United Nations
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Third Regional
Comparative
and Explanatory Study

Gender inequality in learning achievement in primary education.

What can TERCE tell us?

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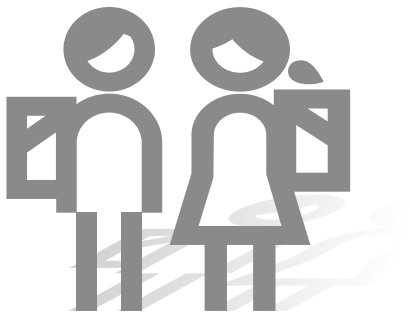

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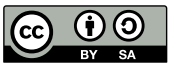

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Foreword

OREALC/UNESCO Santiago is currently promoting discussion and educational policy decision-making at the regional level in line with the UN 2030 Agenda based on the Sustainable Development Goals. The agenda identifies gender equality in education as a pivotal strategy for eradicating global poverty and calls for equal access to education for all and at every level when looking towards the year 2030.

This work premise clearly establishes that it will be a priority of Education 2030 to promote learning opportunities for all. Within this framework, UNESCO Santiago has its own instrument which enables it to provide a diagnostic assessment and deep analysis regarding learning disparities within the region: the Third Regional Comparative and Explanatory Study, TERCE, conducted by the Latin American Laboratory for Assessment of the Quality of Education, LLECE, which is an organization that brings together 15 countries and is coordinated by our Office.

In other words, the TERCE results are of key importance for the discussion and creation of policies in Education 2030, with one of its essential facets being to present information, assess, and analyze the results surrounding topics relevant for discussion, such as learning inequality between genders.

OREALC/UNESCO Santiago developed a collection of Thematic Reports based on TERCE intended for researchers, NGOs, policy-makers, and school principals, with the objective of ensuring the aforementioned occurs. Thus, the present report "Gender inequality in learning achievement in primary education. What can TERCE tell us?" allows us to unveil a part of the existing gender differences in our region.

We expect that this document from OREALC/UNESCO Santiago will provide elements for understanding a regional phenomenon, such as the differences in gender, widely recognized as decisive in the variation and trends of the educational results, and having an impact on learning achievement. Above all, we trust that this Thematic Report on Gender will be an important reference for decision-makers, for those who work for gender equality in education, and for other aspects from the social context of education in Latin America.

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The development of TERCE was carried out by the technical coordination of LLECE, based in OREALC/UNESCO Santiago, consisting of:

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Executive summary

Gender equality refers to the "right to access and participate in education, as well as to benefit from gender sensitive educational environments, processes and achievements, while obtaining meaningful education outcomes that link education benefits with social and economic life" (UNESCO, 2010, p12). Existing research identifies several significant, subject-based gender inequalities in education. Male learners have significant advantages in mathematics and female learners have no less significant advantages in reading and writing (Román Carrasco & Murillo Torrecilla, 2009; Treviño et al., 2010a). Such considerable differences in achievement may have important consequences for the future wellbeing of students. Low literacy skills among boys may increase the likelihood of grade repetition (retention) and early dropout and, as a result, lower male participation in higher education and reduced career opportunities. Similarly low achievement in mathematics and science among girls may reduce their interest in Science, Technology, Engineering and Mathematics (STEM) careers (considered to offer greater opportunities for higher incomes).

In order to shed light on this phenomenon in Latin America, this report analyzes the gender gaps in educational achievement in the Third Regional Comparative and Explanatory Study (TERCE) led by the Latin American Laboratory for Assessment of the Quality of Education (LLECE) at OREALC/UNESCO Santiago. In 2013, TERCE assessed third and sixth grade learners in science, reading, mathematics and writing in: Argentina, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Uruguay and the Mexican state of Nuevo León. The benefit of this dataset is that it enables us to analyze gender inequality in its early stages (primary school).

The analysis presented in this report is threefold. First, we **identify and describe** gender gaps based on the average score differences, the score distributions (variability) and representation in the 'achievement levels' developed by TERCE for each course and grade. Second, we **compare** TERCE results with results from the Second Regional Comparative and Explanatory Study (SERCE), conducted in 2006, in order to identify trends and changes over time. Finally, we **explore** factors that may be associated with the evidenced gender gaps in educational performance, focusing on third and sixth grader achievement in mathematics, reading and science. Stated plainly, the following questions guide our analysis.

Do boys and girls have similar knowledge in the core areas of the educational curriculum in third and sixth grade? Analysis of the 2013 TERCE assessment results revealed that boys and girls do not have similar knowledge in several core areas. The relative (dis)advantages of female or male students varied by subject. Test results revealed a strong general advantage for male learners in mathematics. However, the extent of this advantage differed notably by grade. Third grade mathematics assessments revealed gender gaps in test performance, but relative gender advantages varied between countries;

female students scored higher in half of the study countries with statistically significant gender performance gaps and male students scored higher in the other half. Analysis of sixth grade mathematics performance revealed a clear gender gap in favor of male students. Conversely, female students tended to perform significantly better on reading and writing tests. Female students in both third and sixth grade obtained consistently higher test scores than male students in both reading and writing. The fact that these subject-based gender advantages were greater among sixth graders than third graders suggests that these gaps may be related to continuing primary school education. In contrast to the results for reading, writing and mathematics, the test results for science were fundamentally mixed in terms of gender achievement inequalities. As with the third grade mathematics results, only a few countries had a statistically significant gender gap in science achievement and the gender advantage was split.

Have these similarities (or differences) in core curriculum knowledge changed between 2006 and 2013? In general, comparison of TERCE assessment results (2013) with SERCE results from 2006 indicated that clear gender gaps in certain subjects were not new occurrences. As in 2013, test results from 2006 revealed strong general advantages for male learners in mathematics and for female learners in reading. However, some notable changes did occur between these assessments. Between 2006 and 2013 the performance advantage of female third graders in reading generalized across the region. The performance advantage of sixth grade girls in reading scarcely changed. However, the extent of this advantage reduced in almost all of the study areas during this same period. The number of countries with gender inequalities in third grade mathematics achievement and the extent of those inequalities decreased from 2006 to 2013. Gender inequalities in sixth grade mathematics performance also decreased in some countries between assessments. However, the male student performance advantage in sixth grade mathematics generally increased in the study countries in terms of both average score and variability. Importantly, for reading and mathematics, both assessments indicated that gender inequalities were greater among sixth graders than third graders, further suggesting possible correlation with primary school socialization noted above.

Which factors contribute to our understanding of the identified gender differences? None of the study variables in the adjusted models could directly explain the achievement gaps in all of the considered disciplines and school grades. Individually, these variables did not differently influence male or female achievement. However, when considered jointly and as a whole, the study variables did provide some insight. Analysis to explain the gender gaps in mathematics achievement found similar results across the region. The selected study variables, as a whole, accounted for female learners' advantages in mathematics (only in third grade). However, the same explanatory factors could not account for male-learner advantages in the same subject. The variables that explained the gender gap in third grade reading achievement in Colombia and Paraguay were: school socioeconomic level (SES), rural school, urban public school, female student, retention, student SES, time dedicated to study, mother with higher education, parental expectations of higher education and parental supervision. The explanatory factors for sixth grade achievement gap in Costa Rica, the Dominican Republic, Mexico, Paraguay, Uruguay and Nuevo León were: school SES, rural school, public urban school, female student, retention, student SES, reading habits, time dedicated to study, mother with higher education, parental expectations of higher education, parental supervision and teacher practices. Different variables explained gender gaps in science achievement, namely: parental expectations, mother education, teacher practices, retention, reading habits and time dedicated to study.

Analysis showed a consistent trend in which female-learner performance advantages were explained by the considered variables in the statistical models, while the achievement gaps in favor of boys could not be similarly explained. Therefore, it is highly likely that cultural practices, difficult to capture through quantitative studies, are behind the gender gaps in mathematics.

Introduction

One of the main goals of the United Nations (UN) agenda for 2030 (based on the UN's Sustainable Development Goals) is the eradication of global poverty. The UN identifies pursuit of gender equality in all levels of education as a central strategy for achieving this goal (UN General Assembly, 2015). In order to design and implement policies that will support this goal we must first identify and determine the extent of gender inequalities in education. We must also examine factors that may support the emergence and expansion of those inequalities. Educational assessments (national or international tests in one or more subjects) provide one possible approach for obtaining further insight into these issues.

The present study focuses on test score gaps between male and female learners in the Latin American countries that participated in the Third Regional Comparative and Explanatory Study (TERCE) led by the Latin American Laboratory for Assessment of the Quality of Education (LLECE) of OREALC/UNESCO Santiago. Conducted at the end of the school year in 2013, the assessment included 15 Latin American countries and one Mexican state. TERCE assessed third and sixth grader's achievement in mathematics, reading and writing, as well as science (sixth grade only). The study also collected data on the characteristics of students and their families, teachers and school principals. Exploring gender differences early in the educational system, in this case primary school, provides an essential opportunity to understand the roots and initial evolution of gender inequalities in education.

This report consists of three chapters. Chapter I describes gender disparities in Latin America based on several international and national assessments of learning achievement. In addition, this chapter provides a brief literature review regarding factors found to be associated with gender inequalities in education. Due to a scarcity of existing research on this subject in Latin America, findings are drawn from research conducted in other regions. Chapter II provides additional information about the TERCE assessment including several key advantages and one notable limitation of this data. The third chapter shares analysis and findings about study objectives. This study has three specific objectives. First, it identifies the extent and characteristics of gender achievement gaps in the assessed countries through TERCE. Second, through a comparison of TERCE (2013) and SERCE assessment data (2006) it identifies trend changes in gender inequality over time. Third, it explores several factors that may explain the achievement gaps between male and female students. The purpose of these analyses is to provide an understanding of the nature of inequity in learning by gender in the Latin America and the Caribbean region so as to, subsequently, suggest measures to reduce or eliminate these inequities. Finally, the report concludes with a summary of main findings and recommendations.

Gender disparity and inequality in education in Latin America

I

The importance of education for social, economic and cultural development is globally recognized. Approved in Jomtien (Thailand) in 1990, UNESCO's World Declaration on Education for All (EFA) establishes education as a fundamental human right and maintains that quality education should be accessible to everyone (UNESCO, 2004a). Gender inequalities in education are recognized to be a key barrier to ensuring this right and, consequently, are a focus of global educational goals. Signed in 2000, the World Education Forum's Dakar Framework for Action identified six goals to be attained by 2015. The fifth goal called for the elimination of "gender disparities in primary and secondary education by 2005 and achieving gender equality in education by 2015, with a focus on ensuring female students' full and equal access to (and achievement in) basic education of good quality" (UNESCO, 2000). Since this goal (among others) was not achieved by 2015, the United Nations (UN) announced a new agenda for 2030 based on its Sustainable Development Goals (UN General Assembly, 2015). The UN's new agenda again identifies gender equality in education as a central strategy to eradicate poverty in the world and calls for boys and girls to have equal access to quality education at all levels by 2030 (UNESCO, 2014).

It is important to distinguish between gender parity and gender equality. Gender parity refers to equal representation in education. More specifically, gender parity refers to "achieving equal *participation* for female and male learners in education based on their respective proportions of the relevant age-groups in the population" (UNESCO, 2010, p12). For example, if 50% of the 14-year-olds in a country are female then, in order for there to be gender parity in education, 50% of 14-year-old students should be female. On the other hand, gender equality refers to the "right to access and participate in education, as well as to benefit from gender sensitive educational environments, processes and achievements, while obtaining *meaningful education outcomes* that link education benefits with social and economic life (UNESCO, 2010, p12). Thus, in addition to equal participation (gender parity), gender equality refers to equal educational quality and performance.

The United Nations assesses gender parity (participation/representation) in education through the Gender Parity Index (GPI). Gender parity is achieved when a GPI value is between 0.97 and 1.03, allowing for measurement error (UNESCO, 2003). These values indicate that there are between 97 and 103 female students for every 100 male students; the number of female students is very close to the number of male students so there is gender parity. According to data for 2010, gender parity in primary education had been achieved in all Latin American countries (GPI of 0.97), except for the Dominican Republic (Bellei, Poblete, Orellana, & Abarca, 2013). However, the fact that in several Latin American countries[1] a greater number of female students than male students complete the last grade of primary education indicates a disadvantage for male learners.

1 *Colombia, Paraguay, Honduras, the Bolivarian Republic of Venezuela and El Salvador.*

According to UNESCO, seven Latin American countries have achieved gender parity at both the primary and secondary level and 20 countries in the region are expected to achieve parity at both levels by the end of 2015 (UNESCO, 2015a). However, again, unequal representation continues at the secondary education level, and it is increasing (Jha, Bakshi, & Martins Faria, 2012). In 13 Latin American countries, male students are underrepresented relative to female students in secondary education. For instance, the GPI in lower secondary in Brazil was as high as 1.18 in 2010 (UNESCO, 2015b); for every 100 male students, there were 118 female students in lower secondary education. Inequality in representation/participation results from a higher tendency among male students to drop out of school due to a number of factors such as economic needs, desire to work, low educational achievement and lack of interest in education (UNESCO, 2015a). This degree of male disadvantage is particular to Latin America where male students have higher chances of failing a grade and dropping out, while female students have higher chances of completing mandatory education on time and accessing higher education (Rico & Trucco, 2012; UNESCO, 2015a).

While measures indicate that gender parity in access to primary education has been generally achieved, *educational inequality*, including learning achievement, remains an issue. A number of national and international assessments measuring educational (in)equality indicate that female students tend to outperform male students in literacy (reading and writing) and underperform in mathematics (Ganimian, 2009; OECD, 2014b; UNESCO, 2015c).

This chapter is divided in three sections. The first section reviews national and international assessments in Latin American countries. The second section describes gender inequalities in learning achievement in mathematics, science, reading and civic education in primary and secondary education in Latin America. The last section explores findings from existing research regarding the main factors associated with gender inequalities in mathematics, reading and science achievement.

i) The source: national and international assessments in Latin America

As of 2013, two-thirds of countries in Latin America assess students' knowledge and skills at the primary and secondary level. Assessments generally focus on mathematics and reading but may also include science and civic knowledge[2] (UNESCO, 2015a). In most countries, national education assessments began in the 1990s encouraged by international agencies in an era of educational reforms across the region (Ferrer, 2006). National assessments vary in terms of the samples considered (census or samples), the indicators of success and measurement scales, the levels tested (one or more grades in primary or secondary school) and the frequency of the evaluations (annual or every few years) (Román Carrasco & Murillo Torrecilla, 2009). As a result, while national assessments provide important insight at the country level, differences in the focus and form of assessments prevent direct comparisons of findings between countries. Therefore, in order to grasp the extent (magnitude) of gender inequality in educational achievement across the region, and any associated trends, we must examine international assessments.

