# Evaluation of an Educational Reform in the Context of Equal Opportunities in Turkey: Policy Recommendations with Evidence from PISA

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# Evaluation of an Educational Reform in the Context of Equal Opportunities in Turkey: Policy Recommendations with Evidence from PISA[*]

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## Abstract

The purpose of this research is to identify the current situation regarding equality of educational opportunity after the implementation of 12-year compulsory education which serves as a reform in Turkey on the basis of key indicators and to suggest policy recommendations to provide equality of educational opportunity. The research, aiming to define some variables of student academic success in science, reading and mathematics literacy levels according to PISA 2012 and 2015 panel data for ensuring equality of educational opportunity in Turkey, is in survey model. The research revealed that the extension of the compulsory education period in the context of equal opportunities hadn't increased student success. Delivery of opportunities to the home environment affects the family's socio-economic and socio-cultural variables, which themselves affect student academic success. In this context, supportive policy proposals such as an independent budget, regional economic index creation and direct assistance to the child were presented to the relevant parties and stakeholders.

**Key words:** Educational reform, Equality of educational opportunity, Educational policy recommendations

## Introduction

The level of realization of the goal of transforming the information produced by related parties which are sensitive to the needs of the economy and interacting with each other is passed through the educational systems of societies (Mingat, Tan & Sosale, 2003). Despite improvements in education, in particular, access to education, the need to improve the quality of education and to reduce the level of differences in achievement among regions and school types remain important (Hansen, Chalk & Ladd, 1999; Hutmacher, Cochrane & Bottani, 2001; Wiseman, 2010). In this context, in addition to increasing the duration of compulsory education, to ensure equality of opportunity/EO in education by boosting the quality of learning environments in accordance with the principle of equality, certain variables directly within the school are important, such as schooling rates, increased physical capacity and a strengthened technological infrastructure (State Planning Organization [SPO], 2010; Ministry of Development [MoD], 2013). Even though it is not directly within education, one can say that student gender, the socio-cultural and socio-economic status of the parents and variables which affect the educational performance also affect EEO and student academic success.

### Equality of Educational Opportunity/EEO

Equality debates are intensively focused on the access and participation of different social groups in education at different levels of education, indicating that the issue of equality should be considered more integrated (Lynch, 2000). Equality is a situation related to values in the context of desire, happiness and preference (Frankfurt, 1987). It is possible to define equality as a limited talent provided by the environment of trust which is composed of conditions, options and knowledge (Carter, 2011). Equality, in John Roemer's theory of equality, is

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defined as choices made with free will. The basic idea of the algorithm for Roemer's theory can be summarized as being objective in situations you want to make equal. In addition, it is emphasized that a balance between "choices" and "conditions" can be achieved by "being fair" (Risse, 2002). The concept of equality is also considered in the context of EO. EO is a widely accepted principle in many countries (Gamoran & Long, 2007; Gabay-Egozi, Shavit & Yaish, 2015; Tikly & Barrett, 2011; White, 1982). The education system plays an important role in implementing this principle. Equality of opportunity in education (EEO) is provided by equal education resources for all individuals or by equalizing the educational attainment of individuals (Peragine & Serlenga, 2008). It is stated that the provision of education services should be based on equal opportunities, as the goal is to have the concept of equality is providing education services to each individual to enable them to reach the development potential (Aristoteles, 2013, s. 165). Similarly, according to Kant (2009, p. 21), each individual has many different abilities. Education has a great role in enabling individuals to develop their abilities in accordance with each other at appropriate rates. The factors that provide the EEO which is tried to be explained from a theoretical perspective include school management (building, education program, teachers, etc.), students' educational background, moral structure, schooling rates and the following general elements (Coleman, 1968):

1. Ensuring participation in the workforce by training up to a level.
2. Providing a curriculum with common points for all children regardless.
3. Ensuring that disadvantaged children from different backgrounds with low population density attend the same school,
4. Provision of resources for schools to ensure equality within the framework of certain guideline by local governments

**Equal Opportunity in the World**

Ensuring efficiency in the implementation of the rights-based approach in equality practices will increase the child's participation. The United Nations has developed standards of practice to foster both efficiency and cost-effectiveness in EEO practices. These standards, in summary, are; (*i*) developing systems for the equal participation of all children; (*ii*) maintaining flexibility in developed systems sufficient to meet the needs for children; (*iii*) considering variables such as age range, gender and children's abilities, as well as student performance-oriented educational performance; (*iv*) providing a democratic means of benefiting from opportunities among peers and placing this attitude in children; and (*v*) setting up environments where adult-family and community support will be achieved. Education for All EFA objectives include equality and equality of opportunity-based targets such as meeting the learning needs of all young people and adults through fair access to appropriate learning and life skills programs, and ensuring gender equality in primary and secondary education (UNICEF & UNESCO, 2007). The realization of these objectives is closely linked to the mutual nourishment of the state and the economic well-being of families. Parents with a low family economy do not prefer education. In these families, children will likely have low economic well-being. To increase the economic prosperity of families, the state can keep the family income status to a certain standard by means of spending per student or direct family aid plans (UNESCO, 2009). It is observed that expenditures made per student by educational institutions increase with the education level in almost all countries, though the size of the differences has changed significantly among countries. Even in countries where expenditure per student is similar, resource allocation to various levels of education can vary widely. Among OECD countries in 2014, spending per student at the primary education level was USD $8,733, while the amount was $3,589 in Turkey. Spending per student in secondary education was $3,268 in Turkey while the OECD average was $10,106. On average, expenditures on secondary education are 1.2 times higher than primary school spending. While this rate varies up to 1.5 in the Czech Republic, France, Hungary and the Netherlands, it is less than 1 in Turkey (OECD, 2017). These differences in the annual expenditure of educational institutions per student in each level of education can be greater when they are reflected in the cumulative expenditure per student.

