "Central Exams as the 'Currency' of School Systems: International Evidence on the Complementarity of School Autonomy and Central Exams." *CESifo DICE Report* 1: 46-56.

_____. 2005. "The Effect Heterogeneity of Central Examinations: Evidence from TIMSS, TIMSS-repeat, and PISA." *Educational Economics* 13(2): 143-169.

Sang-Soo Chang is a professor of sociology at Sunchon University, Korea. He is interested in social stratification and mobility, and has published several books on the matters, such as Social Mobility in Korea (2001), Education and Social Mobility in Korea (2009). He is also the author of Stata Programming (2010), Numerical Analysis and Simulation: R Programming (2019), and Introduction to Sociology (2020). He is currently writing some books, such as Social Inequality in Korea and Stata/Mata Programming. [*E-mail:* sangsoo.chang@gmail.com]