There are several international assessments of learning in the Latin American region. As with national evaluations, most international assessment focus on core curriculum areas, namely mathematics, science and reading, but several assessments also include civic education. Participation in international assessments varies. Every country in the region has participated at least once in the learning assessments carried out by the Latin American Laboratory for Assessment of the Quality of Education (LLECE) and several countries have participated in one or more rounds of the Programme

2 *For a list of standardized tests applied in Latin American countries, check: Ferrer, 2006; Murillo & Román, 2008.*

Table 1

Main aspects of the international assessments in Latin America

Assessment	Goal	Areas assessed	Evaluated grades	LA participant countries
ICCS 2009 (Origins: CIVED 1999)	Evaluate and compare the knowledge about civic and citizenship education they received, as well as attitudes, beliefs, intentions and behaviors.	Four thematic areas of citizenship education: civil society and systems, civic principles, civic participation, and civic identity.	Eighth grade students (14 years old).	**2009:** Chile, Colombia, Guatemala, Mexico, Paraguay, Dominican Republic.
LLECE (PERCE 1997, SERCE 2006, TERCE 2013)	Evaluate and compare learning outcomes achieved by students in Latin American primary education.	Reading, writing, Mathematics and science (sixth grade only) (Only in SERCE and TERCE). (In SERCE a limited number of countries).	PERCE: students in third and fourth grades. SERCE and TERCE: students in third and sixth grades.	**1997**: Argentina, Brazil, Chile, Colombia, Costa Rica, Honduras, Mexico, Panama, Paraguay, Peru, Dominican Republic. **2006**: Same countries plus Cuba, Ecuador, El Salvador, Guatemala, Nicaragua, Uruguay and Nuevo León. **2013**: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Uruguay and Nuevo León.
PIRLS (2001, 2006, 2011)	Reading Comprehension.	Language	Fourth graders. In 2011, countries can choose from five or six degrees.	**2001**: Argentina, Colombia. **2011**: Colombia, Honduras.
TIMSS (1995, 1999, 2003, 2007, 2011, 2015)	Evaluate and compare what students know	Mathematics and science.	In 1995, seventh and eighth grades. The third and fourth grades were optional. 1999 eighth grade. Since 2003: fourth and eighth grades.	**1995**:Argentina, Colombia, Mexico. **1999**: Chile. **2003**: Argentina, Chile. **2007**: Colombia. **2011**: Chile, Honduras.
PISA (2000, 2003, 2006, 2009, 2012)	Evaluate and compare what students can do with what they know. PISA attempts to verify the extent to which schools in each participating country are preparing the young for the role of citizenship in contemporary society.	Reading, Mathematics and science. In each application the emphasis is on one area. There are also assessments in other areas of knowledge (e.g., electronic reading proof of financial literacy).	15-year-old students regardless of the degree they are pursuing.	**2000**: Argentina, Brazil, Chile, Mexico, Peru. **2003:** Brazil, Mexico, Uruguay. **2006**: Argentina, Brazil, Chile, Colombia, Mexico, Uruguay. **2009**: Same countries plus Costa Rica, Panama, Peru. **2012**: Same countries except Panama.

Source: UNESCO, 2013a.

for International Student Assessment (PISA). However, fewer countries in the region have participated in other studies of learning achievement, such as the Trends in International mathematics and Science Study (TIMSS), Progress in International Reading Literacy Study (PIRLS), the Civic Education Study (CIVED), and the International Civic and Citizenship Education Study (ICCS).

Table 1 summarizes the main aspects of each of the above-mentioned international assessments and identifies the Latin American countries that participated in each assessment. As the Table demonstrates, these international assessments vary not only in terms of country participation but also in terms of learner age and focus/subject area(s).

TIMSS was among the first international assessments applied in Latin America. Conducted every five years since 1995, TIMSS evaluates learner performance in mathematics and science. The age and grade of participants varies by study year. Unfortunately, only a few countries have participated in these assessments. Even fewer countries have participated in PIRLS assessments, conducted every five years to evaluate language skills among fourth graders.

The IEA Civic Education study, implemented in 1971 and 1999 and revised and renamed as the International Civic and Citizenship Education Study (ICCS) in 2009, examines four thematic areas of citizenship among eighth graders (14-year-olds): civic knowledge (regarding institutions and concepts such as the environment and human rights), student interest in political participation and student perception of various aspects of civil society. The goal of this assessment is to explore how the different nations "prepare their young people to undertake their roles as citizens" (Schulz, Ainley, Fiedman, & Lietz, 2011, p. 13). The assessment evaluates students from 38 countries in Asia, Australia, Europe and Latin America. However, Latin American country participation has been fairly limited. In 1999 (CIVED) only two Latin American countries participated (Chile and Colombia) (Schulz, Ainley, Fraillon, Kerr, & Losito, 2010). In 2009 the survey examined eighth graders from Colombia, Chile, the Dominican Republic, Guatemala, Mexico and Paraguay.

Applied every three years in OECD and partner countries (whose participation varies) PISA assesses skills in reading, mathematics and science among 15-year-old students and examines how learners apply said skills in real life situations (OECD, 2007b). While all subject areas are covered, each evaluation focuses on a particular subject. PISA had a focus on reading in 2000 and 2009, a focus on mathematics in 2003 and 2012 and a focus on science in 2006. Unfortunately, only a relative handful of Latin American countries have participated in PISA evaluations (see Table 1).

LLECE assessments have had the greatest participation of Latin American countries. LLECE evaluates learning achievement among primary school students (usually third and sixth graders) based on national curriculum objectives. Each assessment year LLECE analyses the curriculums of participant countries and identifies common aspects to examine (GEM, 2014; UNESCO, 2005, 2013b). LLECE's First International Comparative Study (PERCE, Spanish acronym) in 1997 evaluated mathematics and reading performance among third and fourth grade students from 13 Latin American countries (see Table 1). The Second Regional Comparative and Explanatory Study (SERCE, Spanish acronym), conducted in 2006, evaluated third and sixth grade student performance in mathematics, reading, writing and science[3]. The Third Regional Comparative and Explanatory Study (TERCE, Spanish acronym), conducted in 2013, also evaluated third and sixth graders in the same subject areas and included almost all of the countries that previously participated in SERCE.

Despite lesser participation in some assessments, Latin American countries are increasingly evaluating student learning. Both national and international assessments are key resources to assist the design and implementation of

3 *The science assessment included only those countries that volunteered to participate.*

programs focused on improving education quality in the region. National assessments provide important insight at the country level. By providing comparative data, international assessments enable us to identify regional trends. Illustrating this point, the following section reviews findings from both national and international assessments regarding gender inequalities in education achievement.

ii) The evidence: gender gap in mathematics, science and reading achievement

According to SERCE, student performance in Latin American primary schools is far behind expected achievement levels (see Appendix I for a definition of the achievement levels). mathematics performance scores are low. Among third graders, 60% of the students scored in the lowest achievement levels and 1 in 10 students could not differentiate natural numbers or interpret simple graphs (Román Carrasco & Murillo Torrecilla, 2009). The proportion of Latin American students in the lowest achievement levels in reading was even larger (70%). In both mathematics and reading, just over half of the sixth graders tested were low-achievers (i.e. scored in Level I or II). Evaluations in science were worse; the majority of sixth graders (80%) performed at the lowest levels (Román Carrasco & Murillo Torrecilla, 2009). Regarding 15-year-old students, PISA assessments reveal that Latin American students are far behind the level of skills and knowledge required to successfully manage real life situations (Rivas, 2015). Finally, regarding civic education in Latin America, ICCS (2009) reported that average achievement in the region was low. Almost one in every three Latin American students performed below Level I, meaning they were not familiar with even basic civic concepts such as representative democracy. Within the region, Chilean student achievement in civic knowledge was the highest, while 61% of students in the Dominican Republic performed below Level I (Schulz et al., 2011).

Also of concern, assessments indicate notable differences in achievement between students of different genders in certain subjects. National assessments of primary (fourth and sixth grades) and secondary (seventh and ninth grades) students from 15 Latin American countries indicated that, on average, female students outperformed male students in reading[4] (Murillo & Román, 2008). Greater female student achievement in reading was present in the entire region except Guatemala where male students outperformed female students in reading. In Mexico, 86.6% of female sixth graders demonstrated at least a basic level of competence in reading in the EXCALE[5] (2005) test compared to only 75.6% of male sixth graders. Among third graders, the proportion was 71.8% and 62.8%, respectively.

While in Chile there were no gender performance differences in the national assessment of primary education[6] (SIMCE 2005), in Peru female students outperformed male students (*Evaluación Nacional de Rendimiento Estudiantil* for sixth and ninth grade, 2004). In Peru, male second graders performed better than female second graders, although the difference was small (between four and six points in the period from 2008 to 2012). However, the performance difference between female and male students was larger in reading comprehension (between eight and nine points) (Consejo Nacional de Educación, 2013).

4 *The authors analyzed Operativo Nacional de Evaluación (Argentina), SAEB (Brazil), SIMCE (Chile), SABER (Colombia), PRONERES (Guatemala), EXCALE (Mexico), National assessments from Peru and Panama, and SINEPE (Paraguay).*

5 *EXCALE measures skills and knowledge in pre-primary, primary (3rd and 6th grade) and secondary education (3rd and 6th grade) since 2005. For more information, see: http://www.inee.edu.mx/explorador/queSonExcale.php*

6 *SIMCE measures Reading, Writing, Mathematics, Science, History, Geography and Social Sciences, and English in primary (2nd, 4th 6th and 8th grade) and secondary education (2nd and 3rd grade). For more information, see: http://www.agenciaeducacion.cl/simce/que-evalua-el-simce/*

In Colombia, results from the SABER[7] test for fifth and ninth graders, concluded that the gender gap, privileging male students, in mathematics increased with time (2005 to 2009) while the gender gap in reading, privileging female students, tended to disappear by ninth grade. Further demonstrating this trend, results from the SABER test for 11th graders (2005, 2009) presented increasing performance advantages for male students in mathematics but an almost insignificant gender advantage in reading for female students (ICFES, 2013).

International assessments further establish these findings. While **SERCE** data showed no clear gender advantage in science[8], assessment findings identified gender gaps in mathematics and reading performance. Male learners tended to achieve higher scores than female learners in mathematics (except for third graders from the Dominican Republic). Moreover, the number of countries where male learners had an advantage over female learners increased by grade; the gap in mathematics performance grew as education continued. Among third graders, male learner performance on mathematics testing was higher in Colombia, Costa Rica, Peru, Nicaragua, El Salvador and Guatemala. Among sixth graders, male learners outperformed female leaners in mathematics in Brazil, Chile, Colombia, Costa Rica, Guatemala, Peru and Nicaragua. However, in contrast, female learners tended to outperform male learners in reading and writing. Female third graders outperformed male students in Argentina, Brazil, Cuba, Mexico, Panama, Paraguay, Dominican Republic, Uruguay and the Mexican state of Nuevo León. Female sixth graders male students in reading in most of the study countries (Argentina, Brazil, Chile, Cuba, Mexico, Panama, Dominican Republic, Uruguay and Paraguay) (Murillo & Román, 2009). Finally, female students outperformed male students in writing in Argentina, Brazil, Colombia, Mexico and Nicaragua (Atorresi, 2010).

Findings from the **TIMSS** and **PISA** evaluations indicate similar trends. In the 1995 TIMSS, male seventh and eighth graders outperformed female students in mathematics in 33 and 31 countries, respectively. Results from the 2007 TIMSS assessment were more mixed. There were no (statistical) differences in gender performance in mathematics testing in 24 countries; in 16 countries female leaners outperformed male learners; and in 8 countries male learners outperformed female learners. Colombia led the gender gap in overall mathematics performance with 32 points in favor of male students. Gender differences in test performance varied by grade. No gender gap in mathematics performance was apparent among fourth graders, but the results for eighth graders were mixed. Male learners outperformed female learners in mathematics in Colombia and El Salvador, but female students outperformed male student in 16 African and Middle East countries. However, considering performance over time, from 1995 to 2007, female eighth graders increased their average score in mathematics in Colombia, Korea, Slovenia and England (Mullis, Martin, & Foy, 2008).

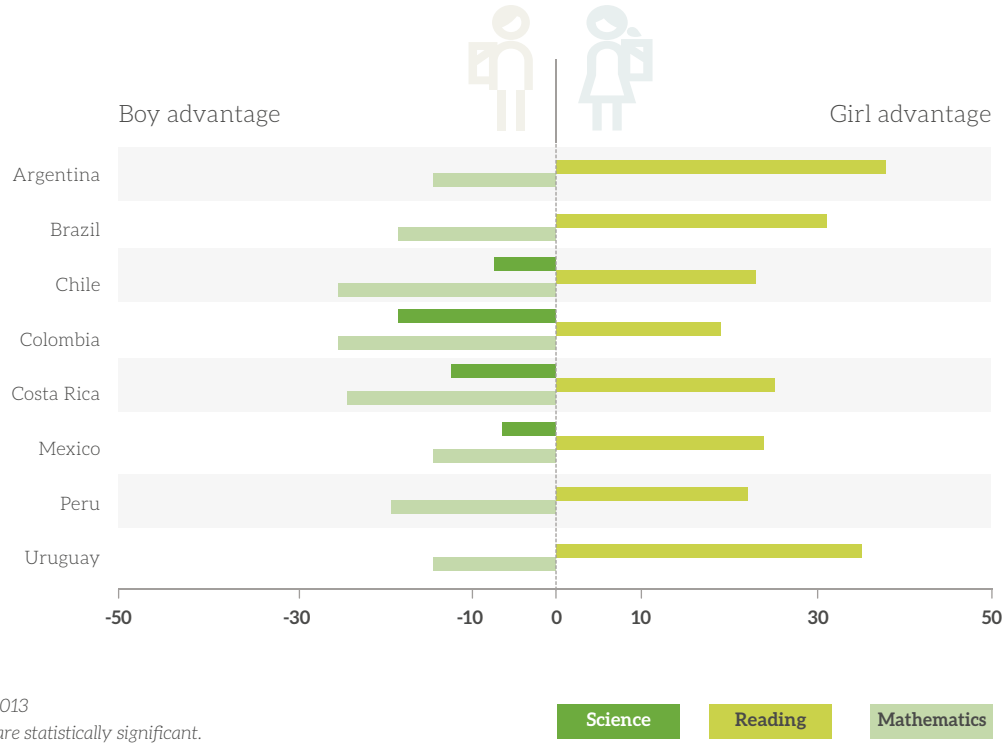
Findings from the latest **PISA** assessment in 2012 are also similar (see Graph 1). Female students outperformed male students in reading achievement in every participating Latin American country. The gender performance gap was the largest in Argentina and Uruguay, 38 points and 35 points or a gap of approximately one school year. Colombia, Chile and Peru demonstrated the smallest gender gaps in reading achievement (less than 0.5 school years) (OECD, 2014b). Unlike in the SERCE testing where no clear gender gap was apparent in science assessments, in PISA assessments male learners outperformed female learners in several Latin American countries. Chile, Colombia, Costa Rica, Mexico, Colombia and Costa Rica had some of the largest gender gaps in science achievement in the sample (OECD , 2013). In the latest PISA assessment (2012), male learners outperformed female learners in mathematics in 41 of the 65 participant countries. Compared to the OECD, Latin America's gender

7 *SABER measures basic skills in reading, mathematics and civic knowledge in 5th and 9th grade. In 11th grade, it assesses the areas of mathematics, reading, civic knowledge, English and science. For more information, the reader is referred to: http://www.icfes.gov.co/*

8 *While female students achieved higher levels in Panama and Paraguay, male students from Colombia and Peru outperformed female students (19 and 16 points respectively) (Treviño et al., 2010a).*

Graph 1

Average PISA 2012 score differences, by country and sex



Source: OECD, 2013
**: all differences are statistically significant.*

gaps are larger in mathematics (+11 for male students), smaller in reading (+38 for female students) and similar in science (1 point in favor of male students) (Bos, Ganimian, & Vegas, 2014).

Results comparisons between recent and earlier assessments suggest mixed trends. While in 1971 male learners outperformed female learners assessments, in 1999 gender differences in civic knowledge performance were minor (Torney-Purta, Lehmann, Oswald, & Schulz, 2001). Indeed, in the ICCS (2009) assessment female learners outperformed male learners in civic knowledge in almost every country (31 of 38) (Schulz et al., 2011). In Latin America, female learners outperformed male learners in civic knowledge in Chile, the Dominican Republic, Mexico and Paraguay. Looking across PISA assessments from 2003-2012 it is clear that while some gender inequalities in testing performance changed many of these differences persisted. In science testing Brazil closed a gap that favored male students. Chile's performance gap in science reduced due to improving test performance by female students. Argentina, Colombia, Mexico and Uruguay maintained the gender gap in science. In reading testing, Brazil duplicated female students advantage but in the

rest of the countries the gender gap did not notably change. The achievement advantage for male learners in mathematics and for female learners in reading has continued for almost a decade (OECD, 2004, 2007a, 2009). Colombia maintains one of the three worse gender gaps in PISA. Female learners performed 25 points below male learners in mathematics and female learners' advantage in reading was among the lowest two in the region. Even in science, male learners had an advantage in Colombia (Bos et al., 2014).