**Equal Opportunity in Turkey**

Turkey in 1997 and in 2012 underwent reforms in terms of the duration of compulsory education. In 1997, the duration of compulsory education was increased to 8 years, while in 2012 it was increased to 12 years. The 4 + 4 + 4 model has been adopted for the duration of compulsory education as in a 4-year period for primary, secondary and secondary education (MoNE [Ministry of National Education], 2012a). With the increase in pre-school education by the 4 + 4 + 4 reform, the rates of schooling in primary and secondary education increased. It can be said that efforts to integrate the education system with the duration of compulsory education have facilitated the transition between stages depending on the increase in schooling rates. If the opportunities that the state offers are generally evaluated, some variables such as schooling rates, schools, teachers, students, classrooms and number of branches during the compulsory education period are noteworthy (MONE, 2012b).

However, in the long term, schooling rates are not the only variable in achieving success in education in terms of equal opportunity or opportunity inequality (Wößmann, 2008). More comprehensive policies must be developed by examining the interrelationships between the resources allocated to education levels and the distribution of student academic success. Educational expenditure per student in Turkey increased by 16.7% between the years 2011-2016. The level of education with the highest increase in education expenditures in 2016 compared to 2015 was secondary education (30.7%). According to 2016 Turkstat education spending statistics, education spending in Turkey increased by 18.9% in 2016 compared to 2015 and became 160,873,000,000 TL. In 2016, secondary education (31.6%) and higher education (20.3%) had the highest level of education expenditures compared to the previous year (Turkstat, 2017). It is possible to find a number of national and international studies about EO in education and its variables (Dinçer & Uysal, 2010; Engin-Demir, 2009; Gelbal, 2008; Güven, 2007; O'Dwyer, Aksit & Sands, 2010; OECD, 2007; World Bank, 2013). General, financial factors play a more important role in most countries; in some countries, financial resources are of considerable importance. Social factors, on the other hand, have less impact. In many countries, educational differences such as school and program type mediate the relationship between socioeconomic status and academic achievement. This relationship is stronger in education systems that divide students into groups such as school/class/program type according to students' cognitive abilities. It is stated that these factors express 60% of the impact of socioeconomic status on success. In Turkey, as a result of changes occurring in the compulsory education period after 1997, educational gains should be investigated under the following titles; (1) the completion of the differences, (2) regional and gender differences and (3) educational level and child labor (Akkoyunlu-Wigley and Wigley, 2008).

## EEO Indicators and Educational Performance

Schools are the smallest units of education. They are the areas where education systems and evaluations are applied. Therefore, maintaining the perspective of realizing both the implementation and the analysis of education policies at the school base is expected (Hanushek, 1986). What can be done to ensure the EEO: (a) provides direct support to the central and local level of education; (b) provides complementary public education which offers support; (c) takes measures to meet the cost of education; (d) designs activities that support education on an international scale and (e) establishes relations which increase the basic level of literacy and which support the school (Edwards, 1946). Some characteristics of the elements should be considered in making education investments. First, it is stated that the conditions for equal distribution of resources are not appropriate and standard. In some cases, more educational resources must be invested in the areas of children with disabilities or children who need special education. Second, in regions where disadvantaged children live, the taxes that families pay should be reduced. Third, considering the right of appeal, it is necessary to ensure that the practices with respect to education finance are fair (Anderson, 2007). Traditional or modern attitudes of actors such as teachers and school principals differ in terms of providing EEO. It is emphasized that in the carrying out of EO policy practices, the efficiency of student academic success, which is considered an output of the system, in academic upskilling should be considered. In addition, the effort to provide a suitable environment for different socio-economic and skill levels among students is an action that strengthens EEO. Finally, the introduction of cultural features in the provision of EO increases the effectiveness of the practices (Richards, 1997). It is noteworthy that research on EEO focuses mostly on; (a) the strength of the student academic success relationship, (b) the effect of the process that changes the relationship between academic achievement and socio-economic level and (c) related suggestions (Ammermuller, 2005; Cappellari & Jenkins, 2007; Gamoran & Long, 2007; Ganzeboom, Graaf & Treiman, 1992; Jencks, 1988; OECD, 2012).

## Context and Rationality of Research

Since 2012, the duration of compulsory education in Turkey has increased to 12 years from 8 years. Compulsory education period change reform is determined to be the 4 + 4 + 4 form, including 4-year primary school, second-grade 4-year secondary school and third-grade 4-year secondary education. This change extended the duration of education and rearranged the education levels. For this reason, the education statistics also differed. After the transition to compulsory education with 4 + 4 + 4, education reform change in schooling rates was observed. If the opportunities provided by the state are evaluated in general, some variables are noteworthy, such as schooling rates, school, teacher, students, classrooms and branch numbers during the compulsory education period. However, in the long term, schooling rates are not the only variable for student academic success in education in terms of equal opportunity or inequality of opportunity. Therefore, the research aims to evaluate the level of the main objective of ensuring equality of opportunity under international education for all [EFA] objectives focusing on the output of the reforms carried out in the context of the educational performance-based assessment of student academic success in Turkey. This research is different from other studies in that it conducts the evaluation at the level of effect and is composed of Programme for

