Journal of Pedagogical Research
Volume 8, Issue 2, 2024
https://doi.org/10.33902/JPR.202426078

Research Article

Modelling the effectiveness of schools based on their equality of opportunities

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The aim of the study is to identify variables that explain students' academic performance, determine their relative importance, and consequently, develop an index to distinguish advantaged and disadvantaged schools in pursuit of educational equality. By using this index, we intend to build a model for evaluating schools' overall performance based on their equality of opportunity. The research is structured within the quantitative research paradigm and the relational research design has been adopted. The research was carried out in 52 secondary schools and analysis were performed on data collected from 1143 students, 1600 teachers and 141 school administrators. While collecting the data, a monitoring exam was used to measure student achievement, which is the dependent variable. Data on independent variables were collected with student, teacher, and administrator surveys. Hierarchical linear modelling and ratio analysis were employed while analysing the data. It was found that student-level variables explain success more than school-level variables. Twenty different variables in total at the student and school level were found to be effective on student achievement. Based on these variables, a school advantages index was created. It has been observed that schools with a high school advantage index are also better off in terms of average school achievement. However, when evaluated together with the school advantages index, it was revealed that the effectiveness order of the schools changed. Our suggestion is that education systems need to have a more holistic approach to evaluate school performances. To provide both fair and radical equality of opportunity, each school should chart a course considering its own conditions regarding the education of disadvantaged students.

Keywords: Equality; Equality of opportunity; School evaluation; School effectiveness; Education

Article History: Submitted 17 November 2023; Revised 13 February 2024; Published online 23 February 2024

1. Introduction

It is a common-sense that education is an indispensable right due to its returns in individual and societal domains. Numerous studies in the field of education indicate that depriving individuals of educational opportunities increases the challenges they will face throughout their entire lives. Despite the clear recognition of this reality, it is still observed globally that many individuals have limited access to quality and sufficient education (UNESCO, 2019). In this context, it is emphasized that the problem is further exacerbated, especially for individuals experiencing disadvantages in the social domain due to factors such as socio-economic status, gender, race, geographical location,

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How to cite: Çimen, İ., Yücel, C., & Karadağ, E. (2024). Modelling the effectiveness of schools based on their equality of opportunities. *Journal of Pedagogical Research, 8*(2), 1-25. https://doi.org/10.33902/JPR.202426078

etc. (OECD, 2012). In other words, all individuals in societies, particularly those in disadvantaged positions, cannot benefit from education in an equal and fair manner, resulting in a lack of equal opportunities in education (Napoletano, 2024; Shields et al., 2017).

Many high-performing countries in education formulate and implement policies that integrate quality and equity (Harris, 2007; OECD, 2012, 2018). However, especially in developing countries like Türkiye, education policies are not consistently approached within the framework of social cohesion and integration. As a result, students in such countries, due to factors like socio-economic status and gender, do not have equal opportunities (OECD, 2018). One of the reasons for this situation lies in the condition of schools and the education system. In this context, the disparities among schools, the frameworks used for their evaluation, and the systems for placing students in schools need to be examined.

According to PISA data, Türkiye has one of the highest rates, at 55%, of variance in differentiation among schools. This indicates that every student faces difficulties in benefiting from the same educational opportunities (OECD, 2019). Indeed, nearly half of disadvantaged children in Türkiye attend disadvantaged schools, a situation that has persisted for many years (OECD, 2018). One of the reasons for this is the implementation of a placement system, particularly in primary education, that considers the proximity of students' residences to schools as the main indicator to decide on the schools they will attend, referred to as the enrolment area. This practice perpetuates the existing social stratification around schools. The presence of socioeconomically higher and lower areas in every settlement and children from these areas attending schools according to their socio-economic levels reinforces existing inequalities (Gegekoğlu, 2023; Yücel et al., 2013).

Apart from the enrolment area, another policy that could pose an obstacle to educational equity is the evaluation of schools and the adoption of a 'tracking system' when placing students, especially during the transition to secondary education. The tracking system involves grouping students based on their academic achievements. Students are placed in different schools based on their academic performance, resulting in students with similar academic levels being grouped in the same schools. Consequently, a homogeneous group is formed within the school, and schools are evaluated based on the success demonstrated by this group as 'good or bad.' As a result, students who are socioeconomically more advanced use their advantages to increase their academic achievements and continue their advantages in schools that show relatively better performance (OECD, 2018). In other words, the evaluation of school effectiveness typically concentrates exclusively on outcomes, overlooking the circumstances of students who serve as inputs to the educational system. Consequently, drawing inaccurate conclusions about school effectiveness may occur as the assessments primarily consider results while neglecting the conditions of students, who are integral components of the educational process.

While it cannot be conclusively determined whether various alternatives implemented worldwide are effective in terms of educational equity, it has been identified that in OECD countries, when the school-based socio-economic level increases by one unit for disadvantaged students, there is an approximately 60-point increase in academic achievements (OECD, 2018). Therefore, evaluating schools based on socio-economic levels rather than academic achievements may yield more beneficial results in terms of educational equity. However, in the context of Türkiye, an approach based on data to evaluate schools in this manner and place students in schools through different alternatives has not been adopted. Therefore, especially in primary education, schools are generally structured based on the socio-economic characteristics of students, and these characteristics significantly influence the provision of quality education. Hence, to ensure that every child in the country can benefit from equal opportunities, it is crucial to carefully monitor the progress of disadvantaged students at the educational system and school levels, create different additional resources for these students and schools, and prevent the perpetuation of socio-economic disparities by avoiding the concentration of these students around the same schools.

This research aims to develop a school evaluation model, particularly focusing on the Turkish example and incorporating the enrollment area and tracking system, for developing and less developed countries. Within this overarching objective, the study intends to identify variables that explain educational equity, determine their relative importance, and consequently, develop an index to distinguish advantaged and disadvantaged schools in pursuit of educational equity. By creating similar indices, countries can achieve a fairer evaluation of schools. The following research questions will be addressed in this context:

RQ 1) To what extent do variations in students' achievements stem from inter-school and intra-school differences in the context of educational equity?

RQ 2) Do students' achievements vary based on the characteristics of schools and teachers? If variations exist, what are the contributing factors?

RQ 3) Do students' achievements differ based on various characteristics they possess? If variations exist, what are the contributing factors?

RQ 4) Drawing on the influential factors in students' achievements related to school, teacher, and student characteristics, how can an index be developed for school advantages based on educational equity to evaluate schools with an alternative approach?

RQ 5) How can school effectiveness be measured when considering educational equity as the foundation?

This research aims to contribute insights into school evaluation models for countries employing similar enrolment area and tracking systems, offering a valuable perspective for educational policy development globally.

2. Conceptual Framework

2.1. Equality of Opportunity

One of the debated dimensions of the concept of equality revolves around the accessibility of resources and opportunities to everyone in society. This ideal, referred to as equality of opportunity (Arneson, 2015), generally defines equality as the access to and utilization of resources (Tezcan, 2015). The assumption underlying this concept is that every society possesses a certain level of hierarchical structure. Individuals' positions in this social hierarchy are determined by a competitive structure where everyone is assumed to have equal conditions (Arneson, 2015). The key point here is the accessibility and availability of resources, which can also be perceived as opportunities, for all segments of society. Indeed, in a place where there is not an equal chance to seize opportunities, the concept of equality of opportunity cannot transcend beyond a mere myth (Brando, 2016).

Within the framework of social justice, different perspectives have been put forward regarding what equality of opportunity is and how it should be implemented (Cavanagh, 2002; Mason, 2006; Morabito & Vandenbroeck, 2015). A common point among these views is the notion of formal equality of opportunity, which begins with the necessity for every individual to have an equal chance of reaching advantageous positions in society. Approaches that attribute the distribution of individuals in different positions in society, such as the caste system, more to individuals' origins than to their abilities and knowledge are rejected from this perspective (Arneson, 2015; Segall, 2013). Thus, the absence of formal barriers to an individual or a group's access to any position in society (such as education) is considered evidence of equality of opportunity (Howe, 1989). Although the necessity of formal equality of opportunity is generally accepted by everyone, debates typically revolve around two axes (Knight, 2013; Mason, 2001). The first is the liberal-meritocratic approach of John Rawls and its advocates, which derives from formal equality of opportunity and is called 'Fair Equality of Opportunity [FEO]', and the second is the egalitarian approaches led by Richard Arneson, Jerry Cohen, and John Roemer and is called 'Radical Equality of Opportunity [REO]' (Mason, 2001; Segall, 2013). The debates on equality of opportunity have been shaped by discussions centred around liberalism and socialism, with some circles viewing them as essentially identical (Scheffler, 2003).

2.2.1. Fair Equality of Opportunity

FEO is based on the equal sharing of the surplus produced as a result of collaborative efforts. Interpreting equality of opportunity through social justice, this theory positions opportunities in social life within values such as freedom, income, welfare, and power, focusing on the fair distribution of opportunities (Kocaoğlu, 2017). There is a situation based on establishing a common collaboration between the most advantaged and the least advantaged, allowing everyone to benefit regardless of their positions in social life such a way that students with greater merits be prioritized (Mithaug, 1996; Napoletano, 2024). In this case, equalizing opportunities can be achieved through an agreement based on the mutual advantages of individuals who are equal and free (Kocaoğlu, 2017). This ideal situation, referred to as the original position, allows for social and economic inequalities as long as they benefit the entire society, especially the most disadvantaged groups (Rawls, 1999). The crucial point is the elimination of disadvantages that are not inherent to individuals but are products of the social structure. Thus, equal access opportunities are provided for everyone to all positions existing in society (Rawls, 1999).

Rawls (1999) articulates his theses on social justice around two principles. The first is related to liberties and emphasizes that basic liberties must be equally distributed for everyone. However, in some cases, basic liberties can be restricted for the sake of equality. In such cases, the second principle, which can be read as a liberal reflection of equality, comes into play. This principle, concerning social and economic inequalities, encompasses two conceptualizations within itself. One is the difference principle, where Rawls advocates that inequalities should be arranged to the greatest benefit of the least advantaged in society. The other is related to the positions in social life, considering positions and offices, and asserts that they should be open to everyone equally. Rawls's two principles are of paramount importance in resolving equality of opportunity. The disadvantaged in society can be brought to an equal level with others by benefiting from these principles, while those in advantageous positions can enhance their advantages by benefiting from the gains brought about by equality of opportunity (Rawls, 1999). According to Rawls's theory, equality of opportunity is concerned with success following similar paths for individuals who possess the same natural talents and skills and are equally willing to use them. In this context, the individual's position at birth within the social system is not considered. The crucial factor is the effort and willingness demonstrated (Alexander, 1986).