Gender gaps in learning achievement exacerbate the generally low achievement scores among Latin American students in mathematics, reading and science, and are cause for concern. In general, female learners demonstrated advantages in reading and writing and male learners demonstrated an advantage in mathematics. However, while the gender gap in reading performance tended to decrease among older students, the gender gap in mathematics performance grew as the level of education increased. Science assessments were mixed, but recent PISA (2012) results suggested a male advantage in several Latin American countries. Brief comparison with CIVED/ICCS and PISA assessments conducted in the past indicates that there have been some changes in gender inequalities in educational achievement but that several notable gaps remain. The following section explores several general factors that may contribute to the development and persistence of these gender gaps.

iii) Looking for explanations: factors associated with gender inequality in mathematics, reading and science

Research examining possible factors that support gender inequalities in education is scarce for Latin American countries. Most existing research on this subject was conducted in OECD countries, the United States, Canada, and European countries. The lack of research on Latin American countries may be explained by the shortage of data collected in the region and the shorter time that datasets have been available for analysis. Another reason could be the scarcity of longitudinal studies and datasets in the region; longitudinal analysis is central to understanding the origins and development of gender inequalities in learning achievement. We are thus necessarily limited to reviewing research findings from other regions to provide an initial grasp of factors that contribute to gender inequalities in education. The following subsections summarize research findings about general institutional/economic factors as well as student, teacher and parent cultural, psycho-social and attitudinal factors that may support gender inequalities in education.

a) Institutional and economic participation and representation

Existing research considers the potential impact of institutional and economic factors on gender inequalities in education. Specifically, research has examined the impact of: access to education, participation in the labor market, political participation (representation in parliamentary seats, at the ministerial level, or as head of state), and emancipation (based on economic opportunities, economic participation, educational attainment, health and well-being of women in comparison to men) (González de San Ramón & De la Rica, 2010; Guiso, Monte, Sapienza, & Zingales, 2008). Cross-national evidence from the 40

participant countries in PISA (2006 and 2009) and SIMS[9] (1982) assessments reveals a positive association between these indexes and female test scores; female learners performed better on tests in countries with greater female access to education, work, political participation/ representation and emancipation[10]. As Guiso et al (2008) note, "in more gender-equal societies, girls perform as well as boys in mathematics and much better than them in reading". However, the performance of boys in reading is not affected by the considered indexes (Guiso et al, 2008, p.1165). A different study examining the same sample of countries concludes that gender inequalities in reading achievement are associated with the Gini Index (Marks, 2008), meaning that gender inequalities are lower in countries with lower Gini Index (higher equality). While informative, institutional and economic factors related to gender inequalities in education have policy implications that are outside of educational systems and their participants and therefore outside the scope of this report.

b) Learner attitudes and self-confidence

Existing research also examines the influence of learner dedication and attitude towards school and school activities in educational gender inequalities. For instance, in the Colombian national assessment the underperformance of male learners in reading was associated with grade repetition (also known as retention) and study techniques (memorization as opposed to comprehension) (ICFES, 2013). Further, PISA 2009 and 2012, boys in participant countries were more likely to report that attending school was useless. Boys also tended to arrive late and to participate less in school activities. The PISA data also suggests that boys spent one hour less per week doing homework and were less engaged with reading (OECD, 2009, 2015). On average, male learner achievement would increase above 4 points if they dedicated one additional hour to homework and it would also increase if they enjoyed reading and read more (OECD, 2010). According to PISA, in comparison to girls, boys from OECD countries tended to avoid reading, even for enjoyment, and are discouraged to read newspapers and comic books by parents and teachers (OECD, 2015). This is problematic considering that the gender gap in reading could be largely reduced (23 points) if male learners enjoyed reading as much as female learners (OECD, 2010).

Self-confidence – whether learners believe that they can successfully perform in a course, i.e. mathematics– is another relevant factor in educational inequalities. Research findings indicate that female learners tended to have lower self-confidence in mathematics, mainly in high school and college; female students were less interested in mathematics than their male peers and assumed that they were less competent (Gunderson, Ramírez, Levine, & Beilock, 2012). In the case of Colombia, a recent study concludes that educational expectations and self-confidence are associated with the underperformance of girls in mathematics (ICFES, 2013). Further, among the Latin American countries that participated in PISA 2012, female learners more frequently reported they did not tend to believe they were good at mathematics. In Chile, for example, 7 out of 10 girls assumed their lack of competence compared to 5 out of 10 boys (OECD, 2014a). On average, female learners tended to be more anxious about mathematics tasks and even more frustrated in mathematics activities (OECD, 2009, 2015). The proportion of female students who felt helpless when doing a mathematics problem was larger among Latin American countries than among OECD countries, namely in Chile, Mexico and Brazil (OECD, 2014a). At similar mathematics score, female learners tended to be less perseverant, less prone to solve problems and less motivated to learn mathematics (OECD, 2014b). These beliefs translate into lower performance and the avoidance of STEM advanced

9 *The Second International Mathematics Study (SIMS) collected Mathematics test scores of 8th grade students from 64 countries, including European countries, United States, New Zealand, Canada, Thailand, Nigeria, Hong Kong, Israel and Japan (Baker & Perkins Jones, 1993).*

10 *The women´s emancipation index (Gender Gap Index) is based on the Global Gender Report (2009) and considers educational attainment, health, economic opportunities, well-being and economic participation (González de San Ramón & De La Rica, 2010).*

courses and careers (Correll, 2001; Eccles et al., 1983; Gunderson et al., 2012; Hyde, Ryan, Frost, & Hopp, 1990; Muller, 1998).

c) Gender stereotypes and beliefs

Differences in learner attitude and self-confidence is partly explained by the prevalence of gender stereotypes and, in particular, *gender beliefs*; gender beliefs are expectations of (in)competence based on gender and societally defined gender roles (Correll, 2001). These beliefs have a significant effect on individuals' attitudes and behaviors, thereby perpetuating gender differences (Jacobs, Davis-Kean, Bleeker, Eccles, & Malanchuk, 2005; Jones & Dindia, 2004; Wigfield & Eccles, 2000). For the purpose of our analysis, gender beliefs assume mathematics is a male domain and that reading is a female one based on the assumption that these relative skills are innate features of male and female learners. (Eccles, Jacobs, & Harold, 1990; Hyde et al., 1990). According to a recent study of 8 and 11-year-old students from the UK, differential motivations to read are mainly explained by gender identity; reading is considered a female activity (McGeown, Goodwin, Henderson, & Wright, 2012). Similarly, experiments conducted in the United States during the 1990s proved that female-learner test performance was impacted by whether they were initially told that a certain gender usually performed better on the exam; female learners scored higher when they were told prior to the test that girls tended to do well on the exam (as opposed to when they were told that boys usually performed better). The researchers dubbed this phenomena the *stereotype threat* (Spencer, Steele, & Quinn, 1999).

A number of studies support the finding that gender beliefs may play a role in learner attitudes and self-confidence. Gender beliefs may explain why females may fear mathematics tasks and challenges and avoid STEM careers (Gunderson et al., 2012; OECD, 2012; Sikora & Pokropek, 2011). Research findings indicate that gender beliefs led girls to assume that they would do worse than boys in mathematics, even when they performed similarly on tests. Research also suggests that gender beliefs may play a role in general student behavior; while boys assume that not being interested in school and being disruptive are positive signs of masculinity (Salisbury, Ress, & Gorard, 1999), girls work hard in school in order to demonstrate that they are ´good girls´(OECD, 2015). More disruptive behavior by male learners (Mathews, Cameron, & Morrison, 2014) may explain why they receive more attention from teachers than female learners (Jones & Dindia, 2004)[11] (further discussed below).

Gender stereotypes are transmitted and reinforced in schools by curriculum biases and by teacher behavior. The curriculum, textbooks and teaching materials may more frequently portray males in scientific or leadership roles, while females may more often appear performing household chores or child care (Blumberg, 2015). Teachers may reinforce gender stereotypes implicitly or explicitly. Research has found that teachers tended to start interactions more often with male students than with female students. Teachers were also more prone to encourage, praise, and criticize, as well as provide individual help, to boys than girls (Becker, 1981). Similarly, the pioneer study by Hall & Sandler (1982) evidenced that female learners faced a 'chilly climate' in class because teachers tended to be less responsive to questions from girls; teachers also tended to interrupt girls more. Due to gender stereotypes teachers may (de)emphasize student performance in certain subjects on the basis of gender. Research has found that teachers tended to spend more time with male learners in mathematics activities and more time with female learners in reading activities (Leinhardt, Seewald, & Engel, 1979). Teachers may motivate and give more opportunities for boys to take leadership roles when developing science or mathematics activities. Teachers may also assume that male learners are more competent in mathematics, which translates into higher expectations, as well as more positive class interactions (Li, 1999). According to a German study, teachers assumed

11 *Related to this disruptiveness, is school-related gender violence (SRGV), which differently affects boys and girls. While girls are more exposed to sexual harassment, boys are more exposed to physical violence (UNESCO, 2015a). The evidence for Latin America is still incipient in this matter, but requires urgent attention.*

that girls failed in mathematics because they are less logical, less competent and they require extra effort to perform as well as boys (Tiedermann, 2000a).

Existing research also considers the potential impact of same-sex teachers on gender beliefs and learning achievement. A public concern is whether male learners are being affected by female teachers due to the stereotype threat or lack of gender role models, in the context of an overrepresentation of female teachers (Carrington & Skelton, 2003). Research findings on this subject are mixed. In South and West Asia, where girls are less likely to be enrolled in school, research finds that an increasing presence of female teachers (the 'feminization of teaching') may facilitate their progression through and completion of compulsory education (UNESCO, 2010). In some African countries, female teachers served as gender role models to female students, promoting their achievement (UNESCO, 2004b). The feminization of teaching in primary education may be reinforcing gender stereotypes in countries where female participation in education is more equal, such as Latin America. Nonetheless, in a study of eighth grader testing in Chile, Paredes (2014) found a positive association between female teachers in mathematics and female students' achievement; the study noted no effect on male students results in the national assessment SIMCE.

Some countries, particularly European countries, are promoting the graduation and hiring of male teachers. However, there is no clear evidence regarding the benefits of same-sex teachers and students in student achievement in Europe (Bradley Carrington, Tymms, & Merell, 2008; Helbig, 2012; Jones & Dindia, 2004; Neugebauer, Helbig, & Landmann, 2010). It is assumed that male students would identify more with male teachers, that they would get more appropriate role models and, therefore, improve their educational outcomes. Based on data from the United States for eighth graders, Dee (2007) concluded that there was a positive association between teacher gender and student test scores, as well as student engagement in the course. One year with a male teacher would reduce male students' disadvantage in reading scores by a third. Yet, in general, teachers tend to have worse relationships with male students and female teachers tend to have better relationships with students (Spilt, Koomen, & Jak, 2012). Moreover, students do not necessarily perceive an advantage of being taught by same-sex teachers (Skelton et al., 2009). Based on TIMSS assessment, an analysis with fifteen OECD countries (namely, Canada, Czech Republic, Finland, France, Hungary, Japan, Netherlands, Norway, New Zealand, Portugal, Slovak Republic, Spain, USA and Sweden), evidences that same-sex teachers have a mixed effect. Having a same-sex teacher had no impact on learner test scores in eight countries; a positive effect for male learners in four countries (Canada, Japan, Portugal and Spain); and a positive effect on female learners three countries (France, Greece and Sweden) (Cho, 2012).

Importantly, gender stereotypes also come from and are reinforced at home. Parental involvement in schoolwork has been found to differ by gender, but the effects of this difference on achievement were not clearly evidenced (Muller, 1998). While parents tended to be more involved with their sons in schoolwork, they tended to be more involved in home activities with girls (Stevenson & Baker, 1987). Gender stereotypes have also been found to affect parent expectations and explanations for differences in achievement. Studies from the USA and Germany suggest that parents had higher expectations for boys as early as elementary school and assumed that mathematics was more relevant for boys (Eccles et al., 1990; Tiedermann, 2000b). Research has found that mothers more often explained male advantages in mathematics as due to innate skills, while they explained female success in the same subject as resulting from effort (Yee & Eccles, 1988). Since parents consider that girls and boys have different skills for mathematics, regardless of their actual performance, parents react differently to students' performance by gender. Parent expectations and explanations may lead to self-fulfilling prophecies. Gender beliefs lead parents to prioritize different activities and competences to be acquired by their children leading them to provide their children with different toys and incentives. This effects children's self-assessment and their interests (Eccles et al., 1983, 1990).

In sum, while there is little existing research into the factors that support gender inequalities in Latin American countries, research from countries in other regions provides a general understanding of such factors. Institutional and economic factors, such as labor market participation and political representation, play a role in female-learner achievement; female students in countries with greater participation and representation in institutional and economic areas performed better on tests. However, the implications of these findings are outside the scope of this report. Existing research also identifies learner attitudes and self-confidence, gender beliefs and their role in student performance as well as parent and teacher expectations/explanations for achievement as key factors. Student, teacher and parents attitudes may be mutually reinforcing in promoting educational inequalities. In general, gender beliefs support stereotypes that female learners are more apt to do well in reading and writing and that male learners are more likely to succeed in mathematics and science.

Building on these initial findings, this report will contribute to existing literature on gender inequalities in education and will help address the current gap in research on this subject in Latin America. Specifically, this research will explore factors associated with gender inequalities in mathematics, science and reading achievement in all of the Latin American countries that participated in the Third Regional Comparative and Explanatory Study (TERCE). Since this assessment focuses on primary-school students, TERCE data provides a unique opportunity to explore gender inequality in education in its early stages. Moreover, because it was applied in fifteen countries in the region, TERCE data provides an important general perspective of gender inequalities in Latin America. Finally, because many of the countries that participated in TERCE also participated in previous LLECE assessments (SERCE), a comparison of assessment findings with SERCE data enables us to examine whether inequalities have changed in the period from 2006-2013.

Our analysis focuses on the following hypotheses:

The gender gap in test scores is associated with students´ attitudes towards studying and their academic performance;

The gender gap in test scores is associated with gender roles transmitted by parents and teachers to the students; and

The gender gap in test scores is associated with gender stereotypes transmitted by teachers and parents.

Prior to turning to results of our analysis in Chapter III, the following chapter describes the TERCE dataset and the variables considered in the analysis.

II The third regional comparative and explanatory study (TERCE)

The Latin American Laboratory for Assessment of the Quality of Education (LLECE) has implemented regional assessments in Latin America for over a decade. LLECE's First Regional Comparative and Explanatory Study (PERCE) in 1997 assessed reading and mathematics achievement among third and fourth graders. Eleven countries in the region participated in PERCE (see Table 1). Participation increased to 16 countries for the Second Regional and Explanatory Study (SERCE), conducted in 2006. Different from PERCE, SERCE assessed third and sixth graders and included a writing assessment. The Third Regional and Explanatory Study (TERCE), conducted in 2013, evaluated third and sixth grader performance in reading, science, writing and mathematics. Although the sample criteria changed between SERCE and TERCE, these assessment findings are comparable with certain caveats (caveats discussed in Chapter III) (UNESCO, 2015c).

The objective of the Third Comparative and Explanatory Regional Study (TERCE) was to provide inputs for evidence-based decision making that can support the design and improvement of educational policies and practices. To this end, TERCE collected information about student achievement and the contextual factors that explain differences in performance (Flotts et al., 2015). A total of 15 countries participated in TERCE: Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic and Uruguay, and, also, the Mexican State of Nuevo León. TERCE assessed more than 134,000 students in third and sixth grade (more than 67.000 students per grade). The framework for building the test was based on the analysis of the national curriculums of the participating countries. The TERCE's test framework was an update of the framework of the Second Comparative and Explanatory Regional Study (SERCE) (Flotts et al., 2015). The tests included multiple-choice and open questions. The writing assessment involved writing a draft and a final version of a short text. In addition to the tests, TERCE collected information on factors related to achievement through surveys applied to students, families, teachers and school principals.