International Student Assessment [PISA] data, which provides big data on the basis of countries. In this context, the study's main aim is to test how the increase in the duration of compulsory education affects the equality of opportunity in education. As a result, it seeks to make policy suggestions that predict possible situations in the future and ensure equality of opportunity. The research, in this general purpose, seeks answer to the following questions; are the variables of (1) mother's education level, (2) father's education level, (3) student gender and (4) home facilities significant predictors of the provision of equal opportunities in education in Turkey according to students' science, math and reading achievement in PISA 2012 and 2015 data? As a result of the findings, what might the policy and planning suggestions be?
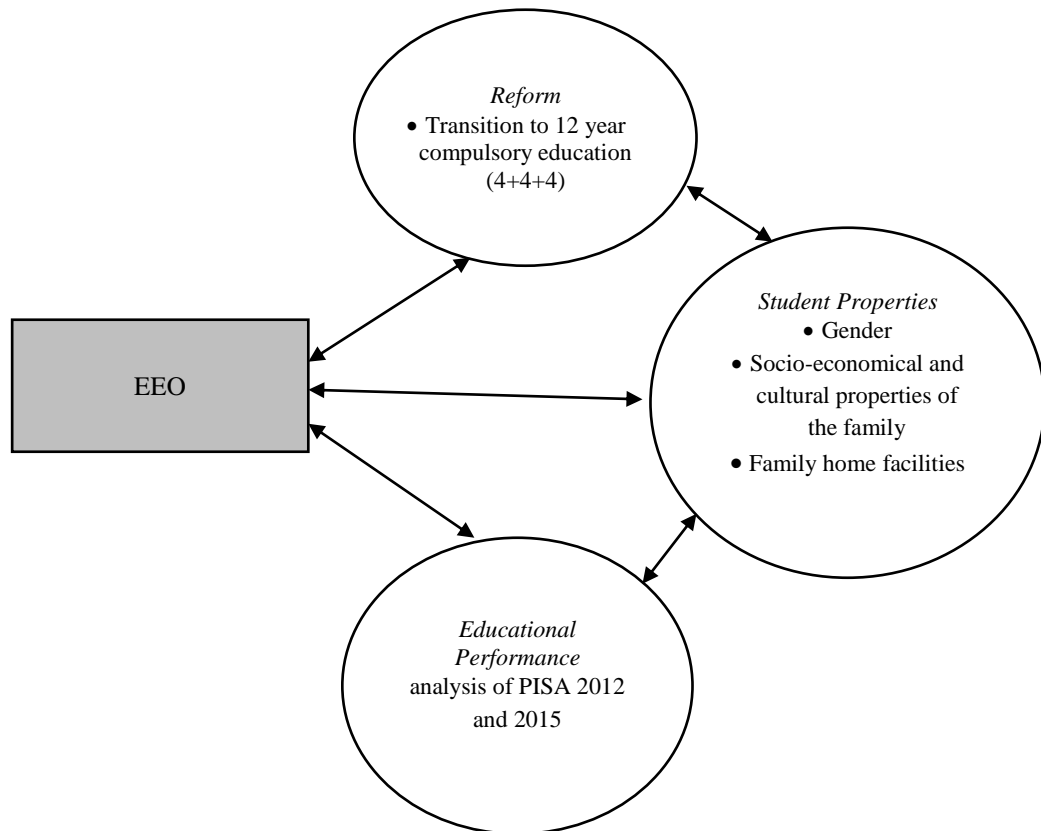


Figure 1. Research Context

## Method

### Research Model

This study, aiming to determine the effect of the variables of; (1) mother's education, (2) father's education, (3) student's gender and (4) home facilities on student academic success in equality of educational opportunity in Turkey according to PISA 2012 and 2015 panel data, is designed using the quantitative descriptive research model. The main purpose of quantitative descriptive research is to define the characteristics of anything. The aim of this kind of research is to determine the relationship between variables by determining one or more characteristics of a group or population, such as age, gender, religious preference and attitudes towards school (Fraenkel & Wallen, 2009).

### Participants

Turkey's sample from PISA 2012 and 2015 was determined by stratified random sampling, considering the strata of type of education, type of school, location of school and administrative forms of schools. This is also done by random selection. Stratification is a sub-component of random sampling. The stratified sample aims to represent the sub-groups in the universe in the sample with their weight in the universe (Büyüköztürk, Kılıç Çakmak, Akgün, Karadeniz & Demirel, 2009).

A total of 510,000 students from 65 countries in the 15-year-old age group responded to the PISA 2012 application to represent about 28 million students. The 15-year-old age group student universe in the PISA 2012 Turkey application was 1,266,638, while the Turkey universe that was able to participate in the application was 955,349 students. In addition, 4,848 students from 57 provinces and 170 schools representing 12 regions according to the Classification of Statistical Region Units (CSRU) Level 1 participated in the application (MoNE/ÖDSGM, 2015; OECD, 2012a; 2014). For PISA 2015 in Turkey, on the other hand, the number of applications among the 15-year-old student universe was 1,324,089 while the Turkey universe that was able to participate in the application was 925,366 students.

In the PISA study, the school sample was determined by the stratified random sampling method. In the first stage, for the implementation of PISA 2015, from 61 cities which represent 12 regions according to Nomenclature of Territorial Units for Statistics Level 1, 187 schools and 5,895 students participated in PISA 2015 (MoNE/ÖDSGM, 2016; OECD, 2015; 2016). The demographic characteristics of the student data used in the research are given in Table 1.