Another crucial aspect of Rawls's theory is related to individuals' ability to utilize their potentials. In this sense, what individuals can do is greatly influenced by the environment in which they live. Particularly, the political and social environment plays a significant role in this context. Therefore, while individuals may have certain freedoms in some respects, they are not in an equal position to pursue different paths or have access to different opportunities. The actions of individuals are determinant in accessing these opportunities, but the political and social structures surrounding individuals are effective at this point. Hence, structures that either support or hinder individuals in their efforts to reach a certain resource become crucial. For instance, in the successful realization of an initiative by an individual, not only their own actions but also the people around them, social and political structures should be considered. The 'basic structure,' as Rawls calls it, encompasses all the social and political institutions, legislative and executive forms, legal systems, economic arrangements, family, etc., in a society. All these structures must treat all units in society fairly (Rawls, 1999).

2.2.2. Radical Equality of Opportunity

In conjunction with criticisms directed at Rawls's theory, egalitarian approaches have gained more prominence in recent years (Mason, 2001). Thinkers such as John Roemer and Jerry Cohen, in harmony with Arneson's (1999) criticisms, have been influential in introducing a different axis termed 'socialist,' 'radical,' or 'luck-sensitive' (Segall, 2013). Luck egalitarianism, a part of egalitarian theories aiming to eliminate the impact of luck in the distribution of social justice, forms the fundamental framework in this interpretation of equal opportunity (Anderson, 1999).

According to luck egalitarianism, an individual in society cannot be held responsible for anything due to reasons beyond their control. Therefore, it is unacceptable for anyone to be in a worse position than others due to factors beyond their control. Accepting differences in achieving advantages among individuals is possible only when these differences result solely from personal choices (Arneson, 2015; Cohen, 2006; Knight, 2013). The core assertion of this axis regarding equal opportunity is that everyone should start from the same place and under the same conditions in obtaining advantageous positions. At this point, eliminating socio-economic inequalities, which John Rawls focused on, is not sufficient; consideration must also be given to the advantages or disadvantages individuals bring with them from birth (Segall, 2013). Therefore, the idea of an acceptable social hierarchy in society does not make sense when considered within this axis (Arneson, 2015).

In the context of radical equal opportunity, the structure of luck holds a crucial position for equal opportunity and social justice. In this regard, two types of luck can be distinguished: option luck and brute luck. The fundamental distinction between them lies in whether luck is dependent on intentional and voluntary actions. Option luck is associated with actions individuals take, considering the risks and consequences beforehand. For example, an investor choosing to invest in a specific stock and later witnessing a significant increase or decrease in its value is an instance of option luck. Here, the individual's potential losses are shaped by actions they chose to take or not take. On the other hand, brute luck is luck resulting from situations beyond an individual's control and is not dependent on intentional actions. For instance, if a meteor falls on an individual's head while walking down the street, it is an example of brute luck (Dworkin, 1981). From the perspective of equal opportunity, what matters are individuals' brute luck (Segall, 2013), and, as stated by Cohen (1989; 2006), the presence of factors beyond an individual's control in achieving advantages leads to inequalities.

2.2. Equality of Opportunity in Education

Equal opportunity in education can be considered both a precursor and a consequence of equal opportunity in a broader sense (Lazenby, 2016). Indeed, many analyses related to equal opportunity often delve into educational matters (Fishkin, 2014; Segall, 2013). In this context, the relationship between education and equal opportunity is approached from two different dimensions. The first perspective views education as a tool on the path to achieving equal opportunity. Therefore, the fundamental question is, "How can education be used to ensure equal opportunity?" According to this approach, assuming individuals' choices and efforts remain constant, every member of society should be able to access the tools necessary for leading a good life. Education plays a crucial role in endowing individuals with competence and freedom to access these tools. The second perspective does not see education merely as a tool but considers it as an intertwined structure with equal opportunity. Thus, the core issue of equal opportunity revolves around the processes within education systems. For instance, topics such as how resources are distributed equally among schools directly concern equal opportunity (Lazenby, 2016; Shields et al., 2017).

In terms of FEO, when considering education specifically, addressing the achievement disparities among students with similar abilities but different socio-economic inputs become crucial. The focus should be on narrowing the gap between students from lower socio-economic backgrounds and their peers from wealthier environments. Thus, Rawls' analysis of equal opportunity in education aims to eliminate the influence of social background and economic class on educational achievement. It advocates for maximizing the potential of all individuals in society by increasing investments in education (Shields et al., 2017).

To understand Rawls' theory in the context of education, certain key points need to be emphasized. In this regard, the difference principle, along with the concepts of affirmative action and basic structure, comes to the forefront. According to Rawls (1999), individuals' innate abilities and the conditions into which they are born are not within their control. In fact, these factors lead

to the unfair foundation of the gains individuals will achieve in life. Privileges such as innate advantages like intelligence, which provide social advantages, hinder equal access for individuals to positions in society. Since individuals do not have the opportunity to choose freely from the set of opportunities, the positions into which they are born are influenced by the political, social, and economic structure of their surroundings.

Rawls takes a realistic perspective, starting from the premise that the talents individuals are born with and the life conditions they are born into are not their choice. He acknowledges that it is not possible to eliminate inequalities in society. However, according to the difference principle, the acceptance of inequalities in society is possible if they work to the advantage of the least advantaged. In this context, he advocates for the rearrangement of inequalities in various institutions in society in a way that benefits everyone, particularly the most disadvantaged (Rawls, 1999). In the process of rearrangement, focusing on education is crucial while considering the benefits of individuals born into disadvantaged segments of society. Therefore, it is inevitable for the state to allocate a significant portion of its resources to education (Rawls, 1999). Thus, education is seen as a powerful tool for achieving fair equal opportunities and, at the same time, as a social institution that should guide inequalities within it to the benefit of the disadvantaged. In this context, affirmative action can be effectively used to remove barriers and direct inequalities within education in a way that benefits the disadvantaged (Pogge, 2007). However, the way affirmative action is implemented should not lead to the reproduction of inequalities. Rawls emphasizes that the principles of social justice should be considered in this regard. Before using affirmative action to ensure equality of opportunities, individuals aspiring to opportunities must have the same abilities and the same willingness. For example, considering two individuals, one from a low socio-cultural background and the other from a high one, the allocation of educational resources depends on the same abilities and willingness. However, if these two individuals have the same willingness and abilities, and the opportunity is to be given to only one of them, then the individual from the low socio-cultural background should be chosen (Arneson, 2015). Rawls thus envisions that social justice in society can be achieved for everyone. This is because an individual from a high socio-cultural background, even if they do not obtain the opportunity at that moment, can find ways to compensate for it (Rawls, 2001).

Interpreting the concept of the basic structure, in the context of education, underscores the importance of not leaving students alone in determining what they can achieve. Students can realize their potential, but it requires the support of the surrounding social, economic, and political structure. The fundamental structures here encompass the socio-cultural and political assumptions of the social stratum in which the student is born, alongside economic realities. Therefore, achieving equal opportunities in education may be possible by minimizing the impact of different fundamental structures on students. Rawls argues that in opening up this path, it is crucial to ensure the fair distribution of basic rights and responsibilities and understand how economic opportunities and social conditions are created for different strata in society (Rawls, 1999).

In the context of radical equality of opportunity, any disadvantage that arises independently of an individual's responsibility is considered unjust and unfair. In other words, every disadvantage that develops irrespective of an individual's actions is regarded as a violation of equal opportunities (Segall, 2013). From this perspective, in education, any differences among students that they did not cause are seen as disruptive to equal opportunities. Therefore, disparities, particularly in educational achievements, are acceptable only when they are shaped by the varying efforts made by students (Knight, 2013; Segall, 2013). No individual can be better or worse educationally due to factors that can be explained by chance. Hence, the impact of chance factors in the distribution of educational inputs, especially resources, should be nullified, compensated for, and improved. The quantity and quality of education a person receives should not depend on variables such as inherent abilities, gender, race, or social background. Therefore, "what determines an individual's educational process is not conditions and circumstances that can be

explained by chance but the unique choices made by that individual in relation to education" (Calvert, 2014).

Given that the primary concern of radical equality of opportunity is to eliminate the effects of brute luck (Lippert-Rasmussen, 2005; Sher, 2010), the distribution of resources in education becomes crucial (Calvert, 2014). As Cohen (1989) and Arneson (2011) pointed out, a significant part of radical equality of opportunity is about eliminating brute luck in the distribution of certain goods. In this regard, examining the theoretical foundation put forth by Ronald Dworkin can be beneficial for education. According to Dworkin (2002), for achieving equal opportunities in education, each student in a school should have access to resources in the same proportion and quality as their peers. Although Arneson (1989) criticized the 'equal proportion and quality distribution of resources' ideal, Dworkin later emphasized the necessity of a resource distribution to bring the levels of those who have been seriously disadvantaged and would benefit very little or not at all from the distributed resources to the same level as others. Therefore, the way resources are distributed becomes crucial in bringing disadvantaged students in education to the same level as others. For example, when considering a situation where a student is born into a family where education is not valued, and consequently, the educational life is not considered important, and the parents have not received enough education, the student is in a position of brute luck due to the family. The disadvantage the student has compared to peers with higher education levels and competence is not caused by the student and is beyond their control. Equal opportunity comes into play at this point, suggesting that measures need to be taken to address the educational disadvantage that does not arise from the student's choices. This could involve establishing a compensatory mechanism throughout the education system or taking individual steps, such as providing educational support to the student's family or allocating more time to the student at school. Since the disadvantage the student experiences due to brute luck can significantly affect their educational success, they should receive a larger share in the distribution of resources to eliminate this disadvantage (Calvert, 2014; Roemer, 1992, 1998).

From the perspectives of Rawls and egalitarians, it is important to note that, despite differences in the analyses of equality of opportunity, there are significant commonalities. The most crucial among these is that the acceptability or fairness of inequalities in individuals' life achievements or outcomes depends on these inequalities arising from the individual's own choices. Therefore, some circles perceive these two approaches as being the same (Anderson, 1999). This research considers an eclectic approach to conduct an analysis by leveraging the strengths of both perspectives. Thus, the starting point is the "maxim" of radical equality of opportunity, which states that it is unjust and unfair for an individual to be in a worse situation than others due to reasons that are not the result of their own choices and mostly explainable by luck. When this interpretation is considered from the perspective of schools and students, no student should be affected by any situation that does not result from their own choices. In other words, non-choosable luck should cease to be a binding factor for schools and students. In this sense, Rawls's thoughts, especially regarding affirmative action, are considered to shed light on the subject. Since there are things that cannot be changed, it is thought that establishing compensatory mechanisms in different ways for students to continue their education can contribute in this regard. Therefore, in this research, both perspectives are used as a conceptual framework.