Student performance results from TERCE are presented in two different ways. First, achievement is estimated with test scores (norm-referenced). In the case of the

mathematics, reading and science tests the results have a score distribution with a regional mean of 700 and a standard deviation of 100 points. The estimation procedure produces five scores called plausible values and all the plausible values are used in the analyses presented in this study. The writing test has a four point scale based on the levels of the rubric used for revising the texts produced by the students[12]. Four is the highest score. Second, TERCE presents student performance information in the form of four achievement levels (see Appendix II). The fourth level represents the most advanced achievement. Students are classified into levels (criterion-referenced) according to their actual performance. Each level has a skills-based definition about the contents, tasks and abilities of the students (Flotts et al., 2015).

The TERCE data has several advantages and one notable limitation. The main advantages are: a) it includes an important number of countries of the region; b) it measures learning in primary education, where enrolment is universal in most Latin American countries; c) its questions are based on the national curricula (rather than standards defined by international agencies that might not relate with students' knowledge). For the purpose of this report, the main disadvantage is that TERCE includes a limited number of questions on academic self-concept. gender stereotypes and student career expectations. Nonetheless, we could identify proxies to test our hypotheses. For the first hypotheses, we considered two proxies. As a proxy of students' attitudes towards studying, we considered how much time students dedicated to study at home. As a proxy of academic performance, we considered retention. For the second hypothesis, we considered teacher´s sex and the educational level of the student's mother as proxies for gender roles. Finally, we measured gender stereotypes transmitted by teachers and parents with several different proxies: teacher practices, family educational expectations, parent and teacher assumptions regarding male and female different skills towards science, mathematics and reading, and parental supervision of homework and studies. Appendix III describes the source and main characteristics of each of these proxies.

12 *The rubric considers three dimensions: discursive (purpose, sequence and capacity to follow the indications), textual (general coherence, cohesion and consistency) and legibility (orthography, punctuation and word segmentation) (Flotts et al., 2015).*

III Findings

The results in this chapter are divided in three sections. The first section examines gender inequalities in education in Latin America by focusing on assessments of primary students in the Latin American Laboratory for Assessment of the Quality of Education (LLECE) Third Regional Comparative and Explanatory Study (TERCE), conducted at the end of the school year in 2013. We analyze gender differences in reading, writing, science and mathematics test performance with three different measurements. First, we consider differences in average test scores between female and male learners. Then, we consider the extent to which achievement varied within these groups (variability analysis). Finally, we analyze the distribution of male and female students by level of achievement. The second section compares SERCE and TERCE findings in order to identify trends in each of the above-mentioned measurements and assessments between 2006 and 2013. The third and final section explores factors that may be associated with the evidenced gender gaps in educational performance in TERCE, focusing on third and sixth grader mathematics, reading and science achievement.

The extent, or magnitude, of the gender achievement gap varies among the participating countries, school grades and disciplines. In fact, there is no discernible trend that permits identification of countries where there are consistent gaps in gender performance in the different grades and disciplines. For this reason, the analysis presented below is organized by discipline and grade.

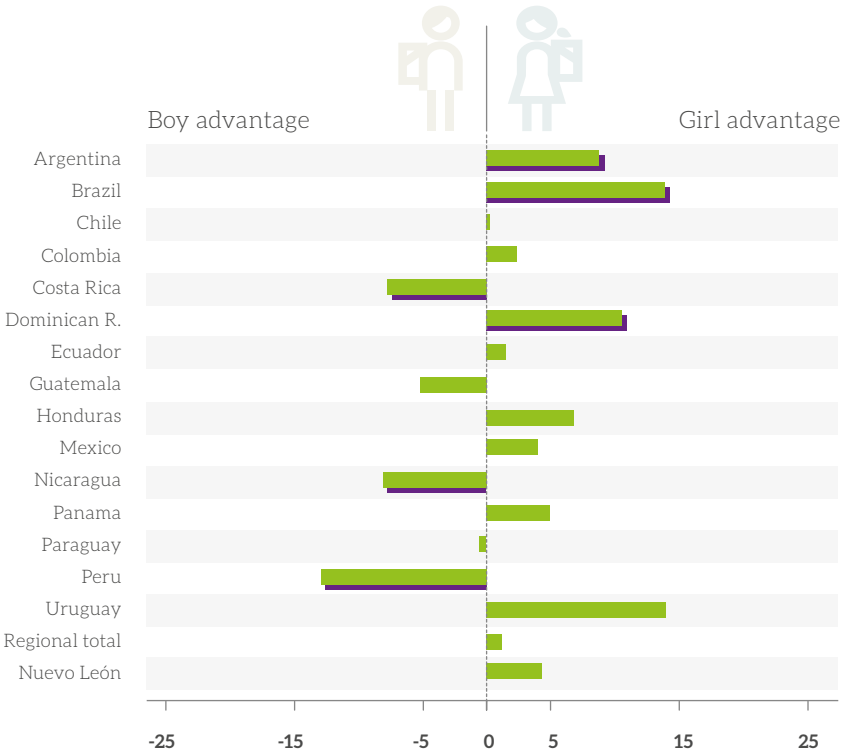
i) Achievement gaps in TERCE

Analysis of the TERCE results provides a mixed picture of gender achievement gaps. First, clear gender gaps in mathematics achievement appear only as education continues; relative equality in achievement among third graders becomes clear inequality in favor of boys in sixth grade. Since schools are the primary source of mathematics knowledge for students (Heyneman, 2004), it is likely that these institutions play a role creating these gender inequalities. Second, girls' advantage in reading in third grade becomes more widespread in sixth grade. Again, the gender gap increases among students with more education. Third, there is no apparent gender gap in science achievement; boys and girls have advantages in the same number of study countries. Fourth, female students show a generalized advantage in writing scores in both third and sixth grades. This finding confirms that girls have consistent achievement advantages in both reading and writing (literacy). Overall, it seems that the education process reinforces gender stereotypes and leads to larger inequalities in mathematics and literacy at the end of primary school.

The following subsections present specific analysis of the gender gap by discipline and grade. It is important to note that the test score scale in mathematics, reading and

Graph 2

Difference (Girl-Boy) in mathematics score in third grade



Note: Purple shadow indicates that difference is statistically significant (P<=0.05)

Source: Own elaboration based on TERCE data.

science has a regional mean of 700 points and a standard deviation of 100. In the case of writing, the score scale goes from one to four.

a) Achievement gap in mathematics

Gender achievement gaps in mathematics are greater in later grades. As this subsection discusses, there is no apparent gap in mathematics performance among third graders. However, by sixth grade boys demonstrate a generalized advantage in mathematics. Therefore, it is plausible that the education processes in schools are in part responsible for the creation of the gender gap in mathematics.

(1) Mathematics gap in third grade

Graph 2 demonstrates the difference by gender in mathematics test scores for third graders. As the graph demonstrates, in 9 of the 15 participating countries there is no apparent gender gap in average mathematics scores. In the six countries that show statistically significant gaps (see purple shadow) the inequalities vary; in three countries boys have a performance advantage (higher scores) in mathematics, but in the other three countries girls show the advantage. Boys show a performance advantage in Peru (with an average score gap of 13 points)[13], Nicaragua

13 *The standard deviation of the test scores is 100 at a regional level, a figure that must be considered for those interested in the statistical magnitude of the gaps. However, the text includes the gap levels in terms of score points in order to reach audiences without a specialization in statistics.*

(8) and Costa Rica (8). Meanwhile, girls have higher levels of mathematics test achievement in Brazil (14 points over boys), the Dominican Republic (11) and Argentina (9).

However, gender differences in mathematics achievement are not evenly distributed along the range of test scores. For example, female third graders do not score uniformly lower than male third graders. Examining gender performance by percentile demonstrates this fact. Table 2 indicates the extent of the gender gap in mathematics test scores in the 10th, 25th, 50th, 75th and 90th percentiles. Students in the 90th percentile have a higher score on the exam than 90% of their classmates; students in the 75th percentile have a higher score than 75% of their classmates, etc. The number in each of the percentiles listed in Table 2 refer to the difference of points that female learners have on the mathematics tests relative to male learners. For example, a score of one in the 90th percentile (this is the case for Argentina) indicates that among students whose scores are better than 90% of their fellow third graders,

Table 2 *TERCE third grade mathematics percentile differences (Girl-Boy) by country*

Country	Gap P10	Gap P25	Gap P50	Gap P75	Gap P90
Argentina	15	12	10	5	1
Brazil	**24***	**22***	13	4	4
Chile	5	5	1	-5	-4
Colombia	.1	8	7	2	-4
Costa Rica	-1	-3	**-8***	**-11***	**-17***
Dominican Republic	8	**11***	**12***	**13***	11
Ecuador	7	4	1	-1	-4
Guatemala	-1	-4	-6	-6	-8
Honduras	5	4	2	9	14
Mexico	5	7	6	4	-3
Nicaragua	-12	-7	-5	-5	-8
Panama	5	5	5	9	6
Paraguay	-1	1	-	-2	-6
Peru	**-16***	**-16***	**-12***	**-13***	-10
Uruguay	23	16	16	10	7
Region (Total)	2	3	2	-	-3
Nuevo León	8	7	6	2	-2

Note: Bold and asterisk indicates that value is statistically significant (P<=0.05)
Source: Own calculations based on TERCE data.

Table 3

Description of mathematics performance levels of third grade students

Level	Description
I	• Ordering natural numbers and comparing quantities. • Identifying basic geometric shapes. • Identifying missing elements in simple sequences (graphical and numerical). • Reading explicit data in tables and graphs.
II	• Reading and writing natural numbers. • Interpreting simple fractions. • Identifying units of measurement or the most appropriate instruments to measure the attributes of a known object. • Identifying relative positions of objects on maps. • Identifying elements in geometric figures or flat representations of geometric shapes. • Extracting information from tables and graphs.
III	• Identifying rules or patterns in the formation of more complex sequences (graphical and numerical), determining missing elements or continuing with the sequences. • Solving problems that involve elements of geometric figures or flat representations of geometric shapes. • Solving problems that require the interpretation of simple fractions. • Solving problems that require the application of natural number operations. • Comparing and estimating measurements of objects and solving problems that involve measurements. • Interpreting information from tables and graphs.
IV	• Solving more complex problems in the area of natural numbers. • Solving problems that involve the comparison and conversion of measurements. • Solving more complex problems that involve elements of geometric figures or flat representations of geometric shapes.

Source: UNESCO, 2015.

females' scores are one point higher on average than males. If the number is negative (as in the 90th percentile in Chile) this indicates that female learners' scores are on average less than male learners. Analyzing mathematics test performance in this way enables us to understand the level of variability in scores and, as a result, to obtain a more detailed understanding of the level of gender inequality in mathematics achievement.

The findings in Table 2 do not indicate a clear pattern in the distribution of mathematics test scores across the study countries. However, gender inequalities in mathematics performance do appear when we compare the test scores of female and male third graders in the specific percentiles. Analysis of mathematics achievement by percentile shows gender gaps in four countries. Of note, female students' scores in Brazil and the Dominican

Republic are significantly higher than their fellow male students in several percentiles. In Brazil, female students' scores are 24 points higher (on average) than male students in the 10th percentile of mathematics performance. Scores in the 25th percentile are similar; female students have a performance advantage of 22 points. In the Dominican Republic female students show a consistent advantage in the 25th, 50th and 75th percentiles, scoring between 11 and 13 points higher than male students. However, in several countries female learners' scores are significantly lower on average. In Costa Rica, female third graders have a greater disadvantage in mathematics test performance as the percentile increases. Among students in the 50th percentile boys score 8 points higher than girls (on average) and test score differences increase to 11 points in the 75th percentile and 17 points in the 90th percentile. Female students also have lower average scores than male learners in the first four percentiles in Peru (with the difference in scores ranging from 12 to 16 points).

Analyzing the proportion of boys and girls in each of TERCE's four achievement levels for third grade mathematics performance further clarifies gender inequalities. The achievement levels are based on a combination of disciplinary domains and different cognitive processes. Level I students were only able to correctly answer the easiest test questions, while students in Level IV correctly answered the most difficult questions. Table 3 summarizes the TERCE achievement levels for third grade mathematics performance.

Table 4 indicates the percentage of females relative to males in each third grade mathematics achievement level by country. A positive number such as 5.1 (see Gap Level II for Argentina) indicates that there are 5.1% more girls in the given achievement level than boys. A negative number indicates that there were more boys than girls in the level (see Gap Level I for Argentina). Table 4 demonstrates that gender inequalities were generally concentrated in the lower achievement levels (Levels I and II), with some exceptions. In most countries there is a higher percentage of male students in the lower achievement levels than female students. However, in some countries there is a higher proportion of boys in Level I achievement group and a higher proportion of girls in Level II; Argentina, Brazil, Colombia, Costa Rica, the Dominican Republic, Mexico, Ecuador, Panama and Nuevo León show this trend. Several countries show a lesser representation of female learners in the highest achievement group (Level IV). The overrepresentation of male students in the Level IV is highest in Chile, Costa Rica and Peru. Uruguay, on the other hand, has 2.9% more girls than boys in the Level IV achievement group.

To sum up, the comparison of average test scores reveals no gap in third grade mathematics performance in the majority of the countries. Among the countries with statistically significant gaps, the gender advantage was split; female students' score are higher in half of the countries and male students' scores are higher in the other half. Analysis by percentile reveals some gender gaps. However, the gender advantage in these countries is also split. It is worth noting that the performance advantages (for boys and girls) are relatively consistent across percentiles in these countries. Achievement level analysis reveals that gender inequalities in third grade mathematics performance concentrate in the lower achievement levels. In most of the countries male students are overrepresented in these lower achievement levels. However, males are also overrepresented in the highest achievement level in several countries. Therefore, while analysis reveals some gender gaps in mathematics performance among third graders, the mixed nature of these findings does not indicate a consistent advantage for either gender.

Table 4

TERCE third grade mathematics level of achievement differences (Girl-Boy) by country (Proportion)

Country	Gap Level I	Gap Level II	Gap Level III	Gap Level IV
Argentina	-5.8	5.1	0.8	-
Brazil	-8.2	6.2	1.6	0.4
Chile	-1.0	-0.9	5.9	-4.0
Colombia	-3.0	2.0	2.0	-1.0
Costa Rica	-1.7	5.4	-0.1	-3.6
Dominican Republic	-2.7	2.5	-0.1	0.4
Ecuador	-1.4	2.0	-0.3	-0.3
Guatemala	2.4	0.5	-2.1	-0.8
Honduras	1.7	-4.7	1.6	1.4
Mexico	-3.7	2.1	2.0	-0.5
Nicaragua	1.5	-0.7	0.4	-1.1
Panama	-2.7	3.0	-0.3	0.1
Paraguay	-0.3	1.6	-1.3	-
Peru	4.0	-0.2	-0.8	-3.0
Uruguay	-4.7	-0.5	2.2	2.9
Region (Total)	-1.3	1.4	0.6	-0.7
Nuevo León	-4.0	1.7	1.8	0.5

Source: Own calculations based on TERCE.