Table 1. Demographic characteristics of the students in the research sample

| | | | PISA 2012 | | PISA 2015 | |
|---|---|---|---|---|---|---|
| Variable | | | *f* | % | *f* | % |
| Gender | Woman | | 2370 | 48,9 | 2938 | 49,8 |
| | Man | | 2478 | 51,1 | 2957 | 50,2 |
| Education status [*] | Mother | Higher Education [d, e, f, g] | 772 | 16,7 | 836 | 14,4 |
| | | Secondary Education [c] | 108 | 2,3 | 846 | 14,5 |
| | | Secondary School [b] | 837 | 18,1 | 1158 | 19,9 |
| | | Elementary School [a] | 2214 | 47,9 | 2182 | 37,5 |
| | | Has not completed the education period | 688 | 14,9 | 796 | 13,7 |
| | Father | Higher Education [d, e, f, g] | 1362 | 29,3 | 913 | 15,7 |
| | | Secondary Education [c] | 238 | 5,1 | 1108 | 19,0 |
| | | Secondary School [b] | 1164 | 25,0 | 1612 | 27,7 |
| | | Elementary School [a] | 1614 | 34,7 | 1840 | 31,6 |
| | | Has not completed the education period | 275 | 5,9 | 349 | 6,0 |
| Home Facilities | Owning a table | Yes | 4052 | 85,2 | 4919 | 84,8 |
| | | No | 704 | 14,8 | 884 | 15,2 |
| | Owning a special room | Yes | 3259 | 68,8 | 4108 | 71,1 |
| | | No | 1476 | 31,2 | 1673 | 28,9 |
| | Owning a studying area | Yes | 3929 | 82,8 | 4807 | 83,3 |
| | | No | 815 | 17,2 | 965 | 16,7 |
| | Owning a computer | Yes | 3208 | 67,8 | 3882 | 67,4 |
| | | No | 1521 | 32,2 | 1880 | 32,6 |
| | Owning software | Yes | 1558 | 34,8 | 2344 | 41,9 |
| | | No | 2921 | 65,2 | 3244 | 58,1 |
| | Having internet | Yes | 2684 | 56,9 | 3635 | 63,0 |
| | | No | 2031 | 43,1 | 2137 | 37,0 |

[*] **International Standard Classification of Education – ISCED 2011**

[a] ISCED 1: Secondary/elementary school    [d] ISCED 5: Higher education/college    [f] ISCED 7: Higher education/ masters
[b] ISCED 2: Secondary/middle school    [e] ISCED 6: Higher education/bachelors    [g] ISCED 8: Higher education/PhD
[c] ISCED 3: Middle school

(This classification has been adapted from OECD, European Union & UNESCO Institute for Statistics. (2015). ISCED 2011 Operational Manual Guidelines for Classifying National Education Programmes and Related Qualifications

## Data Collection

The International Student Assessment Program (PISA) is an international assessment of 15-year-old students' math, science and reading skills. It is a program designed to monitor the knowledge and skills of students in various countries and of students in groups that have different demographic characteristics in each country. It can be mentioned that the PISA evaluation is based on three main principles: (1) Basic indicators of students' knowledge and skills, (2) contextual indicators of how student skills relate to important demographic, social, economic and educational variables, and (3) indicators linking background variables to the levels of the student and school and the results obtained (OECD, 2012b; 2015).

In the PISA studies, the student questionnaire which is used to gather data associated with student performance provides information about /characteristics. More than 80 index, standard total score and variable were defined as the sub-dimensions within the thematic groups of items included in the student questionnaire (MoNE/ÖDSGM, 2015, p. 127; MoNE/ÖDSGM, 2016). The results of PISA are calculated as 500 in all three areas and the standard deviation is 100 (OECD, 2012a; 2015). The PISA 2012 and 2015 study included students and school questionnaires designed to evaluate students' academic performance by using cognitive tests aimed at measuring that performance, although they also include reading skills and science literacy (MoNE/ÖDSGM, 2015). The data obtained from the PISA 2012 and 2015 results, which aim to measure students' mathematics, science and reading skills, are presented in various program formats at http://www.oecd.org/pisa/data/. The panel data for the use of SPSS which is presented on the relevant page has been downloaded and prepared for analysis.

**Data Analysis**

The PISA 2012 data provides the fit index values of the 1st-level single-factor measurement model established with 5 items in the tool of mathematics, reading and science literacy. Before the creation of Confirmatory Factor Analysis (CFA), an investigation was conducted as to whether the assumption of multivariate normality was achieved. As Relative Multivariate Kurtosis = 1.230> 1.00, it does not provide the assumption of multivariate normality. As the chi-Square value $0 \leq \chi^2/(df)=0,95 \leq 2$ is in the critical value, it is observed to be in the perfect range. When the RMSEA value is less than the 0.05 critical value, it shows that it has a perfect fit index (Schermelleh-Engel, Moosbrugger & Müller, 2003). GFI, AGFI, CFI, NFI and NNFI values have a perfect fit index compared to critical values. It is seen that the measurement model established with 5 items constituting the home facilities is confirmed. As the correlation value of the five scoring types calculated according to the mathematics, reading and science literacy levels of students in the sample of Turkey PISA 2012 is over 0.90, mathematics, reading and science literacy, the measurement model fit index values, which were established by 5 scoring, gave excellent results. Since the items are inclusive of each other and the other two items are the sub-components of the "owning a studying area" item, the model was tried to be improved by modification in the error covariance.