3. Methodology

3.1. Research Method and Sample

This study employed a quantitative research approach and hierarchical linear modelling to understand structures between different variables that may be related to each. The research can be evaluated in three stages. In the first stage, we determined student, teacher, and school-related variables influencing student achievements using hierarchical linear modeling. In the second stage, based on the variance rates of these variables, we created a School Advantages Index [SAI] characterizing the assets schools possess at the student, teacher, and school levels. In the third

stage, we conducted an effectiveness assessment by comparing schools based on the scores in these indices and the achievements they demonstrated. Our fundamental assumption here is to develop a comprehensive perspective for evaluating schools based on the conceptual framework of equal opportunity, while considering background of students and teachers and school structures. Therefore, unlike previous research, our unit of equality of opportunity is in school level, rather than focusing on individuals.

We conducted our study in secondary schools in Eskişehir province of Türkiye. In the population of the study, there are a total of 8152 eighth-grade students, 2408 teachers, and 151 administrators in 52 schools. As we aimed to reveal the student, teacher, and school level variables, three different sample groups have been formed for the study. The first sample group of the study consists of eighth-grade students. In forming this sample group stratified sampling method was used. A sample group of 1183 participants was formed. However, due to systematic patterns of missing data for 40 participants in the sample group, these participants were excluded from the sample. Therefore, at a 95% confidence level, a margin of error of 2.69% can be mentioned for the sample group. The 52 schools included in the study were considered as strata, and the number of participants entering the sample was determined based on the proportions of students in these schools to the population. The second sample group consists of teachers working in the selected schools. Although the goal was to include all teachers in the population in this sample group only those teachers who voluntarily participated in the research were included. In this regard, out of the 2408 teachers in the population, 1600 participated in the sample. Thus, the margin of error for the second sample group was calculated as 1.42% at a 95% confidence level. In the third sample group, school principals and vice-principals working in the universe are included. In this sample group, the participation of each unit in the universe is considered for sampling. However, since participation in the research is based on voluntariness, 141 out of a total of 151 administrators participated. Therefore, the margin of error for the third sample group was calculated as 2.66% at a 95% confidence level.

3.2. Data Collection Procedure

The data used in the study were collected from various sources using different tools and techniques. We have included many sources in our study to gain a holistic understanding of student economic, cultural, social and symbolical capitals as Bourdiue (1986) suggests. Firstly, we prepared a student survey with the aim of obtaining information about the demographic, socio-cultural, and economic statuses of the students. In this regard, the survey includes questions designed to determine students' demographic information, such as gender and place of birth, as well as socio-cultural information, such as the frequency of attending theatre and cinema, and socio-economic information, such as family income. Secondly, the teacher survey consists of items encompassing the demographic and socio-cultural information of participating teachers, along with assessments regarding the resources and social environment of the school. Thirdly, the administrator survey aims to gather information about the physical infrastructure, resources, and challenges of schools through the participation of administrators in the research. In this context, when creating the survey, variables related to school resources were examined in terms of equal opportunities in education and their impact on student achievement. We have also some other supporting data sets to referring students' background as illustrated in Table 1.

The data collection process of the research followed three stages. In the first stage, students included in the first sample group were administered both a student survey and an achievement test. In the second stage, relevant surveys were conducted on the second and third sample groups consisting of teachers and administrators from the schools where these students were enrolled. In the third stage, numerical data necessary for the analysis and interpretation of the student survey results were entered by extracting information from other sources.

Table 1
Supporting data sets for students' different forms of capital

Indicator	*Referring to*	*Explanation*
Student success monitoring exam	Dependent variable	Exam was prepared by the Eskişehir National Education Directorate
Ekdeksa	Neighbourhood of student	Endeksa is a predictive real estate data analytics and insights platform offering value added services on location optimization
Market values of municipality	Neighbourhood of student	The current market buying and selling price of real estate properties determined by municipality
ISCO-08	Occupations of students' parents	International Standard Classification of Occupations [ISCO-08] was developed by the International Labour Organization [ILO].
Provincial Socio-Economic Development Index	The homeland and registered places of origin of parents.	SEGE (Research on the Socio-Economic Development Ranking of Provinces and Regions) developed by Ministry of Development of Türkiye

3.3. Data Analysis Procedure

The primary method employed for data analysis was two-level (student level and school level) hierarchical linear modeling [HLM]. In the course of the research, Hierarchical Linear Modeling was employed with the aim of discerning the extent to which student achievement is predicted by variables at both the student and school levels. These models were designed to elucidate variances in student achievement by incorporating not only individual-level factors such as student characteristics or background representing economic, cultural, social and symbolic capital, but also school-level factors, including resource or teaching quality.

Secondly, to facilitate an alternative assessment of schools, an Educational Equality-based School Advantages Index was created. Initially, variables predicting academic achievement were identified through HLM modeling. The weights assigned to these variables in the prediction coefficients were then considered for inclusion in the index. The weighted prediction coefficients were multiplied by the mean of the relevant variable for the respective school. Subsequently, for ease of interpretation, the obtained results were transformed into standardized T scores. For this purpose, the following equation has been employed:

$$\mathrm{SAI_j} = 50 + 10 \cdot \frac{p_1 \cdot \left(\gamma_{01} \cdot \mathrm{W\bar{X}_{1j}} + \ldots + \gamma_{0n} \cdot \mathrm{W\bar{X}_{nj}}\right) + p_2 \cdot \left(\gamma_{01} \cdot \mathrm{Z\bar{X}_{1j}} + \ldots + \gamma_{0m} \cdot \mathrm{Z\bar{X}_{mj}}\right) - \mu}{\sigma}$$

where SAI_j represents the index score for school advantages based on educational equality for the j-th school; *n,* a Level-1 variable (at the student level) predicting student achievement; *m,* a Level-2 variable (at the school level) predicting student achievement; $W\bar{X}_{nj}$, the standardized value of the mean of variable *n* for the j-th school; $\gamma_{0n,}$ the coefficient for variable *n* in the prediction equation; $Z\bar{X}_{nj}$, the standardized value of the mean of variable *m* for the *j*-th school; γ_{0m}, The coefficient for variable *m* in the prediction equation; p_1 (.832) and p_2 (.168) the within-class correlation value for the student and school level, respectively, calculated with the One-Way Random Effects ANOVA model of HLM.

Thirdly, while determining the efficiency scores used for evaluating schools, ratio analysis has been employed. Ratio analysis, as a straightforward measure of efficiency, is expressed as the output-to-input ratio (Demirci, 2018). In the research, efficiency scores for schools were computed by comparing the average achievements of schools ($\bar{x}_j$) with the School Advantage Index, which can be considered as an indicator of the inputs schools possess. Therefore, the efficiency scores for schools (E_j) were calculated as follows:

$$E_j = \frac{\bar{x}_j}{SAI_j}$$

Additionally, the efficiency index ($\prod A,B$), which provides a relative measure of the effectiveness of schools compared to each other, can be calculated according to the following equation:

$$\prod_{A,B} = \frac{E_A}{E_B}$$

4. Findings

4.1. Variances between Schools and within Schools

The primary inquiry was directed towards understanding the proportion of variations in students' achievement scores attributable to differences between schools and within schools. To address this question, the One-Way Random Effects Analysis of Variance [ANOVA] model has been employed. Table 2 summarizes the results.

Table 2
The results of the One-Way Random Effects Analysis of Variance model

Random Effect	*SD*	*Variance Compotent*	*SR*	*Mean square*	*p*
Level 2, u_0	22.99	524.16	51	285.70	<.001
Level 1, r_{ij}	50.95	2596.27			

Regarding the average achievement scores, the within-school variability of students' achievement scores (r_{ij}) was calculated as 2596.27, while the variance across schools (u_0) as computed as 524.16. The significance of the u_0 value at the school level has been observed ($p < .001$), showing a meaningful difference in the average achievement scores among schools. In other words, there is a significant distinction in the mean achievement scores across schools. This condition indicates the presence of variance at the school level concerning student scores. To calculate the variance ratio, it is necessary to compute the within-class correlation value. For this computation the following formula was employed as Raudenbush and Bryk (2002) suggested:

$$p = \frac{\tau_{00}}{\tau_{00} + \sigma^2}$$

where p represents the within-class correlation coefficient, τ_{00} signifies the between-school variability, and σ^2 denotes the within-school variability. Accordingly, 16.8% of the variation in students' achievement scores can be attributed to differences between schools (p_2). Therefore, 83.2% of the differences in achievement scores can be attributed to individual student factors (p_1).

4.2. Characteristics of School and Teachers Predicting Student Achievement

The second aim was to investigate whether students' achievement scores [AS] vary based on the characteristics of the school. In this regard, if variations exist, estimations will be made regarding the specific characteristics contributing to these differences and the extent to which significant features explain the variance in achievement. For this purpose, variables have been theoretically grouped, and separate modelling has been conducted for each group. In situations where there is a multitude of variables, including all of them in the analysis simultaneously may lead to variations in the effects of independent variables on the dependent variable. Hence, it is recommended to theoretically group independent variables and include them in the analysis accordingly (Akyüz-Aru, 2020; Lio & Azen, 2013; Raudenbush & Bryk, 2002).

Our first group of school related variables included the average experience of school administrators [SC1], the number of administrators without any professional training [SC2], the number of administrators with postgraduate education [SC3] and the number of administrators receiving in-service training [SC4]. However, SC1, SC2 and SC4 was not included in the model as they were potentially not effective in exploratory analysis for Level 2 Variables. Therefore, the first means-as-outcomes model ($AS_{ij}=\gamma_{00} + \gamma_{01}*SC3_j + u_{0j} + r_{ij}$) included only SC3. However, it was not a significant predictor (γ_{01}=6.69; SE=4.00; p=.101).

Regarding the model for physical facilities of the schools ($AS_j=\gamma_{00} + \gamma_{01}*SC4_j + \gamma_{02}*SC5_j + \gamma_{03}*SC6_j + u_{0j} + r_{ij}$), none of the variables, including the average number of students in classrooms (SC4, γ_{01}=0.77; SE=0.60; p=.206), the physical problems related to educational activities in schools (SC5, γ_{02}=-13.43; SE=8.50; p=.121), and the general physical problems of the school (SC6, γ_{03}=0.07; SE=4.79; p=.989), significantly predict student achievement. According to the third model ($AS_{ij} = \gamma_{00} + \gamma_{01}*SC7_j + \gamma_{02}*SC8_j + u_{0j} + r_{ij}$), it was observed that two variables related to the socio-cultural facilities of schools, namely the adequacy of socio-cultural activity areas (SC7, γ_{01}=16.23; SE=10.70; p=.136) and the number of socio-cultural activities (SC8, γ_{02}=3.20; SE=10.23; p=.756), do not significantly predict student achievement.