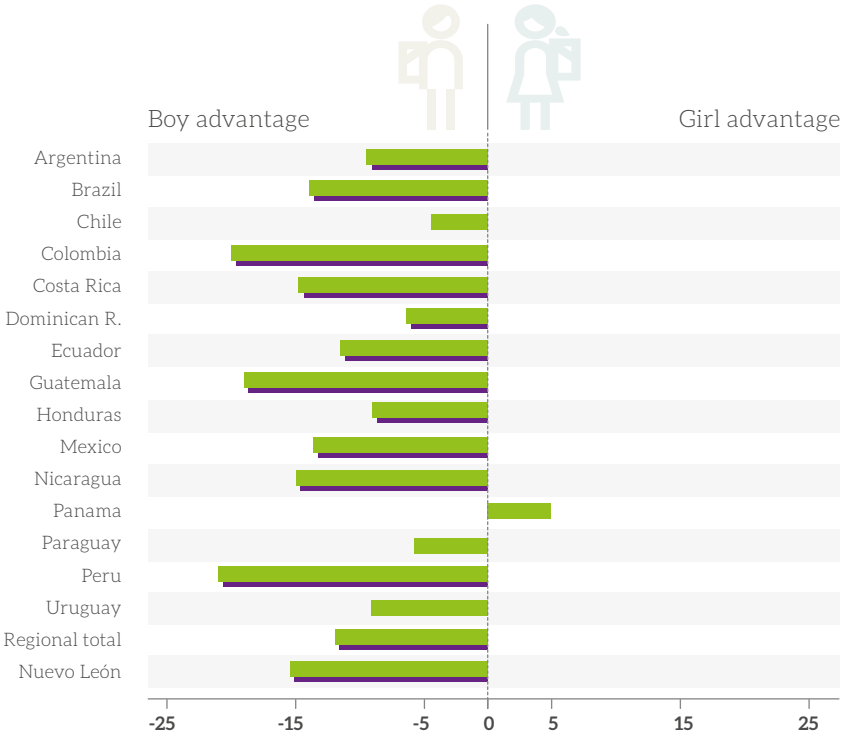
(2) Mathematics gap in sixth grade

Sixth grade mathematics scores reveal a strong pattern of gender achievement gaps across the study countries. Female sixth graders perform significantly lower than male sixth graders in the majority of the countries, with the exceptions of Chile, Panama, Paraguay and Uruguay. Graph 3, which shows differences in average test scores between female and male learners, demonstrates that boys perform better than girls in mathematics in eleven countries and the Mexican State of Nuevo León. Average test score gaps range from 6 to 21 points. The performance gap is greatest in Peru, Colombia and Guatemala (21, 20 and 19 points, respectively). In Costa Rica, Nicaragua and the Mexican State of Nuevo León female sixth graders' scores are 15 points lower (on average) than male students and 14 points lower in Brazil and Mexico. The difference in achievement is 11 points in Ecuador, 9 in Argentina and Honduras, and 6 in Dominican Republic.

Gender inequalities in mathematics achievement among sixth graders are, in general, homogeneously distributed (present across most of the score percentiles). However, in several countries these disparities concentrate in a specific part of the test score distribution. Analysis of the achievement gap by percentile shows no common patterns across the countries (see Table 5). However, there is a statistically significant difference in the majority of percentiles in several countries. In Colombia, Guatemala, Mexico and Nuevo León the gender gap in mathematics performance increases in the higher percentiles. In Colombia, where female students have statistically

Graph 3

Difference (Girl-Boy) in mathematics score in sixth grade



Note: Purple shadow indicates that difference is statistically significant (P<=0.05)

Source: Own elaboration based on TERCE data.

Table 5

TERCE sixth grade mathematics percentile differences (Girl-Boy) by country

Country	Gap P10	Gap P25	Gap P50	Gap P75	Gap P90
Argentina	-9	-12	-10	-9	-10
Brazil	-14	-13	**-17***	-13	-13
Chile	1	-2	-2	-8	-15
Colombia	**-16***	-16	**-20***	**-21***	**-24***
Costa Rica	-8	**-13***	**-16***	**-20***	**-18***
Dominican Republic	-6	-4	-4	-7	-9
Ecuador	**-13***	-8	-10	-12	-14
Guatemala	**-14***	**-14***	**-15***	**-21***	**-30***
Honduras	-6	-6	-9	-10	-13
Mexico	-7	-7	**-14***	**-21***	**-20***
Nicaragua	**-16***	**-15***	**-13***	**-14***	**-15***
Panama	5	3	5	7	6
Paraguay	-2	-3	-3	-6	-12
Peru	**-26***	**-25***	**-19***	**-19***	**-21***
Uruguay	-18	-13	-9	-6	-2
Region (Total)	-9	-10	**-12***	**-15***	-14
Nuevo León	-5	-6	**-17***	**-23***	**-24***

Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on TERCE data.

significant lower scores in all but the 25th percentile, the 16-point test score gap in the 10th percentile increases to 24 points in the 90th percentile. In Guatemala test score disparities increase from 14 points in the 10th percentile to 30 points in the 90th percentile. In Mexico, female students have statistically significant lower scores from the 50th to the 90th percentiles and the point gap increases from 14 to 20 points, approximately. Nuevo León shows a similar trend. The performance gap increases from 17 points in the 50th percentile to 24 points in the 90th percentile. Nicaragua and Peru present statistically significant lower scores for females in every percentile of the distribution. Statistically significant gaps are also present in the 50th percentile in Brazil (17 points) and in the 10th percentile in Ecuador (13 points).

The relative representation of boys and girls in TERCE's sixth grade mathematics achievement levels offers complementary information about the distribution of gender disparities. Table 6 describes the levels of achievement for the sixth grade mathematics assessment. Students classified in the higher levels of achievement demonstrate more sophisticated abilities in mathematics when answering questions involving the disciplinary

Table 6 *Description of mathematics performance levels of sixth grade students*

Level	Description
I	• Estimating weight (mass) and length of objects. • Identifying relative positions on maps. • Identifying rules or patterns in the formation of simple number sequences and continuing them. • Ordering natural numbers and decimals. • Utilizing the structure of the decimal system and monetary systems. • Solving simple problems that involve proportional variations. • Reading explicit data in tables and graphs.
II	• Solving simple problems that involve natural numbers, decimal numbers, fractions, and proportional variations. • Relating different spatial views. • Determining missing terms or continuing graphic or numerical sequences. • Identifying acute, right, and obtuse angles, and solving simple problems that involve angles. • Determining measures of length or the mass of objects through graduated instruments. • Calculating perimeters and areas of polygons.
III	• Solving problems of proportional variations that require the provided information. • Converting units of measurement and solving problems that involve measurement. • Solving problems that involve angles and identifying relations of perpendicularity and parallelism on a plane. • Interpreting formation patterns of numerical sequences. • Solving problems that involve the calculation of perimeters and areas of polygons. • Solving problems that require reading and interpreting information in tables and graphs.
IV	• Solving more complex problems that involve operations of natural numbers, decimal numbers, and fractions, or proportional variations. • Solving more complex problems that involve the calculation of perimeters and areas of polygons, or angles of polygons. • Solving problems that require the conversion of units of measurement. • Solving problems that require the interpretation of data presented in more complex tables or graphs.

Source: UNESCO, 2015.

elements described for each level. Students in Level I can solve simple problems involving basic arithmetic operations where the data is explicit, while students in level IV are able to solve problems involving geometry, fractions, proportional variations and data presented in complex and non-explicit formats.

Sixth grade mathematics comprehension is generally low in the region and, within that context, female students are more often overrepresented in the lower levels of achievement and underrepresented in the higher levels. Table 7 shows the general distribution of students by gender in the different achievement levels. As stated

before, female sixth graders are overrepresented in the Level I of mathematics achievement group, with the exceptions of Chile and Panama. In addition, with the exception of Uruguay, female students are underrepresented in the highest level of achievement in all of the assessed countries.

In sum, while analysis of TERCE's third grade mathematics assessment does not reveal a clear gender gap, analysis of the sixth grade assessment indicates a clear gap in favor of male students. Gender inequalities in mathematics are split among third graders, but a generalized pattern of lower achievement in mathematics for girls is apparent among sixth graders. This trend poses questions about the role of school socialization in creating inequalities in mathematics achievement as schools are the main source of curricular mathematical knowledge for students (Heyneman, 2004; Treviño et al., 2010b). The classroom and interactions with teachers may send messages that encourage boys to pursue mathematics and girls to engage more deeply with other disciplines. Furthermore, schools may reinforce the idea that boys are better at mathematics by shaping learning opportunities differently for male and female students. However, schools are not the only source of socialization. Other societal practice may reinforce gendered messages, expectation and opportunities that present themselves in school.

Table 7 *TERCE sixth grade mathematics level of achievement differences (Girl-Boy) by country (Proportion)*

Country	Gap Level I	Gap Level II	Gap Level III	Gap Level IV
Argentina	4.8	-2.3	-1.5	-1.0
Brazil	6.0	-2.2	-3.5	-0.2
Chile	-0.8	2.7	1.2	-3.1
Colombia	8.5	-1.5	-6.5	-0.5
Costa Rica	3.1	3.3	-5.1	-1.3
Dominican Republic	3.4	-1.9	-1.3	-0.3
Ecuador	1.6	2.4	-2.7	-1.3
Guatemala	7.7	-3.0	-2.8	-1.9
Honduras	5.7	-4.1	-1.3	-0.3
Mexico	1.4	4.0	-1.4	-3.9
Nicaragua	3.5	-1.3	-1.9	-0.3
Panama	-2.8	2.6	0.5	-0.3
Paraguay	1.2	-0.2	-0.7	-0.3
Peru	10.2	-4.8	-3.3	-2.1
Uruguay	5.8	-3.9	-1.9	0.1
Region (Total)	4.3	-0.9	-2.2	-1.1
Nuevo León	0.2	7.3	-2.3	-5.1

Source: Own calculations based on TERCE data.

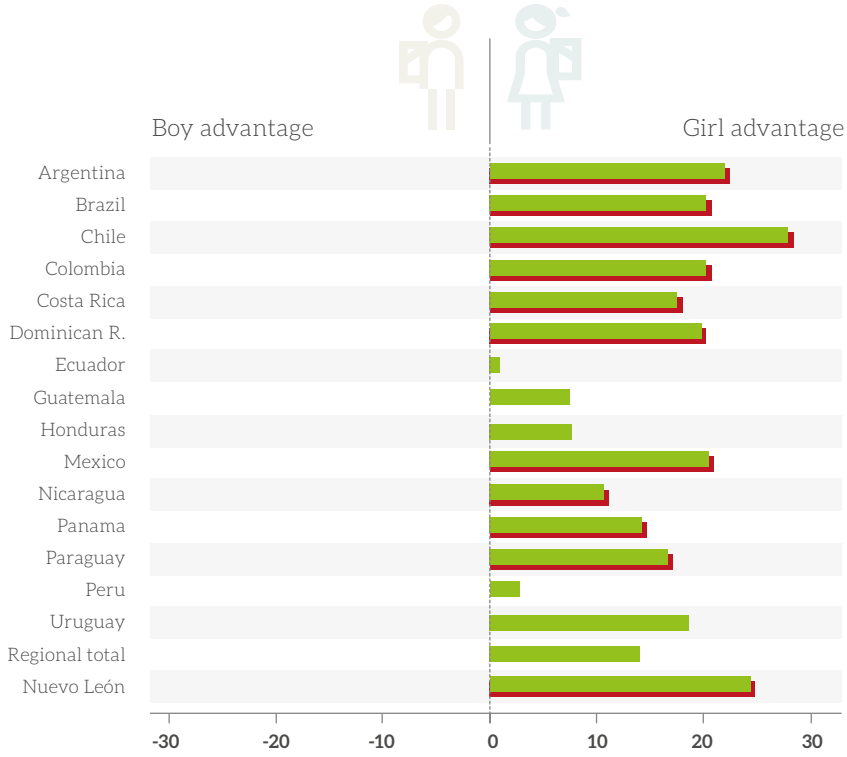
b) Achievement gap in reading

Reading achievement results show a consistent gender gap in favor of girls. Girls show higher scores than boys in reading in third and sixth grades in 10 countries and the Mexican State of Nuevo León. This trend seems to be associated with differing opportunities to formally use language in classrooms. As discussed in previous sections, gender stereotypes lead teachers to provide more opportunities for girls to excel in reading. Furthermore, as presented below, girls have advantages in writing and this pattern may denote that more frequent opportunities to practice reading and writing in the school may strengthen girls' language abilities. Although there is a lack of systematic evidence in the Latin American region, girls are more commonly required to be in charge of writing.

(1) Reading gap in third grade

Girls demonstrate a general advantage in third grade reading achievement (Graph 4). In Argentina, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Mexico, Nicaragua, Paraguay, Panama and the Mexican State of Nuevo León, female third graders have statistically significant higher test scores than male students. Female-student performance advantages range from 11 points in Nicaragua to 28 points in Chile.

Graph 4 *Difference (Girl-Boy) in reading score in third grade*



Note: Red shadow indicates that difference is statistically significant (P<=0.05)

Source: Own elaboration based on TERCE data.

Table 8

TERCE third grade reading percentile differences (Girl-Boy) by country

Country	Gap P10	Gap P25	Gap P50	Gap P75	Gap P90
Argentina	**23***	**21***	**22***	**21***	14
Brazil	**33***	**31***	**29***	**24***	**21***
Chile	**33***	**27***	**22***	**15***	**14***
Colombia	17	**22***	**26***	**22***	16
Costa Rica	**22***	**18***	**15***	**17***	**15***
Dominican Republic	15	**19***	**21***	**22***	**23***
Ecuador	3	3	2	-2	-3
Guatemala	11	11	8	5	4
Honduras	4	7	9	10	11
Mexico	19	**21***	**20***	**20***	**21***
Nicaragua	**17***	**11***	**9***	8	13
Panama	12	**17***	**17***	11	13
Paraguay	13	**14***	**17***	**17***	19
Peru	0	1	0	4	10
Uruguay	32	20	14	14	18
Region (Total)	14	15	14	14	13
Nuevo León	**26***	**25***	**24***	**26***	**24***

Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on TERCE data.

The achievement gap in reading among male and female third graders is, in relative terms, homogeneously distributed along the range of test scores, as Table 8 demonstrates. This means that girls have higher test scores than boys along the whole distribution of achievement in all of the study countries. However, not all of these differences are statistically significant.

The distribution of reading test scores between female and male third graders in Table 8 demonstrates three different situations. First, in Brazil, Chile, Costa Rica, and the Mexican State of Nuevo León girls have statistically significant higher test scores than boys throughout the distribution. Second, there are other countries where female students have a reading advantage over boys, but these advantages are not statistically significant at all the points of the distribution. For example, girls have a statistically significant advantage over boys in four out of five percentiles in Argentina, the Dominican Republic and Mexico. On the other hand, in Colombia, Nicaragua and Paraguay girls reach higher test scores than boys in three out of the five percentiles under analysis and

in Panama girls have an advantage in two percentiles. Third, girls and boys show similar test scores along the whole distribution in Ecuador, Guatemala, Honduras, Peru and Uruguay. Interestingly, there are no statistically significant differences between boys and girls in any of the distribution percentiles at the regional level. These findings underscore the richness of performing analysis at the country-level in order to better measure and understand achievement gaps.

The classification of students into achievement levels in reading provides another perspective for examining the gender gap distribution in third grade. For a better understanding of the results, it is necessary to take into account the substantive definitions of each achievement level. For this reason, Table 9 describes third grade reading achievement levels. The levels embody a progression in students' abilities in relation to the difficulty of the questions of the tests. Level I includes the most basic

Table 9 *Description of reading performance levels of third grade students*

Level	Description
I	• Locating explicit information, repeated literally or through synonyms, found in a highlighted place in the text (beginning or end) and that is clearly distinguishable from other information. • Drawing conclusions from connections between clear ideas. • Inferring the meaning of known and familiar words from clues given by the text. • Recognizing types of short texts of familiar structure.
II	• Locating and associating explicit information (causal relationships), repeated literally or through synonyms, found in the body of a text, which must be differentiated from other information nearby. • Infer information from connections suggested by the text (not necessarily evident). • Identifying relationships that demonstrate understanding of the overall meaning of the text, such as distinguishing the main topic through recognized explicit information and information repeated in the text. • Recognizing the communicative purpose of a non-literary text.
III	• Locating and associating explicit information (causal relationships and in a time sequence), repeated literally or through synonyms, present in different parts of a text, differentiating it from competing information. • Inferring information from connections suggested by the text, and founded in knowledge of the world. • Inferring the meaning of unknown and unfamiliar words from clues given by the text. • Identifying relationships that demonstrate understanding of the overall meaning of the text, such as differentiating the main topic from recognized explicit information and information in the text. • Recognizing characteristics of the content and structure of literary and non-literary texts.
IV	• Interpreting figurative language and actions of characters within narratives. • Reflecting on and casting judgments about the resources and characteristics of the content and structure of literary and non-literary texts. • Recognize types of texts with unfamiliar structures.

Source: UNESCO, 2015.