The multivariate normality assumption was tested before the fit index values of the Level 1 single-factor measurement model established in PISA 2015 (10 items in mathematics, 10 items in reading and 8 items in science literacy). As Relative Multivariate Kurtosis is = 1.068> 1.00, it does not provide the assumption of multivariate normality. Because the chi-square value $2<\chi^2/(df)=2,03 \leq 3$ is in the critical range, it appears to be acceptable. When the RMSEA value is less than the 0.05 critical value, it shows that it has a perfect fit index (Schermelleh-Engel, Moosbrugger and Müller, 2003). GFI, AGFI, CFI, NFI and NNFI values have a perfect fit index compared to critical values. It is seen that the measurement model established with 10 items constituting mathematical literacy has been confirmed. As the correlation value calculated in terms of the levels of math, reading and science literacy for PISA 2015 students in the Turkey sample is above 0.81, the fit index value of measuring models of mathematics, reading and science literacy was excellent. Since the items are inclusive of each other and the other two items are the sub-components of the "owning a studying area" item, the model was tried to be improved by modification in the error covariance.

To analyze the effect of the variables of home facilities, parents' education and student academic success on the provision of equal opportunities in education in Turkey on the basis of PISA 2012 and 2015, a micro-model impact analysis was performed by multiple regression.

Table 2. Skewness and Kurtosis Values in Terms of Students' PISA 2012 and PISA 2015 Data of Mathematics, Science and Reading Skills Variables

| | PISA 2012 | | PISA 2015 | |
|---|---|---|---|---|
| | Skewness | Kurtosis | Skewness | Kurtosis |
| Maths | .50 | -.22 | .24 | -.28 |
| Reading | .01 | -.24 | -.03 | -.23 |
| Science | .22 | -.44 | .27 | -.43 |

At the stage of multiple regression analysis, the Mahalanobis values of mathematics literacy, science literacy and reading skills scores related to PISA 2012 and PISA 2015 data were analyzed. When the probability values in the chi-square distribution of the Mahalonobis values of the PISA 2012 data are examined, nine data are

obtained with values less than 0.001. In the PISA 2015 data, it is determined that there are five data for each of the three success points and multiple regression equations have been established by subtracting these values. In multiple link status analysis, which is one of the multiple regression analysis assumptions, it is understood that if the tolerance value, which is the variance ratio that cannot be explained by other independent variables, is lower than $(1-R^2)$ .20, and if the variance magnification factor value is higher than 10, multiple connections exist between the independent variables (Tabachnick & Fidell, 2007). Tolerance and VIF values were interpreted by considering these criteria. In this study, because the skewness and kurtosis coefficients of the variables were between -1 and +1, it was assumed that the data were normally distributed in the sample group. As a result of the regression analysis, it was observed that the relationship between the variables was linear and that this relationship level was not high; the relationship levels were below .70 (Morgan, Leech, Gloeckner & Barrett, 2004, p. 50).

## Results

Based on the results of Confirmatory Factor Analysis for home facilities, mathematics literacy, reading skills and science literacy variables, the models with single factor level 1 were examined by comparing them with the fit index values. Then multiple regression analysis findings were revealed.

The fit index values of the 1st-level single-factor measurement model established with six items in the PISA 2012 and 2015 home facilities tool are given above. Before making CFA, an examination was conducted as to whether the assumption of multivariate normality was achieved. As the Relative Multivariate Kurtosis is = 1.081> 1.00, it does not provide the assumption of multivariate normality. Because the chi-square value is in the critical value range $2<\chi^2/(df)=2,13\leq3$, it appears acceptable. When the RMSEA value is considered, it is smaller than the 0.05 critical value and the GFI, AGFI, CFI, NFI and NNFI values have a perfect fit index compared to critical values (Schermelleh-Engel, Moosbrugger & Müller, 2003). In this respect, it is seen that the measurement model established with six articles constituting PISA 2012 and 2015 home facilities has been confirmed. Figure 2 shows the measurement models of home facilities.

Table 3. Compliance Index Values of PISA 2012 and 2015 Turkey Data for Home Facilities Variable

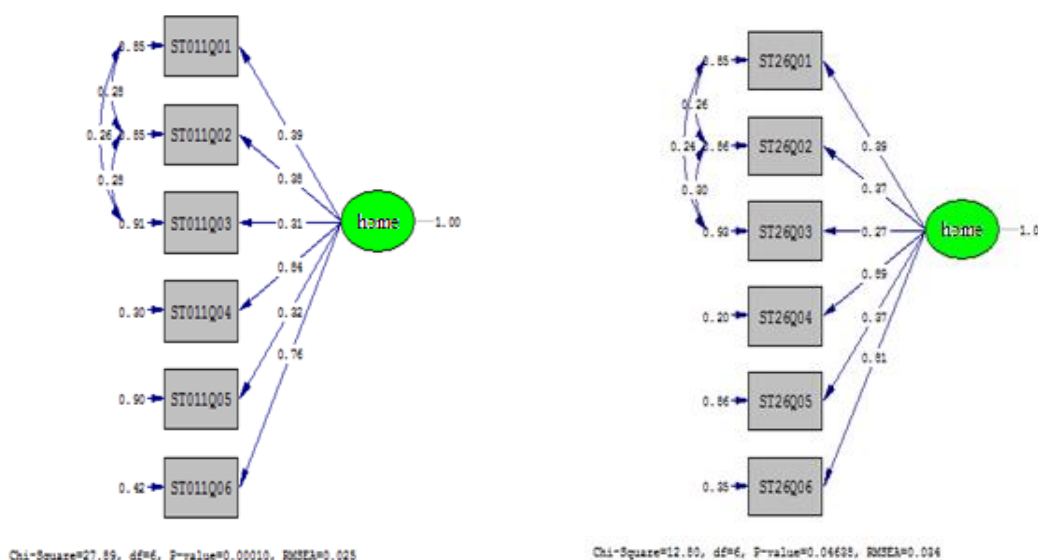| Compliance Index Values | Year | SB$\chi^2$/ (df) | RMSEA | GFI | AGFI | CFI | NNFI | NFI | Relative Multivariate Kurtosis |
|---|---|---|---|---|---|---|---|---|---|
| Home | 2012 | 12.80/(6)=2.13 | 0.034 | 0.97 | 0.96 | 1.00 | 0.98 | 0.97 | 1.081 |
| Facilities | 2015 | 27.89/(6)=4.65 | 0.025 | 0.95 | 0.93 | 0.98 | 0.99 | 0.97 | 1.134 |