A means-as-outcomes model has been established to examine variables related to the school's environment ($AS_{ij} = \gamma_{00} + \gamma_{01}*SC9_j + \gamma_{02}*SC10_j + \gamma_{03}*SC11_j + u_{0j} + r_{ij}$). Concerning student achievement, it is observed that only the variable security of the school environment (SC10) could significantly impact it. The safety of the school environment has a positive effect on students' achievements (γ_{02}= 24.31; SE=6.36; p<.001). However, the variables of the distance of the school from the city center (SC9, γ_{01}=-0.90; SE=1.02; p=.382) and the social structure of the school's environment (SC11, γ_{03}=4.73; SE=4.18; p=.263) were not significant predictors. Upon this finding, the model was re-evaluated by including only the significant variable SC10. In the assessment, it was observed that the model created with only the significant variable had a higher deviation value, but the difference in the chi-square probability was not significant (x^2=2.32711; SD=2; p=.312). Therefore, the final model was constructed using only the SC10 variable. The results are as in Table 3.

Table 3
Estimation of Fixed Effects of the Means-as-Outcomes Model Concerning the School Environment (Final Model)

Fixed effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p*
Intercept1, β_0					
Intercept2, γ_{00}	57.65	15.99	3.604	50	<.001
SC10, γ_{01}	31.70	5.37	5.906	50	<.001

In the final model established regarding the school's environment, it is observed that the safety of the school environment is a significant predictor (SC10, γ_{01}= 31.70; se= 5.37; p<.001). Accordingly, it can be inferred that a one-unit increase in the safety of the school environment could lead to a 31.70-point increase in the average achievement scores of schools. Additionally, the effect size, which illustrates the practical significance of the finding in daily life, is expressed in the table.

The sixth model was about teachers at the schools. Regarding student achievement, it was observed that certain characteristics of teachers, such as the qualification of teachers (SC12, γ_{02} = 27.29; SE=7.79; p=.001), participation in teachers' professional development activities (SC13, γ_{09} = 28.32; SE=13.85; p=.047), and the challenges faced by teachers during instruction (SC14, γ_{10} = −26.37; SE=11.52; p=.027), could potentially be influential. On the other hand, certain teacher-related variables, including the average seniority of teachers (SC15, γ_{01} = .,76; SE= 0.97; p = .076), the percentage of teachers with postgraduate education (SC16, γ_{03} = -0.62; SE = 0.43; p=.162), the average teaching workload of teachers (SC17, γ_{04} = -1.69; se=0.43; p=.162), the university from which teachers graduated (SC18, γ_{05} = 0.16; SE=0.11; p=.150), teachers' reading habits (SC19, γ_{06} = 13.81; SE=13.17; p=.301), teachers' participation in cultural activities (SC20, γ_{07} = 15.85; SE=10.51; p=.139), teachers' participation in social activities (SC21, γ_{08} = 21.81; SE=16.56; p=.195), and problems experienced by teachers (SC22, γ_{011} = 5.29; SE=9.05; p=.562) were not significant predictors. Upon this finding, a reassessment was conducted by including only the significant predictors SC12, SC13, and SC14 in the model. In this assessment, it was observed that the model created with only the significant variables had a higher deviation value, and the difference in the chi-square probability was significant (χ^2 =19.871864; df=8; p=.011). However, the insignificance of

the γ_{00} value in the model indicated the necessity to reconstruct the model. Therefore, the final model was constructed using only the variables SC12, SC13, and SC14. The equation for the model is as follows: $AS_{ij} = \gamma_{00} + \gamma_{01}*SC12_j + \gamma_{02}* SC13_j + \gamma_{03}* SC14_j + u_{0j} + r_{ij.}$

Table 4
Estimation of Fixed Effects of the Means-as-Outcomes Model Concerning the Teachers at Schools (Final Model)

Fixed effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p*
Intercept1, β_0					
Intercept2, γ_{00}	154.72	2.99	51.690	48	<.001
SC12, γ_{01}	38.20	8.49	4.499	48	<.001
SC13, γ_{02}	28.97	14.18	2.043	48	.047
SC14, γ_{03}	−34.72	9.58	−3.625	48	<.001

According to Table 4, it is evident that among the characteristics of teachers in terms of student achievement, the "qualification of teachers" could significantly impact student performance. The qualification of teachers in the school has a positive effect on student achievements (SC12, γ_{01} = 38.20; SE=8.49; p<.001). Thus, an increase of one unit in the qualification of teachers could lead to a 38.20-point increase in the average achievement scores of schools. Another variable that has a positive and significant impact is the "participation of teachers in professional development activities" (SC13, γ_{02}=28.97; SE=14.18; p<.001). In this case, an increase of one unit in teachers' participation in professional development activities could result in a 28.97-point increase in the average achievement scores of schools. Another variable with a significant impact is the "challenges faced by teachers during teaching activities." The challenges faced by teachers during instruction have a negative impact on student achievements (SC14, γ_{03} =−34.72; SE=9.58; p<.001). Thus, an increase of one unit in the challenges faced by teachers during instruction could lead to a 34.72-point decrease in the average achievement scores of schools.

Another model was established to examine variables related to the school atmosphere. Among the variables, the impact of "teachers' perception about the students" on student achievement was found to be statistically significant and it positively predicted students' achievements (SC24, γ_{02} = 33.24; SE=4.53; p<.001). However, the number of disciplinary incidents in the school (SC23, γ_{01} =−0.58; SE=0.35; p=.106) and the collaboration between school administration and teachers (SC25, γ_{03} =−9.67; SE=6.37; p=.136) did not emerge as significant predictors. Following this finding, a reassessment was conducted by including only the significant variable SC24 in the model. In this evaluation, it was observed that the model created with only the significant variable had a higher deviation value, but the difference in the chi-square probability was not significant (χ^2=3.40941; df=2; p=.180). Therefore, the final model was constructed using only the SC24 variable ($AS_{ij} = \gamma_{00} + \gamma_{01}*OKU15_j + u_{0j} + r_{ij}$).

Table 5
Estimation of Fixed Effects of the Means-as-Outcomes Model Concerning the School Atmosphere (Final Model)

Fixed effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p*
Intercept1, β_0					
Intercept2, γ_{00}	155.54	2.57	60.523	50	<.001
SC24, γ_{01}	32.61	4.36	7.475	50	<.001

According to Table 5, it is observed that "student perception in the school" may significantly impact student achievement. Student perception in the school has a positive effect on students' achievements (SC24, γ_{01} = 32.61; SE=4.36; p<.001). Therefore, it can be stated that a one-unit increase in student perception in the school results in a 32.61-point increase in the average achievement scores of schools.

We also included a model about school engagement of students' parents. According to the findings, parental engagement in the school was a significant and positive predictive of student achievement as illustrated in Table 6 (SC25, γ_{01} = 25.64; SE=3.36; p<.001). An increase of one unit in the parental involvement in students' achievements results in a 25.64 point increase in the average school achievement scores.

Table 6
Estimation of Fixed Effects of the Means-as-Outcomes Model Concerning the Parental Engagement

Fixed effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p*
Intercept1, β_0					
Intercept2, γ_{00}	155.20	2.54	61.161	50	<.001
SC25, γ_{01}	25.64	3.36	7.632	50	<.001

Finally, means-as-outcomes model was established to examine the variables related to the student composition of the school. The variables "the rate of divorced families in the school" (SC27, γ_{01} = −0.27; SE=0.37; p=.468) and the number of inclusive students (SC28, γ_{02} = 0.66; SE=0.51; p=.204) were found to be not significant predictors of student success.

4.3. Characteristics of Students' Background Predicting Student Achievement

The research also aimed to explore whether students' achievement scores differ based on their individual characteristics. In this context, if differences exist, an estimation will be made regarding which characteristics contribute to these differences and how much of the variance in achievement they explain. To address this, variables have been theoretically grouped, and separate analyses have been conducted for each group.

The first randomly assigned coefficients model established pertains to students' demographic characteristics. This model ($AS_{ij} = \gamma_{00} + \gamma_{10}*ST1_{ij} + u_{0j} + u_{1j}*ST1_{ij} + r_{ij}$) includes only the gender variable. The results related to the model are presented in Table 7.

Table 7
Estimated Fixed Effects of the Random Coefficients Model for Students' Gender

Fixed Effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p-value*
Intercept1, β_0					
Intercept2, γ_{00}	152.31	3.57	42.643	51	<.001
ST1, Intercept2, γ_{10}	-12.90	2.93	-4.399	51	<.001

Table 7 shows that gender (ST1) has a significant effect on students' outcomes. Accordingly, the average achievement score of female students is higher than that of male students (γ_{10} = −12.90 SE=2.93; p<.001). In other words, being a male student is reflected as a decrease of 12.90 in the average achievement score. It should be noted that the interpretation of this situation is based on the schools' average achievement scores. Therefore, an increase in the proportion of female students in schools will lead to an increase in average achievement scores, while an increase in the proportion of male students will result in a decrease in scores.

Table 8 presents the fixed effects estimates of the random coefficients model related to students' size of family. The number of siblings is identified as a significant factor influencing students' achievement scores. Specifically, the number of siblings has a negative impact on the achievement score (ST2, γ_{10} = -847; SE=1.60; p<.001). Therefore, an increase of one unit in the number of siblings results in a decrease of 8.47 points in the achievement scores. On the other hand, it is found that the number of siblings attending school has a positive effect (ST3, γ_{20} = 4.79; SE=2.08; p=.025). Consequently, an increase of one unit in the number of siblings attending school leads to a 4.79-point increase in student achievement.

Table 8
The fixed effects estimates of the random coefficients model related to students' size of family

Fixed Effect	*Coefficient*	*se*	*t-ratio*	*Approx df*	*p-value*
Intercept1, β_0					
Intercept2, γ_{00}	160.95	4.35	36.972	51	<.001
ST2, Intercept2, γ_{10}	-8.47	1.60	-5.292	51	<.001
ST3, Intercept2, γ_{20}	4.79	2.08	2.309	51	.025

Third model was about students' parents. The first analysis revealed that the educational status of the mother (ST4), the educational status of the father (ST5), and the father's occupation (ST6) are influential factors on student academic performance. On the other hand, variables such as mother's occupation (ST7, $\gamma_{30} = -0.80$; SE=0.70; p=.258), mother's hometown (ST8, γ_{50} = 0.16; SE=2.47; p=.950), and father's hometown (ST9, γ_{60} = 0.78; SE=1.92; p=.403) were not significant predictors. Following this finding, a reevaluation was conducted by including only the significant predictors ST4, ST5, and ST6 in the model. In this reevaluation, it was observed that the model created with only the significant variable had a higher deviation value, but the difference in chi-square probability was not significant ($\chi^2 = 26.95356$; df=18; p=.080). Therefore, the final model was constructed using only the ST4, ST5, and ST6 variables as presented in Table 9.