Table 10

TERCE third grade reading level of achievement differences (Girl-Boy) by country (Proportion)

Country	Gap Level I	Gap Level II	Gap Level III	Gap Level IV
Argentina	-10.4	3.3	4.4	2.6
Brazil	-12.7	3.4	6.4	2.9
Chile	-5.3	-2.2	1.0	6.4
Colombia	-7.7	-1.2	5.2	3.7
Costa Rica	-6.1	-1.3	2.7	4.7
Dominican Republic	-7.1	2.8	3.7	0.6
Ecuador	-1.7	1.3	1.8	-1.5
Guatemala	-3.1	2.3	0.9	-0.1
Honduras	-3.9	-0.1	2.7	1.2
Mexico	-6.5	-0.2	1.8	5.0
Nicaragua	-2.3	-0.2	1.6	0.8
Panama	-8.8	4.6	2.7	1.5
Paraguay	-6.7	2.8	0.7	3.3
Peru	-1.6	0.4	0.7	0.6
Uruguay	-5.3	2.1	0.8	2.4
Region (Total)	-5.5	1.1	2.2	2.1
Nuevo León	-6.3	-2.9	3.6	5.6

Source: Own calculations based on TERCE data.

skills related to localizing and interpreting explicit information, making inferences from familiar words and recognizing types of texts. In contrast, Level IV involves the interpretation of complex figurative texts, reflection and assessment of different types of texts and the recognition of non-familiar texts.

Analyzing the levels of achievement, female third graders are underrepresented in the lowest achievement level in all the study countries (see Table 10). Conversely, the proportion of girls surpasses that of boys in the highest level of achievement in all of the countries except Ecuador and Guatemala.

Female students tend to be underrepresented in the lowest levels of reading achievement and overrepresented in the highest levels. Table 10 shows the differences in the percentage of female and male students in each reading achievement level by country. The pattern is clear; male students are consistently overrepresented in the Level I reading achievement group in all countries. The proportion of male students in the Level II reading achievement group is also higher in Chile, Colombia, Costa Rica, Honduras, Mexico, Nicaragua and the Mexican State of Nuevo León. Table 10 further demonstrates that girls are clearly overrepresented in Levels III and IV in every

country. The only exceptions to this trend are Ecuador and Guatemala, where there is a higher proportion of boys than girls in Level IV.

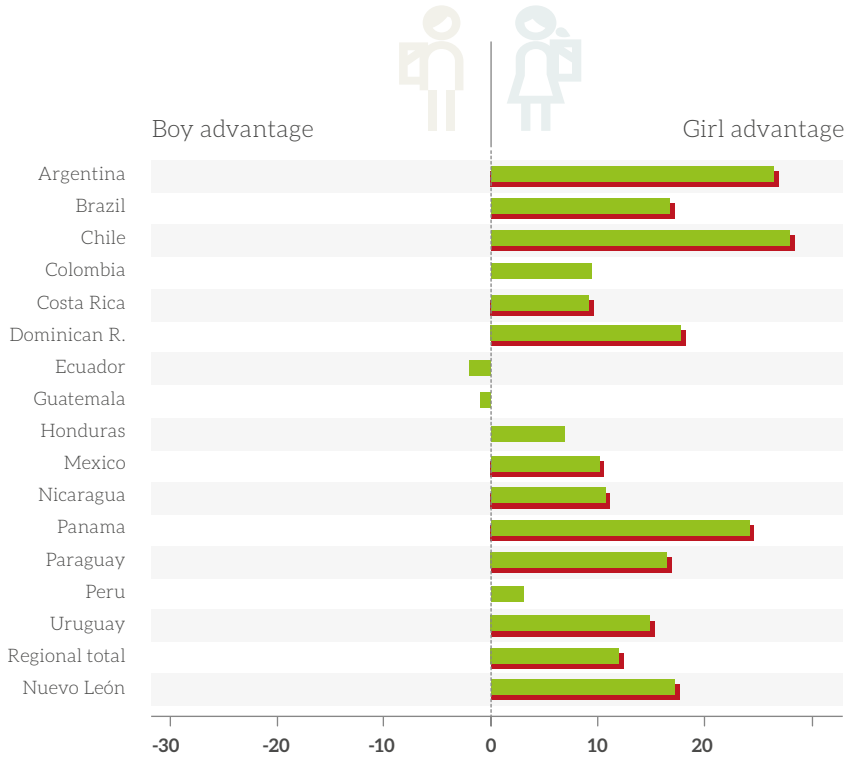
Analysis of TERCE's third grade reading test performance indicates a clear and consistent gender gap in reading achievement that favors female students. Average test score comparisons reveal gender gaps in reading performance. Female students score higher on average than male students in all of the study countries and the majority of these higher scores are statistically significant. Analysis by percentile reveals that female third graders scored higher than male third graders across the score distribution. In several countries, female learners have significantly higher test scores in all or most of the percentiles. Achievement level analysis reveals that females were overrepresented in the highest level and underrepresented in the lowest.

(2) Reading gap in sixth grade

The assessment for sixth grade reading shows a similar pattern of achievement disparities favoring girls. Female students demonstrate higher levels of reading achievement than male students in 10 countries and the Mexican State of Nuevo León (see Graph 5). The magnitude of the reading achievement gap is greater than 20 points in Chile (28), Argentina (26) and Panama (24).

Graph 5

Difference (Girl-Boy) in reading score in sixth grade



Note: Red shadow indicates that difference is statistically significant (P<=0.05)

Source: Own elaboration based on TERCE data.

Table 11

TERCE sixth grade reading percentile differences (Girl-Boy) by country

Country	Gap P10	Gap P25	Gap P50	Gap P75	Gap P90
Argentina	**30***	**29***	**27***	**24***	**20***
Brazil	**22***	**19***	**15***	16	12
Chile	**28***	**31***	**25***	**26***	**28***
Colombia	11	10	11	12	7
Costa Rica	13	10	8	8	7
Dominican Republic	13	**19***	**22***	**21***	11
Ecuador	4	2	-2	-4	-9
Guatemala	4	4	-	-4	-6
Honduras	2	1	9	12	12
Mexico	12	**15***	**11***	8	6
Nicaragua	5	9	**10***	**13***	15
Panama	**19***	**26***	**27***	**26***	**20***
Paraguay	9	**15***	**15***	**18***	**23***
Peru	-8	-	7	8	8
Uruguay	7	24	16	15	16
Region (Total)	11	**13***	**13***	**12***	11
Nuevo León	**17***	**21***	**18***	**15***	**14***

Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on TERCE data.

Inequalities range from 15 to 18 points in the Dominican Republic (18), Brazil (17), Paraguay (16), Uruguay (15), and the Mexican State of Nuevo León (17). Finally, the gap is situated between 9 and 11 points in Nicaragua (11), Mexico (10), and Costa Rica (9).

The analysis of the score distribution demonstrates that the differences in reading achievement among sixth graders present a similar pattern to those of third grade; girls consistently have higher test scores than boys along the whole achievement distribution. In spite of the generalized trend, not all of the differences in achievement between girls and boys are statistically significant (see Table 11).

According to Table 11, countries can be classified into three different groups considering their varying gender disparities in sixth grade reading performance. First,

Table 12

Description of reading performance levels of sixth grade students

Level	Description
I	• Locating and associating explicit information, repeated literally or through synonyms (paraphrased), found in different parts of a text (beginning, body, or end), and differentiated from other information. • Establishing causal relationships between explicit information from the text. • Interpreting expressions in figurative language. • Recognizing types of text from their familiar structure; recognize the speaker of a text. • Recognize elements that establish links of co-reference in the text (substitution by synonyms, syntagmas, or pronouns) which are close and are clearly distinguishable.
II	• Locating and associating explicit information (causal relationships and in time sequences), repeated literally or through synonyms (paraphrased), found predominately in the body of a text, which must be differentiated from other competing information. • Inferring information from connections suggested by the text, and founded in knowledge of the world. • Inferring the meaning of known and familiar words from clues given by the text. • Identifying relationships that demonstrate understanding of the overall meaning of the text, such as differentiating the main topic, main idea, and the main characteristics of characters from explicit and implicit information in the text. • Recognizing functions of discontinuous texts present in various texts. • Recognizing the speaker, audience, and communicative purpose in different texts. • Relating two texts, according to their characteristics, and the information that both texts provide. • Replace connectors according to their meaning in the text.
III	• Locating explicit information, repeated predominantly through synonyms (paraphrased), that is found in different parts of the text, and that is necessary to differentiate from other relevant information competing with it. • Relating explicit information (causal relationships and time sequence), repeated predominantly through synonyms (paraphrased) in different parts of the text, differentiating between relevant information competing with each other. • Inferring information from connections suggested by the text, and founded in knowledge of the world. • Interpreting literary figures and expressions in figurative language. • Recognizing the function of different elements and resources of a text. • Recognizing elements that establish links of co-reference in a text (substitution by synonyms, syntagmas or pronouns), near and/or far from one another, with elements that compete with them. • Recognizing the purpose of connectors, verbs, and spelling signs in literary and non-literary texts.
IV	• Inferring the meaning of words used with different meanings depending on the context in which they are found. • Reflecting on the purpose and resources of a text. • Relating two texts, based on their communicative purposes.

Source: UNESCO, 2015.

in Argentina, Chile, Panama and the Mexican State of Nuevo León girls obtain higher reading test scores than boys along the entire achievement distribution. Second, female students test scores surpass those of male students in four percentiles in Paraguay; in three percentiles in Brazil and the Dominican Republic; and in two percentiles in Mexico and Nicaragua. Finally, there are no statistically significant differences in any of the portions of the distribution under analysis in Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Peru and Uruguay.

Again, the classification of students in achievement levels provides an additional perspective of gender gaps in reading in sixth grade. Table 12 describes TERCE's sixth grade reading achievement levels. Students in Level

Table 13 *TERCE sixth grade reading level of achievement differences (Girl-Boy) by country (Proportion)*

Country	Gap Level I	Gap Level II	Gap Level III	Gap Level IV
Argentina	-9.0	1.8	3.2	4.0
Brazil	-5.9	1.6	1.2	3.0
Chile	-2.9	-6.7	1.3	8.3
Colombia	-2.0	-1.1	3.4	-0.4
Costa Rica	-1.9	-1.2	0.4	2.8
Dominican Republic	-8.2	6.9	0.9	0.4
Ecuador	-	1.0	0.8	-1.9
Guatemala	-	2.1	-2.3	0.2
Honduras	-2.2	0.4	-0.1	1.9
Mexico	-0.4	-3.0	2.8	0.7
Nicaragua	-2.0	-1.2	1.7	1.5
Panama	-6.0	-	3.2	2.8
Paraguay	-6.1	0.8	2.6	2.7
Peru	4.0	-6.5	2.0	0.5
Uruguay	-2.0	-1.3	0.2	3.0
Region (Total)	-2.8	-0.4	1.3	1.8
Nuevo León	-2.7	-3.0	0.4	5.3

Source: Own calculations based on TERCE data.

I are able to perform basic functions in reading that include locating and establishing causal relationships with explicit information, as well as recognizing texts and their elements at a general level. On the other hand, students in Level IV demonstrate complex reading skills such as inference, reflection and relating communicative purposes of two texts.

Analysis by level of achievement also further evidences the distribution of gender disparities (see Table 13) and confirms a trend: female reading advantage in the vast majority of the countries. The general pattern across countries indicates that while female students are underrepresented in the lowest level of achievement, they are overrepresented in the highest one.

Looking more specifically at the gender disparities in achievement level, Table 13 shows that there are more male students than female students in the lowest achievement level in every study country (with the exceptions of Ecuador, Guatemala and Peru). Conversely, there is a higher proportion of girls than boys in the highest achievement level, with the exceptions of Colombia and Ecuador.

The results from TERCE's sixth grade reading test scores are very similar to the findings for third graders. Comparison of average test scores reveals a strong gender gap in sixth grade reading performance. Female students score higher on average than male students in all but two of the study countries. Again, the majority of these higher test scores are statistically significant. Analysis by percentile reveals that female sixth graders score higher than male third graders across the score distribution, but not all of these higher scores are statistically significant. Achievement level analysis reveals that, as was the case for third graders, female sixth graders are overrepresented in the highest level and underrepresented in the lowest.

In sum, while gender inequalities in mathematics achievement differ by grade, female students in both third and sixth grade consistently obtain higher scores on TERCE's reading tests. In general, while not always statistically significant, female students' performance advantage in reading appears across the score distribution in both grades. In addition, female students in both grades are generally underrepresented in the lowest level of achievement and overrepresented in the highest. Analysis of TERCE data reveals a clear and consistent gender gap in reading achievement that favors female learners.

As in mathematics, the apparent gender inequalities in reading achievement raise questions about both the socialization process during school and the impact of these gaps on the students' future opportunities. It seems that Latin American schools - and society in general – send consistent, gendered messages about academic roles. It appears that the primary school system motivates female learners to develop stronger reading skills. In the same vein, male learners appear to be socialized to get involved in tasks related to mathematics in primary school. Thus, by the end of primary education gender inequalities in reading and mathematics achievement are well established. This early socialization that directs female learners toward language achievement and male learners towards mathematics may have important implications for future education and professional opportunities. In general, boys might show a higher propensity to follow educational paths related to the sciences, engineering, technology and mathematics (STEM). Conversely, girls may be more prone to study careers in the humanities and social sciences. Differing subject paths and opportunities may lead to a situation in which males will be overrepresented in careers that hold a higher symbolic status and higher long run earning (STEM) and females may be overrepresented in fields associated with lower symbolic status and earning power, such as humanities and the social sciences.

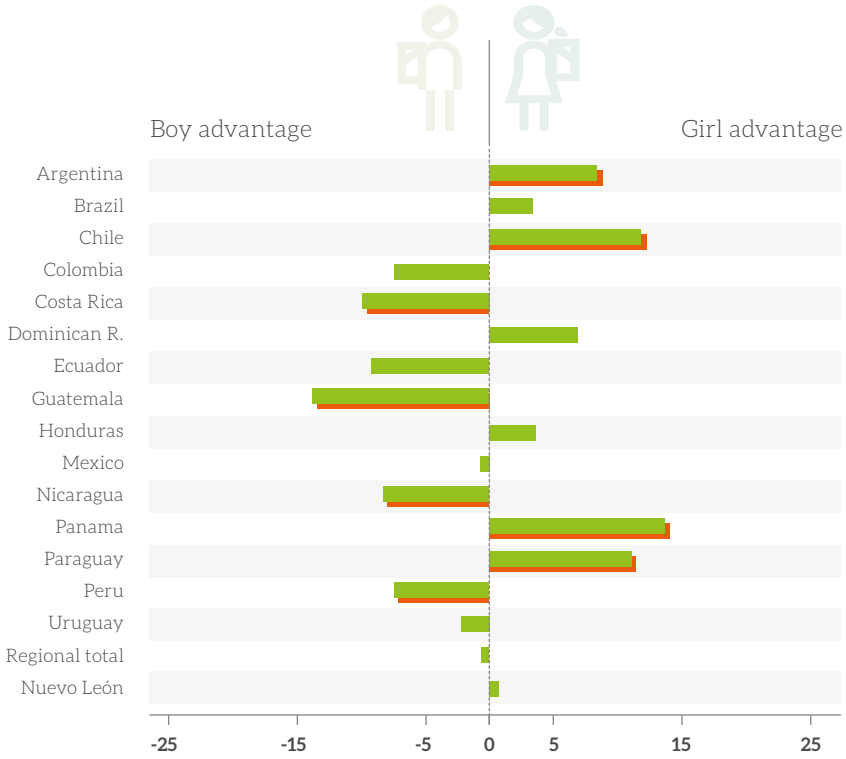
c) Achievement gap in science

Results in science show an even distribution of science performance advantages across the study countries; because boys and girls each have advantages in four countries. These results may be regarded as unexpected because, according to the literature, one would expect the gender gap that favors male sixth graders in mathematics to be replicated in science. Such a hypothesis is based on evidence that shows similar gender gaps in favor of boys in both mathematics and science.

As stated, sixth grade achievement in science across the study countries paints a mixed picture of the gender gap (see Graph 6). While in Panama (14 points), Chile (12), Paraguay (11) and Argentina (8) female sixth graders have higher science test scores, in Guatemala (14 points), Costa Rica (10), Nicaragua (8) and Peru (7) male students score higher.