Figure 2. PISA 2012 and 2015 1st-Level Single-Factor Measurement Model for Home Facilities

According to the data of PISA 2012 and 2015, when the $R^2$ values of the home facilities are examined, it can be seen that having a computer ($R^2 = 0.80/0.70$) and the effects of internet presence at home have the highest value of $R^2 = 0.65/0.58$. Owning a table ($R^2 = 0.15/0.15$), a room ($R^2 = 0.14/0.15$), software ($R^2 = 0.14/0.10$) or working area ($R^2 = 0.07/0.09$) cases were found to affect success to a lesser extent.

Table 4. $R^2$ Values of Items in Home Facilities Measurement Model

| Items | $R^2$ | |
|---|---|---|
| | 2012 | 2015 |
| Owning a table | 0.15 | 0.15 |
| Owning a room | 0.14 | 0.15 |
| Owning a studying area | 0.07 | 0.09 |
| Owning a computer | 0.80 | 0.70 |
| Owning software | 0.14 | 0.10 |
| Having Internet | 0.65 | 0.58 |

When the results of the PISA 2012 multiple regression analysis equation are examined, mathematics, reading and science are predictive of student academic success ($F_{(4-4494)}=237,89$, p=,00/$F_{(4-4494)}= 343,92$, p=,00/$F_{(4-4494)}= 180,60$, p=,00). It is seen that the independent variables of gender, mother's education, father's education and home facilities explain 18% ($R^2 = 0.18$) of the mathematics literacy score, 23% ($R^2 = 0.23$) of the reading skill score and 14% ($R^2 = 0.14$) of the science literacy score. When PISA 2015 examines the effect of gender, mother's education, father's education and home facilities on the total score for student academic success, a multiple regression analysis equation is examined. Maternal educational variable for mathematics and reading achievement; the standardized regression coefficient ($\beta$) of gender variable for science achievement was 0.026, and t-statistic was removed from the multiple regression analysis equation because it did not significantly predict the t-statistic t = 1.84, p = 066>, 05. When the results of the PISA 2015 multiple regression analysis equation are examined, mathematics, reading and science are predictive of student academic success.

It is seen that the independent variables of gender, father's education and home facilities explain 11% ($R^2=0.11$) of the mathematics literacy score, 14% ($R^2=0.14$) of the reading skill score and 11% ($R^2=0.11$) of research variables of the science literacy score. When PISA 2012 data are examined, the relative importance of predictive variables on mathematics and science success is as follows; home facilities score, father's education, mother's education and gender. The order of relative importance on reading skill is; gender, home education score, father's education and mother's education. According to the results of PISA 2015, the order of relative importance with respect to mathematics and reading success is; home facilities, father's education and gender. The relative importance with respect to science literacy is; home facilities, father's education and mother's education.

Table 5. Results of Multiple Regression Analysis on the Effects of Gender, Mother's Education, Father's Education and Home Facilities Variables on Student Academic Success