Table 9
Fixed Effects Estimates of the Random Coefficients Model for Parent-Related Variables (Final Model)

Fixed Effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p-value*
Intercept 1, β_0					
Intercept2, γ_{00}	117.64	9.83	11.967	51	<.001
ST4, Intercept2, γ_{10}	6.72	2.40	2.799	51	.007
ST5, Intercept2, γ_{20}	8.33	2.17	3.842	51	<.001
ST6, Intercept2, γ_{30}	−2.20	0.60	−3.680	51	<.001

It was observed that a higher education level for mothers positively affects students' achievements (ST4, γ_{10} = 6.72; SE=2.40; p=.007). Thus, an increase of one unit in the mother's education level results in a 6.72-point increase in students' achievement scores. Another variable with a significant positive effect related to parents is the "father's education level" (ST5, γ_{20} =8.33; SE=2.17; p<.001). In this case, an increase of one unit in the father's education level leads to an 8.33-point increase in students' achievement scores. Indeed, the father's occupational level negatively affects students' achievements (ST6, $\gamma_{30} = -2.20$; SE=0.60; p<.001). Therefore, an increase of one unit in the father's occupational level results in a 2.20-point decrease in students' achievement scores (Note that as father's occupational level approaches 1, it indicates better occupations according to ISCO).

Fourth model was related to the economic inputs of the family. Among the variables, the family's monthly income and various sources at home was observed as having an impact on student achievement. On the other hand, regarding the economic indicators of the family, variables related to the type of residence the family resides in (ST12, γ_{20} = 2.68; SE=1.70; p=.120) and the ownership of another residence by the family (ST13, $\gamma_{40} = -2.57$; SE=2.33; p=.277) did not emerge as significant predictors. Upon this finding, the significant predictors, ST10 and ST11 variables, were re-evaluated by including them individually in the model. In the evaluation, it was observed that the model created with only the significant variable had a higher deviation value, but the difference in the chi-square probability was not significant (χ^2=12.89535; df=9; p=.167). Therefore, the final model was created using only the ST10 and ST11 variables (see Table 10).

Table 10
Fixed Effects Estimates for the Random Coefficients Model Related to Family Economic Inputs (Final Model)

Fixed Effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p-value*
Intercept 1, β_0					
Intercept2, γ_{00}	111.59	6.55	17.049	51	<.001
ST10, Intercept2, γ_{10}	9.93	1.36	7.271	51	<.001
ST11, Intercept2, γ_{20}	5.86	1.62	3.618	51	<.001

The student achievement was significantly influenced by the family-related characteristic of "family income status." A higher family income status has a positive impact on students' achievements (ST10, γ_{10}=9.93; SE=1.36; p<.001). Thus, an increase of one unit in family income status results in a 9.93-point increase in students' achievement scores. Another variable with a significant positive impact related to the family's economic indicators is the "presence of different assets at home" (ST11, γ_{20}=5.86; SE=1.62; p<.001). In this case, an increase of one unit in the presence of different assets at home leads to a 5.86-point increase in students' achievement scores.

Fifth model was about students' neighbourhood as presented in Table 11. Accordingly, the neighbourhood where the student resides significantly influences student achievement. Therefore, having a neighbourhood with a higher index positively affects academic performance (ST14, γ_{10}=8.02; SE=1.80; p<.001). Thus, an increase of one unit in the neighbourhood index leads to an 8.02-point increase in student achievement.

Table 11
Fixed Effects Prediction of Random Coefficients Model Regarding the Student's Neighborhood

Fixed Effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p-value*
Intercept 1, β_0					
Intercept2, γ_{00}	154.30	3.22	47.847	51	<.001
ST14, Intercept2, γ_{10}	8.02	1.80	4.456	51	<.001

Sixth, a random coefficients model related to the number of books in the student's household has been established. Having a higher number of books in the student's home positively influences academic outcomes (ST15, γ_{10}=10.00; SE=1.26; p<.001). Thus, an increase of one unit in the number of books at home is associated with a 10-point increase in the student's academic performance. The results of the model were presented in Table 12.

Table 12
Fixed Effects Estimate of the Random Coefficients Model Regarding the Number of Books in the Student's Home

Fixed Effect	*Coefficient*	*SE*	*t-ratio*	*Approx df*	*p-value*
Intercept 1, β_0					
Intercept2, γ_{00}	126.77	4.49	28.237	51	<.001
ST15, Intercept2, γ_{10}	10.00	1.26	7.957	51	<.001

According to the seventh model presented in Table 13, having the opportunity for private lessons (ST16, γ_{10}=9.98; SE=0.94; p<.001), participation in supplementary courses (ST17, γ_{20}=8.73; SE=1.17; p<.001) and having extra financial resources for students' learning (ST18, γ_{30}=3.88; SE=1.14; p=.002) positively influenced the student's achievement score. Thus, an increase of one unit in having private lessons, participation in supplementary courses, and having extra financial resources resulted in an increase of 9.98, 8.73, and 3.88 points in the student's achievement, respectively. The model outcome was presented in Table 13.

Table 13
Fixed Effects Estimate of the Random Coefficients Model Regarding Learning Opportunities of Students

Fixed Effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p-value*
Intercept 1, β_0					
Intercept2, γ_{00}	110.69	4.03	27.461	51	<.001
ST16, Intercept2, γ_{10}	9.98	0.94	10.572	51	<.001
ST17, Intercept2, γ_{20}	8.73	1.17	7.469	51	<.001
ST18, Intercept2, γ_{30}	3.88	1.19	3.261	51	.002

Lastly, a random coefficients model has been established for social life-related opportunities. The participation of students in socio-cultural activities such as cinema, theatre or sports positively influenced their academic success. On the other hand, the activities students engage in during holidays do not significantly predict academic success (ST20, γ_{20}=0.63; SE=1.43; p=.663). Based on this finding, the significant predictor variable ST19 was reevaluated by incorporating it into the model individually. In the assessment, it was observed that the model created solely with the significant variable had a higher deviation value, but the difference in the chi-square probability was not significant ($\chi^2 = 5.92448$; df=3; p=.114). Therefore, the final model was constructed using only the ST19 variable as presented in Table 14.

Table 14
Estimated Fixed Effects of the Random Coefficients Model on Students' Social Life (Final Model)

Fixed Effect	*Coefficient*	*SE*	*t-ratio*	*Approx. df*	*p-value*
Intercept 1, β_0					
Intercept2, γ_{00}	153.18	3.33	45.960	51	<0.001
ST19, Intercept2, γ_{10}	8.84	1.54	5.734	51	<0.001

According to Table 14, student achievement was significantly influenced by students' participation in socio-cultural activities. Higher participation in socio-cultural activities has a positive impact on students' achievements (ST19, γ_{10}=8.84; SE=1.54; p<.001). Thus, an increase of one unit in participation in socio-cultural activities leads to an increase of 8.84 points in students' achievement scores.

4.4. School Advantages Index

The fourth research question aims to create an index for school advantages to evaluate schools with an alternative approach to reflect on equality of opportunity. For this purpose, the variables predicting achievement in HLM models were first identified, and the weights of these variables in the index were considered based on their prediction coefficients. The weighted prediction coefficients were multiplied by the standardized value of the school's mean in the respective variable. Subsequently, the obtained results were transformed into standardized *t*-scores for ease of interpretation. In Table 15, scores of 10 schools are shown as examples among 52 schools for illustrative purposes.

Table 15
School Advantages Index of Some Schools

Rank	*School Code*	*SAI*	*Rank*	*School Code*	*SAI*
1st	SCH32T	74.04	48th	SCH44T	35.18
2nd	SCH43T	70.16	49th	SCH49T	34.91
3rd	SCH24O	68.79	50th	SCH23O	34.38
4th	SCH47T	67.83	51st	SCH7O	33.17
5th	SCH12O	63.12	52nd	SCH37T	29.41

The schools with high index scores can be interpreted as advantaged based on their student profiles and resources, while those with low index scores are considered disadvantaged. As observed, the SAI scores of the schools range between 29.41 and 74.04. Accordingly, the most

advantaged school is SCH32T with an index score of 74.04, while the least advantaged school is SCH37T with an index score of 29.41. Please note that these values are shaped according to the selected sample group and serve only as an illustrative model.

4.5. Effectiveness of Schools based on Their Advantages

The fifth research question of the study is concerned with establishing a framework for evaluating the effectiveness of schools using SAI. In assessing schools, ratio analysis has been employed to determine effectiveness scores. Table 16 provides a comparative presentation of the averages obtained by some schools in the achievement exam and school advantage indices. We also included schools' average scores obtained from central success exam to have a clearer view.

Table 16
Achievement, SAI, and Effectiveness Scores of Schools

School Code	*Achievement Score*		*Central Exam (CE) Average*		*SAI*		*Effectiveness Score (ES)*	
	Score	Rank	Score	Rank	Score	Rank	Score	Rank
SCH24O	206.40	1st	371.03	1st	68.79	3rd	3.0004	24th
SCH32T	200.91	2nd	367.58	2nd	74.04	1st	2.7136	45th
SCH25O	195.75	3rd	282.63	33rd	52.49	20th	3.7289	5th
SCH43T	195.45	4th	336.97	6th	70.16	2nd	2.7860	39th
SCH50T	193.57	5th	330.32	9th	61.02	8th	3.1721	16th
SCH12O	189.33	6th	358.89	4th	63.12	5th	2.9997	25th
SCH26O	183.65	7th	326.79	12th	62.46	6th	2.9401	32nd
SCH3O	182.69	8th	320.88	14th	61.00	9th	2.9950	27th
SCH36T	127.35	45th	264.82	41st	43.02	41st	2.9601	30th
SCH33T	126.67	46th	252.43	48th	44.09	38th	2.8731	37th
SCH16O	120.40	47th	255.43	46th	36.50	46th	3.2984	13th
SCH20O	117.89	48th	275.90	37th	39.35	44th	2.9959	26th
SCH23O	116.25	49th	230.19	52nd	34.38	50th	3.3816	9th
SCH37T	107.86	50th	258.94	44th	29.41	52nd	3.6672	6th
SCH28T	86.00	51st	268.17	40th	37.43	45th	2.2975	52nd
SCH7O	76.67	52nd	254.44	47th	33.17	51st	2.3116	51st

The rankings of SAI and effectiveness show variability. For instance, the school ranked first in the achievement ranking differs in the SAI and effetiveness rankings. To provide a more comprehensive interpretation, the rankings of schools in terms of achievement, SAI, and effectiveness were examined through the Spearman Rank Differences Correlation, and the results are presented in Table 17.