In the majority of the study countries, gender inequalities in sixth grade science achievement are homogeneously dispersed along the test score distribution. As Table 14 demonstrates, while there are differences in achievement between girls and boys in the various percentiles, these differences are generally not statistically significant. Furthermore, where there are statistically significant differences, the disparities favor female students in some cases and male students in others.

Graph 6 *Difference (Girl-Boy) in science score in sixth grade*



Note: Orange shadow indicates that difference is statistically significant (P<=0.05)

Source: Own elaboration based on TERCE data.

Table 14

TERCE sixth grade science percentile differences (Girl-Boy) by country

Country	Gap P10	Gap P25	Gap P50	Gap P75	Gap P90
Argentina	15	9	7	5	2
Brazil	9	5	4	1	-5
Chile	**18***	**19***	**14***	9	3
Colombia	-2	-3	-7	-12	-14
Costa Rica	1	-6	**-13***	**-14***	**-15***
Dominican Republic	1	0	3	-2	-10
Ecuador	9	8	9	7	6
Guatemala	-5	-3	-7	-12	**-18***
Honduras	-6	-8	**-13***	**-20***	**-26***
Mexico	8	9	6	3	-5
Nicaragua	12	6	0	-6	-11
Panama	11	**13***	**15***	**16***	11
Paraguay	**18***	**15***	11	10	4
Peru	-8	-7	-6	-5	-8
Uruguay	7	7	3	-5	-8
Region (Total)	5	3	0	-4	**-8***
Nuevo León	-8	-6	-7	-8	-12

Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on TERCE data.

Analysis of gender inequality in science achievement by percentiles indicates the same mixed picture; equal relative advantages for girls in some countries and for boys in others. As Table 14 demonstrates, female students have statistically significant higher science test scores than male students in Chile (10th, 25th and 50th percentiles), Panama (25th, 50th and 75th percentiles) and Paraguay (10th and 25th percentiles). On the other hand, male students´ test scores surpass those of female students in Costa Rica (50th, 75th and 90th percentiles), Guatemala (90th percentile) and Honduras (50th, 75th and 90th percentiles).

Analysis of achievement levels gives a complementary understanding of the gender gap in science achievement. Table 15 describes TERCE's sixth grade science achievement. Level I students demonstrate knowledge of the most basic skills in science, which are related to recognizing actions to satisfy vital needs and daily health care issues. Meanwhile, students in Level IV are able to identify and analyze research questions.

In contrast to the percentile analysis findings, the distribution of female and male students in the science achievement levels illustrates important gender disparities (see Table 16). In Argentina there are 4.8% more boys than girls in the lowest achievement level and in the second level female students surpass male students by 5%. In Chile there are 5% more male students in the Level I achievement group, but the Level III achievement group has 4.3% more female students. Colombia has 5.1% more female students than male students in the Level III achievement group. In Costa Rica there are 7.5% more female than male students at the second achievement level and in the third level there are 5.2% more boys than girls. The Dominican Republic and Paraguay have higher proportions of male students in Level I, 4% and 4.7%, respectively. In Ecuador, Honduras and Mexico there are more female students than male students in the Level II achievement group, with relative percentages of 5.1%, 4.9% and 6.8%, respectively. Finally, in Panama boys are overrepresented in the Level I achievement group (7.2% more than females) and underrepresented in Level II (5.2% more girls than boys).

Table 15

Description of science performance levels of sixth grade students

Level	Description
I	• Recognizing actions aimed at satisfying vital needs and taking care of one's health in everyday contexts.
II	• Interpreting simple information presented in different formats (tables, graphs, diagrams); comparing and choosing information to make decisions and recognizing conclusions. • Classifying living beings and recognizing the criteria of classification from the observation or description of its characteristics. • Establishing relationships of cause and effect in familiar situations.
III	• Interpreting varied information presented in graphs of different formats and/or with more than one data series, in order to make comparisons and recognize conclusions. • Recognizing conclusions from the description of research activities. • Applying their scientific knowledge in order to explain phenomena in the natural world in various situations. • Recognizing parts of structures of living systems and associating them with the role that they have in the greater system.
IV	• Analyzing research activities in order to identify the variables involved, inferring the question to which they wish to respond and choosing the pertinent information. • Distinguishing among various questions those that can be responded to scientifically. • Utilizing scientific terms in order to name phenomena that are not within their immediate environment. • Utilizing scientific knowledge in order to understand natural processes, the factors involved, and the impact of their variation.

Source: UNESCO, 2015.

Table 16

TERCE sixth grade science level of achievement differences (Girl-Boy) by country (Proportion)

Country	Gap Level I	Gap Level II	Gap Level III	Gap Level IV
Argentina	-4.8	5.0	-0.5	0.3
Brazil	-1.1	2.5	-	-1.3
Chile	-5.0	-0.2	4.3	0.9
Colombia	0.2	5.1	-3.3	-2.0
Costa Rica	-	7.5	-5.2	-2.4
Dominican Republic	-4.0	3.9	0.3	-0.2
Ecuador	0.1	5.1	-3.2	-2.1
Guatemala	2.8	2.9	-3.7	-2.0
Honduras	-4.1	4.9	0.1	-0.9
Mexico	-3.3	6.8	-0.9	-2.6
Nicaragua	0.8	2.8	-3.1	-0.5
Panama	-7.2	5.2	1.5	0.6
Paraguay	-4.7	3.7	1.5	-0.5
Peru	-0.2	2.2	-1.0	-1.0
Uruguay	-0.8	2.1	0.8	-2.1
Region (Total)	-1.9	3.9	-1.0	-1.1
Nuevo León	-3.4	4.5	2.0	-3.0

Source: Own calculations based on TERCE data.

The mixed gender inequality patterns in the score distribution are better evidenced by analyzing differences in the proportion of girls and boys in each level of achievement. For example, female students are underrepresented in the lowest level of achievement in 10 countries and the Mexican State of Nuevo León. Exceptions to this finding include Colombia, Costa Rica, Ecuador, Guatemala and Nicaragua. Conversely, girls are overrepresented in the Level II achievement group in all countries, with the exception of Chile. However, at the highest achievement level, there are more boys than girls in 12 countries and the Mexican State of Nuevo León (with the exceptions of Argentina, Chile and Panama). The particular way that girls and boys are generally represented in the achievement levels is worth noting. Female students are underrepresented in both the lowest and highest achievement levels, but they are clearly more concentrated in the second achievement level.

Furthermore, within the third level half of the countries evidence a higher representation of female students, while the other half indicate that there are more male students.

In sum, TERCE's sixth grade science assessment results do not reveal clear gender inequalities as in mathematics and reading. The test results for science are fundamentally mixed. Comparison of average test scores reveals no clear gender gap. **Among the countries that show a statistically significant gap in scores, the gender advantage is split; female students score higher in half of the countries and male students score higher in the other half.** Analysis by percentile reveals that there are limited statistically significant gender differences in achievement across the countries. The achievement level analysis also indicates a gender gap. Male sixth graders tend to be overrepresented in the lowest and highest achievement levels.

The overrepresentation of male students in the highest achievement levels in science likely plays a factor in the overrepresentation of males in STEM careers; it is probable that high achieving male leaners will be more inclined to further pursue the education needed for these careers. Inequalities in primary school assessment and education processes may not be the only factors that explain this overrepresentation. However, these two variables are key indicators to understand both learning inequalities in science and how teaching practices may shape future learning and career preferences.

d) Achievement gap in writing

Analysis of writing achievement evidences a clear and consistent advantage for female students over male students. These findings align with our findings regarding reading performance; they indicate large and consistent female-student advantages in literacy performance. As explained before, the girl's literacy advantage may be related to having more opportunities for girls to practice and develop literacy skills in the schools. It is commonly known, that girls more often perform classroom tasks like oral presentations and writing reports for group work. Furthermore, since literacy performance is closely linked to the socioeconomic status of the families, it is also plausible that socialization processes at home reinforce the opportunities to engage in the activities that support language arts development, such as oral and written communications. Families may also more intensely promote reading activities among girls.

As mentioned before, it is important to recall that the score scale in writing goes from one to four. Writing is scored through assessment of a letter that each of the students write following a specific purpose and instruction about the type of message that the letter should include. Using rubrics, the assessment includes both the discursive and textual dimensions of the letter, as well as legibility conditions. The discursive dimension considers the purpose, sequence and capacity to follow the instructions, as well as the type of genre and the register (only in sixth grade). The textual dimension assesses global coherence, concordance and cohesion of the text. Finally, orthography, word segmentation and punctuation are the key indicators for legibility convention assessment.

(1) Writing gap in third grade

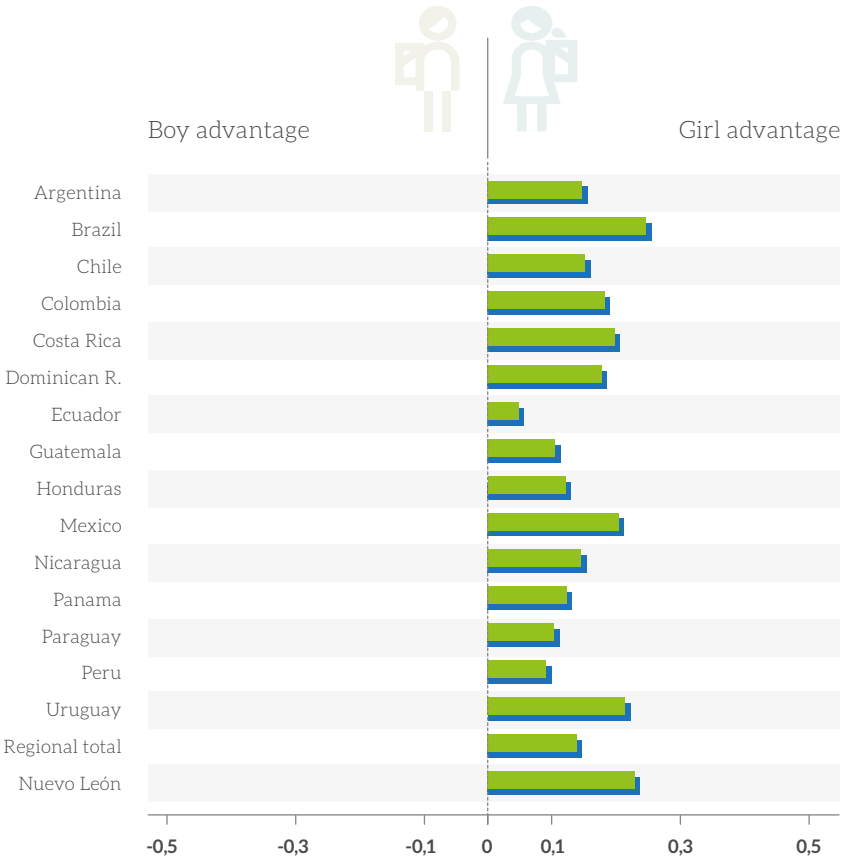
In all participating countries, without exception, writing scores for third and sixth grade female students are higher than those of male students. The scale of writing scores goes from one to four. The achievement gap in writing among third graders is, on average, 0.14 points in favor of female students (see Graph 7). This gap varies from 0.05 to 0.25 points among the countries. However, in all cases the differences are statistically significant.

The pattern of writing inequalities is also reflected along the score distribution. As Table 17 demonstrates, female student test scores surpass those of male students in every country and percentile under analysis. However, in this case, not all the differences are statistically significant.

Gender disparities in third grade writing performance are generalized across the different percentiles under analysis. However, there are important differences when

Graph 7

Difference (Girl-Boy) in writing score in third grade



Note: Blue shadow indicates that difference is statistically significant (P<=0.05)

Source: Own elaboration based on TERCE data.

comparing countries. In Mexico female third graders achieve significantly higher test scores than male students in all of the analyzed percentiles. Female students test scores surpass those of boys in four out of five percentiles in Chile, Colombia, Mexico, Costa Rica and Guatemala and in three of five percentiles in Argentina and Uruguay. In the Dominican Republic, Honduras, Nicaragua and Peru female students have advantages in two of five percentiles. In Panama and the Mexican State of Nuevo León female students show a statistically significant advantage in only one percentile. Ecuador is the only country without statistically significant differences between female and male students in writing achievement. It is important to note that Ecuador has the lowest achievement gap in writing (0.05) among third graders in the region.

Each of the analyses of TERCE's third grade writing test performance indicates a gender gap in achievement that favors female students. Average test score comparisons for female students are higher than male students scores in

Table 17

TERCE third grade writing percentile differences (Girl-Boy) by country

Country	Gap P10	Gap P25	Gap P50	Gap P75	Gap P90
Argentina	**0.27***	**0.13***	0.13	0.13	**0.07***
Brazil	**0.33***	**0.27***	**0.27***	0.13	**0.20***
Chile	**0.20***	**0.20***	**0.18***	**0.13***	0.07
Colombia	**0.20***	0.20	**0.20***	**0.20***	**0.20***
Costa Rica	**0.40***	**0.27***	**0.20***	**0.13***	0.13
Dominican Republic	0.13	0.20	**0.20***	**0.27***	0.20
Ecuador	0.07	-	0.07	0.07	0.07
Guatemala	0.07	**0.07***	**0.13***	**0.13***	**0.20***
Honduras	-	0.07	**0.13***	0.13	**0.20***
Mexico	**0.20***	**0.20***	**0.27***	**0.27***	**0.20***
Nicaragua	0.13	0.13	**0.20***	**0.13***	0.07
Panama	**0.20***	0.20	0.07	0.07	0.07
Paraguay	**0.13**	**0.07***	0.13	0.07	0.13
Peru	0.13	**0.33***	**0.27***	0.13	0.07
Uruguay	0.13	**0.20***	**0.20***	0.13	**0.13***
Region (Total)	**0.27***	**0.27***	**0.27***	**0.20***	**0.20***
Nuevo León	0.07	0.13	0.13	0.13	**0.20***

Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on TERCE data.

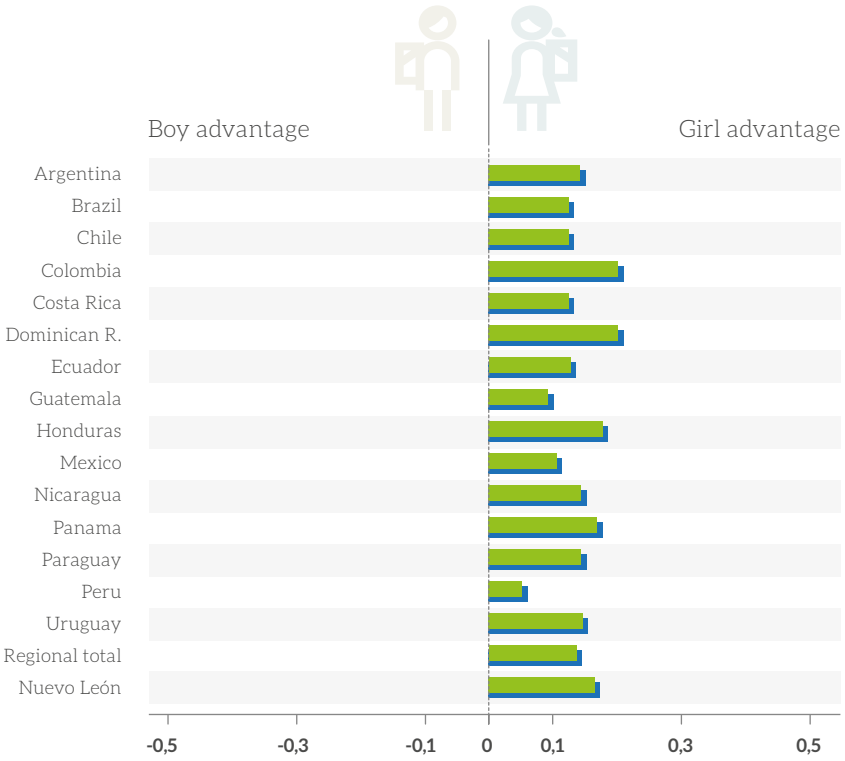
all of the participating countries. In addition, all of these higher scores are statistically significant. Analysis by percentile reveals that female third graders score higher than male third graders in most of the score distribution. In several countries female learners have significantly higher test scores in all or most of the percentiles.