| Year | Success Type | Variable | B | Standard Error $_B$ | β | t | p* | Binary r | Partial R | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2012 | Mathematics[1] | Invariant | 1773,91 | 19,45 | - | 91,21 | ,000 | - | - | - | - |
| | | Gender | -69,42 | 12,11 | -,08 | -5,74 | ,000 | -,08 | -,09 | 1,00 | 1,00 |
| | | Mother's Education | 45,30 | 5,92 | ,13 | 7,66 | ,000 | ,31 | ,11 | ,66 | 1,51 |
| | | Father's Education | 64,46 | 5,534 | ,19 | 11,65 | ,000 | ,34 | ,17 | ,67 | 1,49 |
| | | Home Facility | 51,51 | 3,95 | ,20 | 13,03 | ,000 | ,32 | ,19 | ,80 | 1,25 |
| | Reading[2] | Invariant | 1816,53 | 16,99 | - | 106,90 | ,000 | - | - | - | - |
| | | Gender | 208,89 | 10,58 | ,26 | 19,75 | ,000 | ,253 | ,283 | 1,00 | 1,00 |
| | | Mother's education | 48,34 | 5,17 | ,15 | 9,35 | ,000 | ,317 | ,138 | ,66 | 1,51 |
| | | Father Education | 52,58 | 4,84 | ,17 | 10,87 | ,000 | ,327 | ,160 | ,67 | 1,49 |
| | | Home Facility | 47,02 | 3,45 | ,20 | 13,62 | ,000 | ,327 | ,199 | ,80 | 1,25 |
| | Science[3] | Invariant | 1920,16 | 16,81 | - | 114,26 | ,000 | - | - | - | - |
| | | Gender | 33,21 | 10,46 | ,04 | 3,18 | ,002 | ,040 | ,047 | 1,00 | 1,00 |
| | | Mother's Education | 38,68 | 5,11 | ,13 | 7,57 | ,000 | ,284 | ,112 | ,66 | 1,51 |
| | | Father's Education | 41,36 | 4,78 | ,15 | 8,65 | ,000 | ,289 | ,128 | ,67 | 1,49 |
| | | Home Facility | 42,55 | 3,42 | ,19 | 12,46 | ,000 | ,300 | ,183 | ,80 | 1,25 |
| 2015 | Mathematics[1] | Invariant | 3472,68 | 30,98 | - | 112,08 | ,000 | - | - | - | - |
| | | Gender | -97,97 | 18,17 | -,07 | -5,39 | ,000 | -,06 | -,07 | 1,00 | 1,00 |
| | | Father's Education | 109,55 | 8,11 | ,17 | 13,52 | ,000 | ,24 | ,18 | ,92 | 1,09 |
| | | Home Facility | 100,37 | 5,54 | ,23 | 18,12 | ,000 | ,28 | ,23 | ,92 | 1,09 |
| | Reading[2] | Invariant | 3381,51 | 30,90 | - | 109,43 | ,000 | - | - | - | - |
| | | Gender | 245,60 | 18,12 | ,17 | 13,55 | ,000 | ,17 | ,18 | 1,00 | 1,00 |
| | | Father's Education | 106,64 | 8,08 | ,17 | 13,19 | ,000 | ,24 | ,17 | ,92 | 1,09 |
| | | Home Facility | 106,04 | 5,52 | ,24 | 19,20 | ,000 | ,30 | ,24 | ,92 | 1,09 |
| | Science[3] | Invariant | 3473,441 | 30,665 | - | 113,272 | ,000 | - | - | - | - |
| | | Mother's Education | 18,562 | 8,330 | ,03 | 2,228 | ,026 | ,17 | ,02 | ,746 | 1,340 |
| | | Father's Education | 100,406 | 9,007 | ,16 | 11,148 | ,000 | ,24 | ,15 | ,745 | 1,342 |
| | | Home Facility | 97,638 | 5,624 | ,23 | 17,362 | ,000 | ,28 | ,22 | ,891 | 1,122 |

2012
[1]: Mathematics Literacy=1773,91-69,42*gender+45,30*mother's education+64,46*father's education+51,51*home facility score (R= 0,42/$R^2$=0,18/F= 237,89/p=,000*)
[2]: Reading Skills=1816,53+208,89*gender+48,34*mother's education +52,58*father's education+47,02*home facility score (R= 0,48/$R^2$=0,23/F= 343,92/p=,000*)
[3]: Science Literacy=1920,16+33,21*gender+38,68*mother's education+41,36*father's education+42,55*home facility score (R= 0,37/$R^2$=0,14/F= 180,60/p=,000*)

2015
[1]: Mathematics Literacy =3472,68-97,97* gender +109,55* father's education +100,37* home facility score (R= 0,33/$R^2$=0,11/F= 244,01/p=,000*)
[2]: Reading Skills =3381,51+245,60* gender +106,64* father's education +106,04* home facility score (R= 0,38/$R^2$=0,14/F= 316,73/p=,000*)
[3]: Science Literacy =3473,44+18,562*mother's education+100,406** father's education +97,638* home facility score (R= 0,33/$R^2$=0,11/F= 235,33/p=,000*)

*p<,05

## Conclusion and Discussion

In general, among home facilities, owning a computer has the most significant effect on student academic success; on the other hand most significant is having the Internet at home. Reading skills are mostly predicted by the variables of gender and mother's and father's education. In this respect, PISA 2012 and 2015 reveal similar results within the scope of research variables. These results can also be said to be similar to the results of

family socio-cultural and economic impact on student academic success in the literature (Bol, Witschge, Van de Werfhorst & Dronkers, 2014; Brandsma, 2002; Cemalcilar & Gökşen, 2012; Coleman, 1968; Cresswell & Ainley, 2006; Dinçer & Uysal, 2010; Durmuş, 2008; Ferreira & Gignoux, 2010; Mohammadi, Akkoyunlu & Şeker, 2011; Smits & Gündüz Hoşgör, 2006; Tansel & Bircan Bodur, 2012; Tomul, 2011; World Bank, 2010; Yıldırım, Özdemir & Sezgin, 2014). There are three basic research results of the study of Mohammadi, Akkoyunlu and Şeker (2011) aiming to define the relationship between School Resources, Family Characteristics and Student Performance in Turkey: (1) students' individual characteristics significantly affect success, (2) the mother's level of education positively affects the student's academic success and (3) the intellectual aspect of the parents (i.e., number of books at home, number of social activities, number of activities carried out at the end of the week, etc.) has a positive and significant effect on the student's academic success. Indeed, Dincer and Uysal's (2010) study of student academic success in Turkey indicated that the type of educational programme and the student's socio-economic status are important determinants of student academic success in the PISA 2006 Science Test. The most determinative factor of the program type in student academic success is the student's socio-economic status. Student academic success is also similar in schools – a situation that is constantly renewing itself. In this case, it is emphasized that the education system reproduces instead of removing the existing disadvantages arising from the socio-economic situation.

In general, the family's income level affects the degree to which the family invests in its children's education. When the current situation in Turkey is analyzed, although the attitude towards education changes from region to region, the first group that has been forbidden to receive compulsory education is girls. In addition, the financial and gender role of the mother affects the participation of girls in terms of attitude and education (Smits & Gündüz Hoşgör, 2006).