Table 17
The Relationship between School Rankings in AS, CE, SAI, and ES

Variables	*1*	*2*	*3*	*4*
1-AS	1			
2-CE	0.753**	1		
3-SAI	0.799**	0.825**	1	
4-ES	0.092	−0.317*	−0.436*	1

n=52; **$p < .01$; * $p < .05$

According to Table 17, there is a significantly positive correlation between the average scores schools obtained in the current research exam and their scores from the CE (r=.75; p<.01). Additionally, a strong positive correlation exists between schools' SAI scores and their average achievement scores (r=.80; p<.01) as well as CE scores (r=.82; p<.01). This implies that as schools' SAI scores increase, their academic achievements also tend to increase. While no significant relationship was found between schools' ES and aAS (r=.09; p>.05), a moderate negative

correlation can be observed between CE scores and ES (r=−.32; p<.05). Furthermore, a moderate negative correlation exists between SAI scores and ES (r=−.44; p<.01), suggesting that as SAI values increase, effectiveness scores tend to decrease.

5. Conclusion and Discussion

In the present study, we initially delved into the parental, environmental, economic, and socio-cultural factors that could potentially influence students in achieving academic success. Additionally, we examined various characteristics of the schools they attended. In this regard, it has been observed that factors related to students' families, environments, and individual circumstances may have a more significant impact on their success than the specific features of the schools they attend. Our analysis revealed that a substantial portion of the variance in academic achievement among students can be attributed to differences in their socio-economic opportunities. Considering recent studies, it is possible to observe a recurrence of similar findings in numerous research endeavors that, in parallel with the present investigation, scrutinize student achievement within a hierarchical data structure encompassing both school and family levels (eg. Akyüz-Aru, 2020; Berkowitz et al., 2017; Fryer & Levitt, 2013; Nonoyama-Tarumi et al., 2015; Teodorovic, 2011).

Influential factors in student academic achievement encompass gender, siblings, parental education, occupation, family income, home resources, residential environment, books at home, private tutoring, enrichment courses, opportunities, and social life. These findings are compatible with previous research. Consistent with literature, girls generally outperform boys (e.g., Fortin et al., 2015; Lietz, 2006; Matthews et al., 2009; Siddiq & Scherer, 2019). Research by Gelbal (2010), Karwath et al. (2014), and Marks (2006) indicates a negative impact of total siblings on academic performance. Conversely, siblings attending school positively impact achievement, fostering peer-like solidarity (Nicoletti & Rabe, 2014). Parental education is a crucial determinant (Çiftçi & Çağlar, 2014; Häkkinen et al., 2003; Martins & Veiga, 2010; Sirin, 2005). Contrarily, research deems the mother's occupation insignificant; Marks (2008) revealed the father's occupation as more pivotal across thirty OECD countries. Family economic resources, akin to parental education, differentiate from the student's initial school steps, affecting cognitive skills (Garcia, 2015; Magnuson & Duncan, 2006). Higher socio-economic levels in the environment lead to increased academic achievement, while disadvantaged areas may experience a decline (Ainsworth, 2002; Greenman et al., 2011; Leventhal & Brooks-Gunn, 2004). The rise in home books positively affects student achievement (Chiu & Xihua, 2008; Evans et al., 2010; Hoxby, 2001; Woessmann, 2004). Private tutoring, as 'shadow education,' impacts student achievements, although less studied than socio-economic indicators (Bray & Kobakhidze, 2015; Hamid et al., 2009; Yeşilyurt & Say, 2016; Zhang & Bray, 2018). Successful students engage in socio-cultural activities like theatre or museums (Greene et al., 2018; Hoxby, 2001; Swan, 2014; Yücel et al., 2013).

On the other hand, the variables influencing students' academic achievements at school level can be reviewed in three groups. The first group is related to the school environment. According to research results, schools perceived as safer have a positive impact on student achievement in their surroundings. Similarly, in the research by Berman et al. (2018), the ratio of drug cases in the school's vicinity has been found to impact student achievement, and adult arrest rates also influence students' absenteeism. Bowen and Bowen (1999) stated in their study that dangers in the school environment negatively affect student achievement. The second group includes characteristics related to teachers. In this context, the high quality of teachers, their participation in professional training activities, and their positive perception of the potential success of students in the school can enhance student achievement. However, an increase in the problems experienced by teachers in carrying out instructional activities has been found to have negative effects on student success. It is widely acknowledged that, concerning school characteristics, the most influential factor affecting student achievement is teachers (Hanushek & Woessmann, 2011). In their evaluation based on PISA and TALIS, Mammadov and Çimen (2019) demonstrate that

educationally successful countries are those that minimize negative traits related to teachers, such as lacking sufficient subject knowledge, failure in classroom management, and unwillingness to engage in professional development activities. The third group is associated with student parents. Accordingly, in schools with high school-parent interaction and, consequently, more involved parents, students' achievements are positively influenced. According to various studies in the literature (Fan & Chen, 2001; Heynes, 2003; Ingram et al., 2007; Park et al., 2017; Yıldırım & Kalman, 2023) an increase in interaction between schools and families may positively reflect on student achievements.

After identifying the school and student-based variables affecting academic achievement in the study, the school-based averages of these variables were computed, and each variable's scores were standardized. Subsequently, utilizing these averages, an advantage index was created for each school. In this index, schools with advantageous positions in terms of student, teacher, and other school-related indicators had higher scores, while disadvantaged schools had lower scores. This is clearly depicted in Figure 1.

Figure 1
Comparison of SAI and Schools' Average Achievement Scores

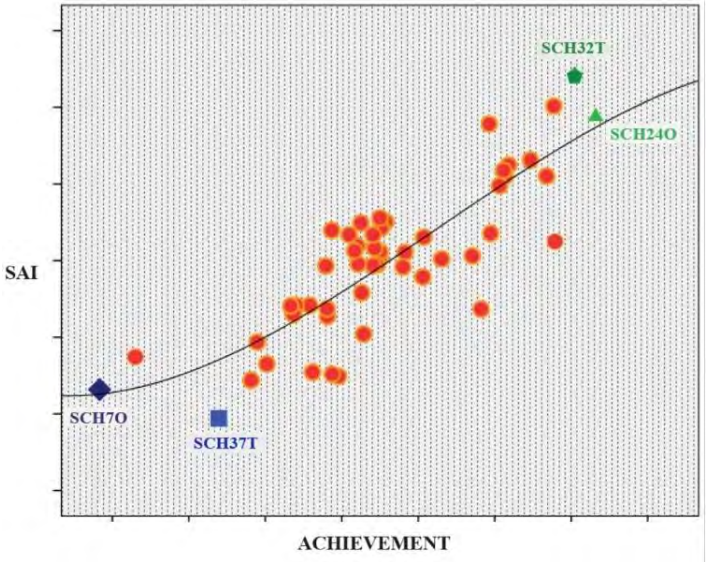

Figure 1 provides a comparative presentation of schools' average achievement scores and school advantage index scores. To examine specific cases, certain schools have been considered with code labels. When examining the characteristics of schools SCH37T and SCH7O, it is evident that they are in the worst conditions concerning various student attributes, such as economic indicators of the family, number of books at home, opportunities available to the student, socio-cultural life of the student, mother's and father's educational status, number of siblings, father's occupation, and access to private tutoring. In this regard, the socio-economic background of students in these two schools is significantly lower than that of others. Moreover, a similar situation is observed within the school-specific features. For example, both schools rank at the bottom in terms of the safety of the school environment. While SCH7O has the least school-parent interaction, SCH37T ranks 44th out of 52 in this aspect. In terms of teacher quality, SCH7O is 35th, and SCH37T is 44th. The perception toward students is low in both schools, and they rank among the lowest five schools regarding teachers' participation in professional training activities. SCH37T is identified as the school where teachers face the most challenges, while SCH7O ranks 4th in this regard.

In the literature, one can come across other studies indicating that the performance of schools is negatively affected by the number of disadvantaged students. Furthermore, schools with a higher proportion of disadvantaged students can deteriorate over time due to the associated impact (Levacic & Woods, 2002). Additionally, in the education system in Turkey, the success an student achieves determines the school they will enroll in for the next level of education after primary

education. Since students are initially segregated based on their socio-economic levels, their placement in different types of schools according to their achievements further deepens unequal opportunities (Schütz et al., 2008). From this perspective, the current enrollment zone system contradicts the ideal structure in both fair opportunity equality and radical opportunity equality analyses, as indicated by research findings.

The principle of fair opportunity equality advocates for social positions to be accessible to everyone without any restrictions based on social class or other indicators originating from family backgrounds, ensuring unrestricted access for individuals with similar motivation and abilities (Rawls, 1999; 2001). However, the enrollment zone system, by confining students within specified boundaries, guarantees the formation of homogeneous groups within schools. Consequently, a currently disadvantaged student struggles to find a place within school profiles with high advantage indices. When schools are regarded as social positions, this restricts the disadvantaged student's access to advantaged schools. Despite the state's role as a regulatory institution, obligated to equitably meet individuals' needs, it is not inaccurate to assert that the enrollment zone system is influenced by a political framework sustaining existing inequalities. Research findings indicate that a student's opportunities in education are determined by the socio-economic and cultural foundations in their surrounding environment. Yet, achieving equal opportunities in education is feasible by minimizing the impact of different socio-economic and cultural backgrounds on students. Therefore, it is crucial to question how basic rights and responsibilities are distributed and how opportunities in society are created for individuals from diverse strata (Rawls, 1999). In light of this, it is necessary to consider systems that bring together various socio-economic structures, such as the school advantage index resulting from research, instead of the enrollment zone system for determining schools.

On the other hand, according to radical opportunity equality, any disadvantage for which an individual cannot be held responsible is considered unjust and unfair. When considered in an educational context, every difference that students did not cause themselves distances the education system from equal opportunity (Segall, 2013). In this regard, as seen in research findings, variations in students' achievements occur due to numerous factors beyond their control. Moreover, this differentiation deepens further due to the current structure of the education system. Disadvantaged students, because of reasons beyond their control, find themselves compelled to attend schools that perpetuate their disadvantages. While the existing structure of the education system should aim to balance situations that students did not choose by their own will (Arneson, 2015), it, in fact, plays a disruptive role within this balance. In radical opportunity equality, the only determining factor in a student's educational process should be the unique choices they make related to their education (Calvert, 2014; Scheffler, 2003). In this scenario, any restriction due to the socio-economic structure in which a student finds themselves eliminates any chance for unique choices.

Comparing school achievements with the school advantage index sheds light on the dilemma posed in the literature as to whether education serves as a mitigator or a perpetuator of social stratification. In this sense, the research results align more closely with the position of being a 'perpetuator of social stratification,' departing from Miller (1959) and Parsons (1959) and focusing on Bernstein (1975), Bourdieu and Passeron (1990), Bowles and Gintis (2011), and Willis (1981). As seen in the above examples, disadvantaged students are already receiving education in disadvantaged schools, while advantaged students are attending advantaged schools. In this context, the results of the research can be interpreted through Bourdieu's conceptualization of reproduction. The study reveals that students, in a sense, are confined to educational opportunities that their social class can provide. Consequently, they encounter difficulties in accessing more constructive and decisive opportunities related to their education. When compared with advantaged students, those who cannot access these opportunities continue to remain in the social stratum of their families. Therefore, both generally in the education system and specifically through schools, the social stratum in which students find themselves tends to repeat and

reproduce. However, a more egalitarian understanding is necessary for students to break free from this structure. Achieving this equality in education systems is only possible through strategies that support disadvantaged students more in closing the achievement gaps with their peers (Murphy, 2010). The efforts, time, and resources that successful countries allocate to disadvantaged students in international exams support the necessity of these strategies (Patterson, 2013).

Considering the advantage situations of some schools labeled as unsuccessful, it has emerged that they may indeed be effective schools. To better interpret these results, the relationship between schools' achievement rankings, advantage indices, and efficiency scores has been examined. Consequently, a high-level relationship has been observed between schools' achievements and advantage indices, while there is a moderate negative correlation between efficiency scores and advantage indices. It can be inferred from this that the advantages schools possess play a significant role in being classified as successful. On the other hand, an increase in schools' advantage indices tends to decrease their effectiveness scores. Therefore, schools perceived as successful may not necessarily be so when considering both advantages and disadvantages. It can be suggested that a disadvantaged school, by effectively utilizing its available resources, could create more value in students' achievements.

For example, SCH32T ranks second in average achievement score and first in the school advantage index. However, when examining the effectiveness score derived from considering the school's SAI score, it is observed that it drops to the forty-fifth position. Therefore, despite appearing as a successful school, SCH32T may owe this success largely to being more advantageous than others at both the student and school levels. While SCH22O seems less successful compared to SCH32T, it emerges as the most effective school when considering the school advantage index reflecting the inputs of the school. Similarly, SCH49T, with a success rank of 36, is a school ranked 50th in terms of SAI. However, it occupies the second position as an efficiency score. Thus, SCH22O and SCH49T can create more value in outputs compared to SCH32T under the existing conditions. SCH14O, on the other hand, shows little variation in success ranks concerning the three indicators. Therefore, it effectively utilizes its school advantages and produces the expected output. However, SCH7O ranks at the bottom for all three indicators. This indicates that the school is not effective, cannot bring about any transformation in disadvantaged students, and therefore requires different measures, approaches, and support. As this school is less impactful on the development of disadvantaged students compared to others, these students are more at risk educationally.

In the end, our suggestion is that education systems need to have a more holistic approach to evaluate school performances. To provide both fair and radical equality of opportunity, each school should chart a course considering its own conditions regarding the education of disadvantaged students. Schools identified as less effective, such as SCH7O, should receive targeted support and interventions to improve their impact on disadvantaged students. For schools, particularly those with higher advantage indices, focus should be on optimizing their available resources to enhance operational effectiveness. Moreover, this evaluation model can be considered as a benchmarking mechanism for schools. Regular monitoring and evaluation of school performance, considering both advantages and disadvantages, should be conducted to adapt strategies and policies accordingly.

Acknowledgements: This study is part of a doctoral dissertation titled 'Developing School Advantages Index for School Profiles in terms of Equality of Educational Opportunity'.

Author contributions: The first author was responsible for all the process of the manuscript. The second author was supervisor, and the third was supervisor for statistical analysis.

Declaration of interest: The authors declare that no competing interests exist.

Funding: No funding source is reported for this study.

References

Ainsworth, J. W. (2002). Why does it take a village? The mediation of neighborhood effects on educational achievement. *Social Forces, 81*(1), 117-152. https://doi.org/10.1353/sof.2002.0038

Akyüz-Aru, S. (2020). *Investigation of variables affecting science and mathematics success of grade 4 students "TIMSS 2015 status analysis* (Publication no. 611893) [Doctoral dissertation, Gazi University]. Council of Higher Education Thesis Center.

Alexander, L. A. (1986). Fair equality of opportunity: John Rawls' (best) forgotten principle. *Philosophy Research Archieves*, *11*, 197-208. https://doi.org/10.5840/pra19851111

Anderson, E. S. (1999). What is the point of equality?. *Ethics, 109*(2), 287-337. https://doi.org/10.1086/233897

Arneson, R. J. (1989). Equality and equal opportunity for welfare. *Philosophical Studies, 56*(1), 77-93. https://doi.org/10.1007/BF00646210

Arneson, R. J. (1999). Against rawlsian equality of opportunity. *Philosophical Studies, 93*, 77-112. https://doi.org/10.1023/A:1004270811433

Arneson, R. J. (2011). Luck egalitarianism - a primer. In C. Knight, & Z. Stemplowska (Eds), *Responsibility and distributive justice* (pp. 24-50). Oxford University Press

Arneson, R. J. (2015). *Equality of opportunity.* The Stanford Encyclopedia of Philosophy.

Berkowitz, R., Moore, H., Astor, R. A., & Benbenishty, R. (2017). A research synthesis of the associations between socioeconomic background, inequality, school climate, and academic achievement. *Review of Educational Research, 87*(2), 425 –469. https://doi.org/10.3102/0034654316669821

Berman, J. D., McCormack, M. C., Koehler, K. A., Connolly, F., Clemons-Erby, D., Davis, M. F., Gummerson, C., Leaf, P. J., Jones, T. D. & Curriero, F. C. (2018). School environmental conditions and links to academic performance and absenteeism in urban, mid-Atlantic public schools. *International Journal of Hygiene and Environmental Health, 221*, 800-808. https://doi.org/10.1016/j.ijheh.2018.04.015

Bernstein, B. (1975). *Class, codes, and control.* Routledge.

Bourdieu, P. (1986). The forms of capital. In J. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241–258). Greenwood.

Bourdieu, P. & Passeron, J. (1990). *Reproduction in Education, Society and Culture.* Sage.

Bowen, N. K., & Bowen, G. L. (1999). Effects of crime and violence in neighborhoods and schools on the school behavior and performance of adolescents. *Journal of Adolescent Research, 14*(3), 319-342. https://doi.org/10.1177/0743558499143003

Bowles, S., & Gintis, H. (2011). *Schooling in capitalist America: educational reform and the contradictions of economic life.* Basic.

Brando, N. (2016). Distributing educational opportunities: positionality, equality and responsibility. *International Journal of Children's Rights, 24*, 575-598. https://doi.org/10.1163/15718182-02403006

Bray, M., & Kobakhidze, M. (2015). Evolving ecosystems in education: The nature and implications of private supplementary tutoring in Hong Kong. *Prospects: Quarterly Review of Comparative Education, 45*, 465-481. https://doi.org/10.1007/s11125-015-9353-2

Calvert, J. S. (2014). *Luck egalitarianism and educational equality* [Unpublished doctoral dissertation]. University of Canterbury, Christchurch.

Cavanagh, M. (2002). *Against equality of opportunity.* Oxford University Press.

Chiu, M. M., & Xihua, Z. (2008). Family and motivation effects on mathematics achievement: Analyses of students in 41 countries. *Learning and Instruction, 18*, 321-336. https://doi.org/10.1016/j.learninstruc.2007.06.003

Cohen, G. A. (1989). On the currency of egalitarian justice. *Ethics, 99*, 906-944. https://doi.org/10.1086/293126

Cohen, G. A. (2009). *Why not socialism*. Princeton University Press

Çiftçi, C. & Çağlar, A. (2014). The effect of socio-economic characteristics of parents on student achievement: Is poverty destiny? *International Journal of Human Sciences, 11*(2), 155-175. https://doi.org/10.14687/ijhs.v11i2.2914

Demirci, A. (2018). *Teori ve uygulamalarla veri zarflama analizi.* Gazi Publishing.

Dworkin, R. (1981). What is equality? Part 2: Equality of resources. *Philosophy and Public Affairs, 10*(4), 285-345.

Dworkin, R. (2002). *Sovereing virtue: the theory and practice of equality.* Harvard University Press.

Evans, M. D., Kelley, J., Sikora, J., & Treiman, D. J. (2010). Family scholarly culture and educational success: Books and schooling in 27 nations. *Research in Social Stratification and Mobility, 28*, 171-197. https://doi.org/10.1016/j.rssm.2010.01.002

Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: a meta-analysis. *Educational Psychology Review, 13*(1), 1-22. https://doi.org/10.1023/A:1009048817385

Fishkin, J. (2014). *Bott lenecks: A new theory of equal opportunity.* Oxford University Press.

Fortin, N. M., Oreopoulos , P., & Phipps, S. (2015). Leaving boys behind gender disparities in high academic achievement. *The Journal of Human Resources, 50*(3), 545-579. https://doi.org/10.3368/jhr.50.3.549

Fryer, R. G., & Levitt, S. D. (2013). Testing for racial differences in the mental ability of young children. *American Economic Review, 103*(2), 981-1005. https://doi.org/10.1257/aer.103.2.981

Garcia, E. (2015). *Inequalities at the starting gate: cognitive and noncognitive skills gap between 2010-2011kindergarten classmates.* Economic Policy Institute.

Gegekoğlu, Ş. (2023). Evaluation of address-based school enrollment policy in the context of equal opportunity. *Political Economy and Management of Education, 4*(1), 23-41.

Gelbal, S. (2010). The effect of socio-economic status of eighth grade students on their achievement in Turkish. *Education and Science, 33*(150), 1300-1337.

Greene, J. P., Erickson, H. H., Watson, A. R., & Beck, M. I. (2018). The Play's the thing: Experimentally examining the social and cognitive effects of school field trips to live theater performances. *Educational Researcher, 47*(4), 246–254. https://doi.org/10.3102/0013189X18761034

Greenman, E., Bodovski, K., & Reed, K. (2011). Neighborhood characteristics, parental practices and children's mathachievement in elementary school. *Social Science Research, 40*, 1434-1444. https://doi.org/10.1016/j.ssresearch.2011.04.007

Häkkinen, I., Kirjavainen, T., & Uusitalo, R. (2003). School resources and student achievement revisited: New evidence from panel data. *Economics of Education Review, 22*, 329-335. https://doi.org/10.1016/S0272-7757(02)00060-2

Hamid, M., Obaidul, R. S., & Asaduzzaman, K. (2009). Private tutoring in English for secondary school students in Bangladesh. *TESOL Quarterly, 43*(2), 281-308. https://doi.org/10.1002/j.1545-7249.2009.tb00168.x

Hanushek, E. A., & Woessmann, L. (2011). The economics of ınternational differences in educational achievement. E. A. Hanushek, S. Machin, & L. Woessmann (Ed.), *Handbook of the economics of education (Volume III)* (pp. 89-200). North Holland.