When the status of the families of students who left school is analyzed in terms of social capital, risk factors include the mother's literacy, a lack of social security, the father's lack of a permanent job, the working of male students during school times and school drop-out due to migration (Cemalcilar & Gökşen, 2012; Ferreira & Gignoux, 2010; World Bank, 2010). Similarly, the studies of Gökşen, Cemalcılar and Gürlesel (2008) defined as having "dropped out" those children who did not attend any other educational institutions and who left school for a reason other than death or health problems before completing the eight-year compulsory education. According to the findings of the study, whose field research was conducted in Istanbul, Diyarbakir, Sanliurfa, Mardin, Erzurum and Konya, the factors leading to school dropout are (i) the education system and school conditions (ii) and socio-cultural and economic conditions.

Theoretically, the main reason for the provision of educational services is the positive externalities that these services have. In addition, due to the fact that not all individuals can fully comprehend the importance of education services, the state offers the first education services without compensation. Thus, the alternative cost of reading for poor students and their families is very high, and education loans are not easy to obtain, even in developing countries (Durmuş, 2008). In addition to talking about the economic effectiveness of educational investment, the return on investment can take about a quarter of a century to achieve. The return on investment among disadvantaged children is high, while the return on investment among children with a higher socioeconomic level is relatively low (Brandsma, 2002). In addition to debates over educational investment made by the public, the cost of education is related to the family's economic situation, educational perspective and socio-cultural aspects. Bol, Witschge, Van de Werfhorst and Dronkers' (2014) survey coincides with the social selection mechanism and the finding that the differentiation of students affects inequality.

When the income comparison of men in Turkey is compared between 1994 and 2002, it can be seen that the threshold of inequality is high. Another result is the high level of the inequality threshold when income is compared in terms of education levels (Tansel & Bircan Bodur, 2012). In 2001, as a result of the crisis, the implementation of the Conditional Cash Transfer Program launched in 2001 investigating the perspectives of beneficiaries (Yıldırım, Özdemir & Sezgin, 2014).

Tomul's study aiming to evaluate educational inequality in Turkey between 1975 and 2000 according to the Gini index reached the conclusion that, in all regions of Turkey, the educational level of the population increased between 1975 and 2000 (Tomul, 2011). In Engin-Demir's (2009) study, which aimed to investigate the factors that influence academic achievement in low-income students who live in the city centers of Turkey, the variables of the regression model were found to affect academic achievement to the degree of ¼.

When a comparison was conducted among countries using PISA 2000 data to define the importance of economic and social-cultural sources and schools for socio-economic inequalities in education, Marx, Cresswell and Ainley (2006) found that although cultural factors play a more important role in most countries, material resources are of considerable importance in some countries. Social factors have less impact. In many countries, educational differences such as school and program type mediate the relationship between socioeconomic status

and academic achievement. This relationship is even stronger in education systems that divide students into groups such as school/class/program type according to their cognitive abilities.

## Implication

When equality and equal opportunity are considered theoretically, it is possible to determine that equality is the same practices at every point and that equality of opportunity can be defined as the equalization of conditions by revealing, as much as needed, anything with different situations. Therefore, in the most general sense, it may be advisable to distribute the budget appropriately in the proportion of deficiencies determined by a needs analysis, not according to the equality principle.

Different projects such as the "Haydi Kızlar Okula" (Girls Let's Go to School) project from the Ministry of National Education and the Conditional Cash Transfer program from the Social Policy Ministry have been carried out in Turkey for children with special needs and to promote access to education for both genders. In this way, the development of facilitating models with a numerical increase can be achieved. Quality improvement can take place through government-created plans. Another important policy that will help provide equal opportunities in education is to establish a minimum quality standard in schools. As a result of school-based assessments, policies that improve equality of opportunity in education can promote parity among students with socio-economic levels by monitoring and evaluating the characteristics of pupils with low achievement.

When problems arising from inequality are investigated, one can conclude that groups of students have similar characteristics. These problems cannot be solved immediately and it can be said that they have disordered properties as well. In this respect, the presence of students with similar characteristics is an indication of a problem at the regional level. Considering the basic variables of equal opportunities in education, the creation of a regional economic index or regional training index can help uncover solutions to the problems that are encountered. When cultural and economic factors are thought to affect the role of gender in education in Turkey, the design of measures to be taken and the raising of awareness about the problem can lead to another benefit.

If education systems prioritize early childhood and basic education, the beginning of a strong education is ensured and its basic structure starts to emerge. It may be advisable to take measures in public policy, early childhood education and childcare. In this way, children have the ability to improve their lives. One of these policies may be to make early childhood education free of charge. According to the socio-economic situation, it may be more appropriate to charge the benefit of early childhood education. When out of the current situation in Turkey Fee considered early childhood (preschool) education advisable to make legally required. Most schools do not have the budget to meet their needs in a timely manner. To improve their physical structure and organize social events, many schools must seek donations from parents. Therefore, it may be advisable to develop a system by which schools can engage in direct spending.

## Limitations

Two important reform movement that took place in Turkey since 2010. The first reform 12 years of the compulsory education period is intended to provide the educational levels of technology integration by strengthening its technological infrastructure of schools in Turkey. In this context, since the integration of Technology Increasing Opportunities and Technology Improvement Movement (Fatih Project) contains a number of topics that should be researched within itself. Therefore, this study examines the context of student academic success, an output indicator of the education system, with the reform of compulsory education to 12 years.

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