Harris, D. N. (2007). High-Flying schools, student disadvantage, and the logic of NCLB. *American Journal of Education, 113*(3), 367-394. https://doi.org/10.1086/512737

Heynes, W. H. (2003). A meta analysis: The effects of parental ınvolvement on minority children's academic achievement. *Education and Urban Society, 35*(2), 202-218. https://doi.org/10.1177/0013124502239392

Howe, K. R. (1989). In defense of outcomes-based conceptions of equal educational opportunity. *Educational Theory, 39*(4), 317-336. https://doi.org/10.1111/j.1741-5446.1989.00317.x

Hoxby, C. M. (2001). If families matter most, where do schools come in? In T. M. Moe (Ed.), *A primer on America's schools* (pp. 89-126). Hoover Institution Press.

Ingram, M., Wolfe, R. B., & Lieberman, J. M. (2007). The role of parents in high-achieving schools serving low-income, at-risk populations. *Education and Urban Society, 39*(4), 479-497. https://doi.org/10.1177/0013124507302120

Karwath, C., Relikowski, I., & Schmitt, M. (2014). Sibling structure and educational achievement: How do the number of siblings, birth order,and birth spacing affect children's vocabulary competences? *Zeitschrift für Familienforschung, 26*(3), 372-396. https://doi.org/10.3224/zff.v26i3.18993

Knight, C. (2013). Luck egalitarianism. *Philosophy Compass, 8*(10), 924-934. https://doi.org/10.1111/phc3.12077

Kocaoğlu, M. (2017). *John Rawls: Adalet teorisi ve temel kavramları* [John Rawls: Theory of justice and its basic concepts]. Imaj Publishing.

Lazenby, H. (2016). What is equality of opportunity in education? *Theory and Research in Education, 14*(1), 65-76. https://doi.org/10.1177/1477878515619788

Levacic, R., & Woods, P. A. (2002). Raising school performance in the league tables (Part 1): Disentangling the effects of social disadvantage. *British Educational Research Journal, 28*(2), 207–226. https://doi.org/10.1080/01411920120122158

Leventhal, T., & Brooks-Gunn, J. (2004). A randomized study of neighborhood effects on low-income children'seducational outcomes. *Developmental Psychology, 40*(4), 488–507. https://doi.org/10.1037/0012-1649.40.4.488

Lietz, P. (2006). A meta-analysis of gender differences in reading achievement at the secondary school level. *Studies in Educational Evaluation, 32*, 317-344. https://doi.org/10.1016/j.stueduc.2006.10.002

Lio, W., & Azen, R. (2013). Determining predictor ımportance in hierarchical linear models using dominance. *Journal of Educational and Behavioral Statistics, 38*(1), 3-31. https://doi.org/10.3102/1076998612458319

Lippert-Rasmussen, K. (2005). Hurley on egalitarianism and the luck-neutralizing aim the luck-neutralizing aim. *Politics, Philosophy & Economics, 4*(2), 249–265. https://doi.org/10.1177/1470594X05052543

Magnuson, K. A., & Duncan, G. J. (2006). The role of family socioeconomic resources in the black–white test score gap among young children. *Developmental Review, 26*, 365-399. https://doi.org/10.1016/j.dr.2006.06.004

Mammadov, R., & Çimen, İ. (2019). Optimizing teacher quality based on student performance: A data envelopment analysis on PISA and TALIS. *International Journal of Instruction, 12*(4), 767-788. https://doi.org/10.29333/iji.2019.12449a

Marks, G. (2006). Family size, family type and student achievement: Cross-national differences and the role of socioeconomic and school factors. *Journal of Comparative Family Studies, 37*(1), 1-24. https://doi.org/10.3138/jcfs.37.1.1

Marks, G. (2008). Are father's or mother's socioeconomic characteristics more important influences on student performance? Recent ınternational evidence. *Social Indicators Research, 85*(2), 293-309. https://doi.org/10.1007/s11205-007-9132-4

Martins, L., & Veiga, P. (2010). Do inequalities in parents' education play an important role in PISA students' mathematics achievement test score disparities? *Economics of Education Review, 29*, 1016-1033. https://doi.org/10.1016/j.econedurev.2010.05.001

Mason, A. (2001). Equality of opportunity, old and new. *Ethics, 111*(4), 760-781. https://doi.org/10.1086/233572

Mason, A. (2006). *Levelling the playing field: The ideal of equal opportunity and its place in egalitarian thought.* Oxford University Press.

Matthews, J. S., Ponitz, C. C., & Morrison, F. J. (2009). Early Gender differences in self-regulation and academic achievement. *Journal of Educational Psychology, 101*(3), 689–704. https://doi.org/10.1037/a0014240

Miller, D. (1996). Two cheers for meritocracy. *Journal of Political Philosophy, 4*(4), 277-301. https://doi.org/10.1111/j.1467-9760.1996.tb00053.x

Mithaug, D. E. (1996). *Equal opportunity theory.* Sage.

Morabito, C., & Vandenbroeck, M. (2015). Equality of opportunities, divergent conceptualisations and their implications for early childhood care and education policies. *Journal of Philosophy of Education, 49*(3), 456-472. https://doi.org/10.1111/1467-9752.12112

Murphy, J. (2010). *The Educator's handbook for understanding and closing achievement gaps.* Corwin.

Napoletano, T. (2024). Meritocracy, meritocratic education, and equality of opportunity. *Theory and Research in Education, 14*(1), 65-76. https://doi.org/10.1177/14778785241226662

Nicoletti, C., & Rabe, B. (2014). *Sibling spillover effects in school achievement.* The Institute for the Study of Labor.

Nonoyama-Tarumi, Y., Hughes, K., & Willms, J. D. (2015). The role of family background and school resourceson elementary school students' mathematics achievement. *Prospects*: *Quarterly Review of Comparative Education, 45*(3), 305-324. https://doi.org/10.1007/s11125-015-9362-1

OECD. (2012). *Equity and quality in education: supporting disadvantaged students and schools.* Author.

OECD. (2018). *Equity in education: Breaking down barriers to social mobility.* Author.

OECD. (2019). *PISA 2018 results (Volume II): Where all students can succeed.* Author.

Park, S., Stone, S. I., & Holloway, S. D. (2017). School-based parental involvement as a predictor of achievement and schoollearning environment: An elementary school-level analysis. *Children and Youth Services Review, 82*, 195-206. https://doi.org/10.1016/j.childyouth.2017.09.012

Parsons, T. (1959). The school class as a social system some of its functions in American society. *Harvard Educational Review, 29*(4), 297-318.

Patterson, R. (2013). Finland – a model of teacher professionalism. In J. Morris, & R. Patterson (Eds), *Around the world: The evaluation of teaching profession* (pp. 29-40). The New Zealand Initiative.

Pogge, T. (2007). *John Ralws: His life and theory of justice.* Oxford University Press.

Raudenbush, S., & Bryk, A. S. (2002). *Hierarchical linear models: Applications and data analysis methods.* Sage.

Rawls, J. (1999). *A theory of justice.* Harvard University Press.

Rawls, J. (2001). *Justice as fairness: A restatement.* Harvard University Press.

Roemer, J. E. (1992). Providing equal educational opportunity: Public vs. voucher schools. *Social Philosophy & Policy, 9*(1), 291-309. https://doi.org/10.1017/S026505250000368X

Roemer, J. E. (1998). *Equality of opportunity.*Harvard University Press.
Scheffler, S. (2003). What is egalitarianism? *Philosophy & Public Affairs, 31*(1), 5-39. https://doi.org/10.1111/j.1088-4963.2003.00005.x
Schütz, G., Ursprung, H. W., & Wößmann, L. (2008). Education policy and equality of opportunity. *KYKLOS, 61*(2), 279-308. https://doi.org/10.1111/j.1467-6435.2008.00402.x
Segall, S. (2013). *Equality and opportunity.* Oxford University Press.
Sher, G. (2010). Real-world luck egalitarianism. *Social Philosophy and Policy, 27*(1), 218-232. https://doi.org/10.1017/S0265052509990094
Shields, L., Newman, A., & Satz, D. (2017). *Equality of educational opportunity.* The Stanford Encyclopedia of Philosophy.
Siddiq, F., & Scherer, R. (2019). Is there a gender gap? A meta-analysis of the gender differences instudents' ICT literacy. *Educational Research Review, 27*, 205-217. https://doi.org/10.1016/j.edurev.2019.03.007
Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75*(3), 417-453. https://doi.org/10.3102/00346543075003417
Swan, D. W. (2014). *The effect of informal learning environments during kindergarten on academic achievement during elementary school* [Paper presentation]. Annual Meeting of the American Education Research Association, Philadelphia, PA.
Teodorovic, J. (2011). Classroom and school factors related to student achievement: What works for students? *School Effectiveness and School Improvement, 22*(2), 215-236. https://doi.org/10.1080/09243453.2011.575650
Tezcan, M. (2015). *Eğitim sosyolojisi* [Educational sociology]. Anı Publishing.
UNESCO. (2019). *The technical cooperation group on the indicators for SDG 4*. Author.
Willis, P. (1981). *Learning to labor.* Teachers College Press.
Woessmann, L. (2004). *How equal are educational opportunities? Family background and student achievement in Europe and the US.* CESifo Working Papers.
Yeşilyurt, E. & Say, D. (2016). Factors affecting success of high school students in Turkey. *Ege Academic Review*, *16*(3), 541-554.
Yıldırım, C.S. & Kalman, M. (2023). School improvement experiences of school principals working in low socio-economic environments: A narrative ınquiry. *Boğaziçi University Journal of Education, 40*(2), 195-226. https://doi.org/10.52597/buje.1072159
Yücel, C., Boyacı, A., Demirhan, G. & Karatasş, E. (2013). Evaluation of administrative functionality and ınvestigation of problems in the terms of economic, social and cultural capitals: "enrollment zone" (hinterland) practice in national education organizational system. *Educational Management in Theory and Practice, 19*(1), 135-151.
Zhang, W., & Bray, M. (2018). Equalising schooling, unequalising private supplementary tutoring: Access and tracking through shadow education in China. *Oxford Review of Education, 44*(2), 221-228. https://doi.org/10.1080/03054985.2017.1389710