(2) Writing gap in sixth grade

Gender disparities in writing performance among sixth graders also favor female students over male students in all of the countries (see Graph 8). The regional achievement gap accounts for 0.14 points, with a range across countries that goes from 0.05 to 0.20 points. Table 18 provides an analysis of the gap along the test score distribution.

Graph 8

Difference (Girl-Boy) in writing score in sixth grade



Note: Blue shadow indicates that difference is statistically significant (P<=0.05)

Source: Own elaboration based on TERCE data.

The writing advantage for female sixth graders is also generalized but it is more pronounced than the advantage for third graders. Girls show higher test scores in all countries and percentiles of the distribution, with the exception of the 10th and 25th percentiles in Paraguay.

However, not all the differences detected are statistically significant. Table 18 provides a comparison of scores throughout the percentiles and presents disparities according to their statistical significance.

Female students score higher along the test score distribution in the vast majority of countries, but it is necessary to underscore several differences. Gender disparities in favor of female students exist in all of the percentiles in Colombia, the Dominican Republic, Nicaragua and the Mexican State of Nuevo León. In Argentina, Brazil, Chile, Costa Rica, Ecuador, Honduras, Panama and Uruguay female students exhibit higher test scores in writing in four of five percentiles. In Mexico female students' scores surpass those of boys in three percentiles. In Guatemala and Peru there are significant advantages for girls in two percentiles. Finally, in Paraguay female students score significantly higher than their male peers only in the 90th percentile.

Table 18

TERCE sixth grade writing percentile differences (Girl-Boy) by country

Country	Gap P10	Gap P25	Gap P50	Gap P75	Gap P90
Argentina	**0.17***	**0.17***	**0.17***	**0.13***	0.03
Brazil	**0.17***	**0.13***	**0.13***	**0.13***	0.03
Chile	**0.17***	**0.20***	**0.13***	0.07	**0.07***
Colombia	**0.30***	**0.27***	**0.23***	**0.17***	**0.13***
Costa Rica	**0.20***	0.13	**0.14***	**0.10***	**0.07***
Dominican Republic	**0.17***	**0.23***	**0.27***	**0.20***	**0.20***
Ecuador	**0.23***	**0.17***	**0.13***	**0.10***	0.07
Guatemala	**0.23***	**0.13***	0.07	0.07	0.07
Honduras	0.08	**0.17***	**0.20***	**0.20***	**0.17***
Mexico	**0.25***	**0.17***	0.07	**0.07***	0.07
Nicaragua	**0.13***	**0.17***	**0.20***	**0.13***	**0.13***
Panama	0.07	**0.20***	**0.17***	**0.20***	**0.10***
Paraguay	-	-	0.10	0.07	**0.07***
Peru	0.17	0.13	**0.17***	0.13	**0.13***
Uruguay	**0.17***	**0.17***	**0.13***	0.13	**0.10***
Region (Total)	**0.27***	**0.23***	**0.17***	**0.12***	**0.10***
Nuevo León	**0.17***	**0.20***	**0.20***	**0.20***	**0.13***

Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on TERCE data.

The patterns of writing performance evidence that female students hold an enormous advantage over male students in this subject area. In all the study countries female students in both third and sixth grade score higher in writing assessments than male students. Furthermore, when analyzing the achievement gap along the test score distribution, it is clear that female students maintain their advantage in almost every percentile of the distribution with a few exceptions. The fact that the writing advantage of female sixth graders is more generalized across the score distribution than for female third graders indicates that disparities in writing performance may be reinforced by schooling. The results suggest that, somehow, the educational system shapes the interests of girls and boys; it is clear that schools are rather successful in motivating girls towards the area of language and communication, but not equally effective in providing boys with the opportunities to similarly excel.

Analysis of TERCE's sixth grade writing test scores reveals findings very similar to the results for third graders. Female students' average test scores are higher than male student scores in all of the participating countries and all scores are statistically significant. Analysis by percentile

reveals that female sixth graders' again score higher across the score distribution, but are more pronounced in the highest percentile. In nearly all of the countries female learners have significantly higher test scores in all or most of the percentiles.

ii) Gender inequality over time: comparing SERCE (2006) and TERCE (2013)

This section analyzes trends in educational achievement among third and sixth graders from participant countries in both the Second Regional Comparative and Explanatory Study (SERCE), implemented in 2006, and TERCE, implemented in 2013. A few important caveats regarding these datasets are required. First, regarding the sample, Cuba and El Salvador participated in SERCE but they did not participate in TERCE. Second, the science assessment in SERCE was optional (instead of mandatory as in TERCE). Third, while the mean score in SERCE was set at 500 points, in TERCE it was set at 700 points (in the comparative analysis, the mean is 500).

In order to permit a comparison between the SERCE and TERCE datasets, LLECE made a number of data adjustments to ensure a similar level of difficulty between the items. These adjustments included using the technique of anchor blocks, applying the exclusion criteria from SERCE to the TERCE dataset[14] and considering the SERCE scale and cut-off points for the TERCE data[15]. By making it possible to compare results from SERCE and TERCE, these adjustments enable us to analyze trends in student achievement levels and in gender inequality between 2006 and 2013. Following our previous analysis of the TERCE data, this section describes trends in gender inequality in mathematics, reading and science in terms of differences in mean scores as well as variability and level of achievement. Due to the lack of comparability between the writing test in SERCE and TERCE[16], assessments of this subject were excluded from the comparison.

a) Trends in gender inequality in mathematics

Comparative analysis reveals that from 2006 to 2013 gender inequality in mathematics achievement decreased among third graders but increased among sixth graders. The decrease in gender achievement inequalities in third grade is reflected in the analysis of the average score, the distribution of scores and the levels of achievement. However, the analysis for sixth graders evidences an increasing disadvantage for female students.

(1) The mathematics trend in third grade

Graph 9 illustrates that between 2006 and 2013 gender equality among third graders in terms of average mathematics scores generally improved. In 2006, male third graders performed better than female third graders in six countries: Colombia, Costa Rica, Chile, Guatemala, Nicaragua and Peru. Of note, at the same time female students had a 13 point test score advantage over their male peers in the Dominican Republic. TERCE results from 2013 show a general reduction in gender inequality: gender differences reduced (8 average points) and persist only in Nicaragua and Peru.

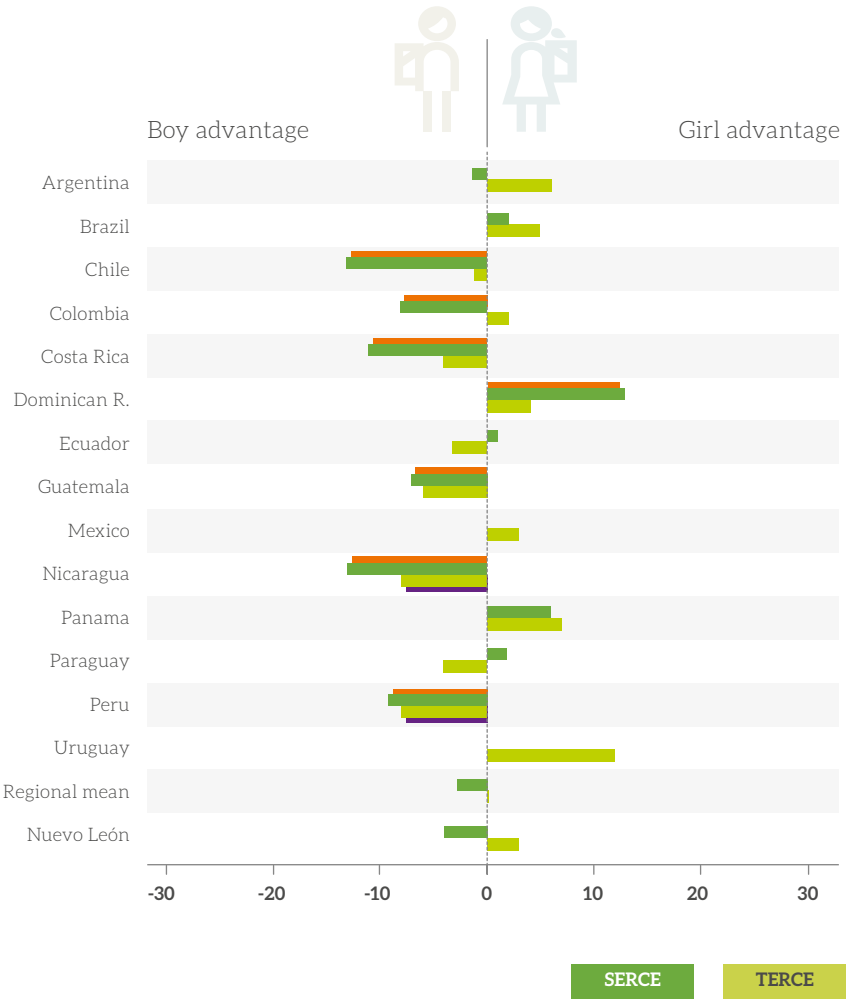
14 *TERCE and SERCE applied different sample exclusion criteria. TERCE considered as part of the sample, those students who participated in any test assessment and answered at least three questions. SERCE excluded from the sample, students who did not answer the last two questions of the second block and also when the OUTFIT and INFIT were lower than 0.7 or higher than 1.3 (Flotts et al., 2015).*

15 *For details on the dataset adjustments to compare TERCE with SERCE, check the description on page 21 from the comparative TERCE-SERCE report (UNESCO, 2015d).*

16 *The writing tests of SERCE and TERCE are not comparable. The SERCE writing test is based on the notion that students may improve their writing by asking them to plan their writing, produce a draft and, then, a final version. The TERCE test asks students to write a letter conveying a specific message on a topic previously defined.*

Graph 9

Differences (Girl-Boy) in mathematics score - SERCE and TERCE (3rd grade)



Note: Orange shadow indicates that difference is statistically significant in SERCE and purple for TERCE (P<=0.05)

Source: Own elaboration based on SERCE and TERCE data.

Table 19 compares the SERCE and TERCE score distributions. The score distribution indicates differences in female test scores relative to male test scores from the 10th to the 90th percentile. Negative scores indicate that male students obtained a higher score than female students in that percentile. Positive scores indicate that the female students scored higher. The numbers refer to the point difference in average test score. One explanation for gender inequality could be that female students achieve lower scores in the lowest levels of the distribution (10th percentile) while male students obtain higher scores in the upper levels of the distribution (90th percentile). In this scenario, gender inequality would be explained by the different overrepresentation of female and male students at the extreme levels of the distribution.

Table 19 *SERCE-TERCE third grade mathematics percentile differences (Girl-Boy) by country*

	Percentile 10		Percentile 25		Percentile 50		Percentile 75		Percentile 90	
Country	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	3	**18***	6	13	0	7	-11	0	-9	-2
Brazil	**10***	**23***	**11***	**15***	4	0	0	-3	-6	4
Chile	-2	4	-3	4	-2	-6	**-25***	-2	**-22***	-10
Colombia	-8	6	-6	4	-6	2	-11	6	-18	-2
Costa Rica	-7	0	-7	**10***	**-13***	-2	**-10***	**-16***	**-21***	**-13***
Dominican Republic	**16***	0	**19***	**8***	4	8	4	**13***	2	2
Ecuador	**-12***	0	-2	-3	0	-6	0	-10	12	0
Guatemala	**-14***	0	0	-6	-1	**-11***	**-10***	-10	**-12***	**-18***
Mexico	2	7	3	**12***	2	2	-5	-3	-8	**-14***
Nicaragua	-4	-8	**-14***	**-10***	**-14***	-4	**-14***	**-10***	**-14***	-1
Panama	**12***	**18***	5	**18***	**11***	**15***	0	7	3	2
Paraguay	**15***	-1	2	0	8	0	0	1	0	**-18***
Peru	0	**-13***	-5	**-15***	-3	-4	**-13***	**-10***	**-25***	-2
Uruguay	2	18	0	18	**-11***	2	-1	5	**-14***	2
Nuevo León	1	**11***	0	**13***	-2	3	-7	0	**-13***	-1

Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

Table 19 shows a mixed picture. There seems to be a reduction of gender inequality among the best and worst performers. In 2006, male students obtained the highest scores in Chile, Costa Rica, Guatemala, Nicaragua, Peru, Uruguay and the Mexican state of Nuevo León. However, in 2013 this advantage remained in only four countries (Costa Rica, Guatemala, Paraguay and Mexico). There are signs of gender equality among the lowest performers (10th percentile) because by 2013 previously existing gender gaps had disappeared in the Dominican Republic, Ecuador, Guatemala and Paraguay. Yet gender gaps have increased in Argentina, Brazil, Panama, Peru and Nuevo León. On the other hand, while Costa Rica has maintained its male student performance advantage, Chile presents a clear improvement in terms of gender equality since gender differences disappeared by 2013.

Achievement level comparisons (Table 20) indicate that gender inequalities in mathematics performance decreased over time. While in 2006, every participant country, with

the exception of Paraguay and Ecuador, had some kind of gender gap in mathematics, by 2013 this disparity was present only in Argentina, the Dominican Republic, Peru and Uruguay. During this period in Argentina and Dominican Republic female students increased their overrepresentation in Level II. In Peru male students improved their performance (increased representation in Level IV).In Uruguay the situation of male students worsened. Compared to female students, there are 3.4% more male students at the lowest performance level (2013), meaning they can only solve basic computations and problems. In addition, in 2006, boys were overrepresented in the highest achievement group (Level IV). However, this trend was not apparent in 2013, except in Peru. Even the gender differences identified in the lowest levels of achievement in 2006 were almost completely absent by 2013. This was the case in Brazil, Costa Rica, the Dominican Republic and Nicaragua.

Table 20

SERCE-TERCE third grade mathematics level of achievement differences (Girl-Boy) by country

	Below Level I		Level I		Level II		Level III		Level IV	
Country	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	-1.0	-0.9	0.1	**-4.4***	**3.2***	**5.1***	-1.5	0.5	-0.8	-0.2
Brazil	**-1.9***	-0.7	-0.8	-3.4	**2.8***	4.2	1.2	1.0	-1.3	-1.1
Chile	0.2	-0.2	2.4	-1.0	**4.0***	0.2	-1.6	1.5	**-5.1***	-0.6
Colombia	0.7	-0.8	2.2	0.2	1.0	-0.9	-0.6	2.0	**-3.3***	-0.5
Costa Rica	-0.4	0.1	**4.6***	0.7	1.2	2.0	-2.1	0.1	**-3.4***	-2.8
Dominican Republic	**-9.7***	-1.9	**7.6***	-2.2	**2.6***	**4.2***	-0.3	0.3	-0.2	-0.4
Ecuador	1.3	-0.5	-2.3	3.4	-0.9	0.0	0.4	-2.8	1.5	-0.1
Guatemala	1.0	-0.1	2.2	3.3	-1.5	0.0	-0.9	-1.3	**-0.9***	-1.9
Mexico	-0.2	-0.3	-0.9	-1.8	-0.1	0.6	**3.7***	3.4	**-2.5***	-1.9
Nicaragua	**3.4***	1.0	**6.8***	3.6	**-7.4***	-3.8	-1.8	0.4	-0.9	-1.2
Panama	-2.6	-2.1	-0.1	-1.1	1.2	1.8	**1.7***	0.7	-0.3	0.7
Paraguay	-0.6	1.5	-0.1	-2.1	1.3	3.2	-0.2	-0.6	-0.4	-2.0
Peru	0.8	1.3	2.9	3.1	1.1	-0.9	**-2.6***	0.0	**-2.2***	**-3.5***
Uruguay	**-1.8***	**-3.4***	0.6	0.0	**3.0***	-1.2	-0.2	1.8	-1.6	2.8
Nuevo León	-0.3	0.1	-0.2	-2.2	2.5	0.8	1.0	0.7	**-3.0***	0.6

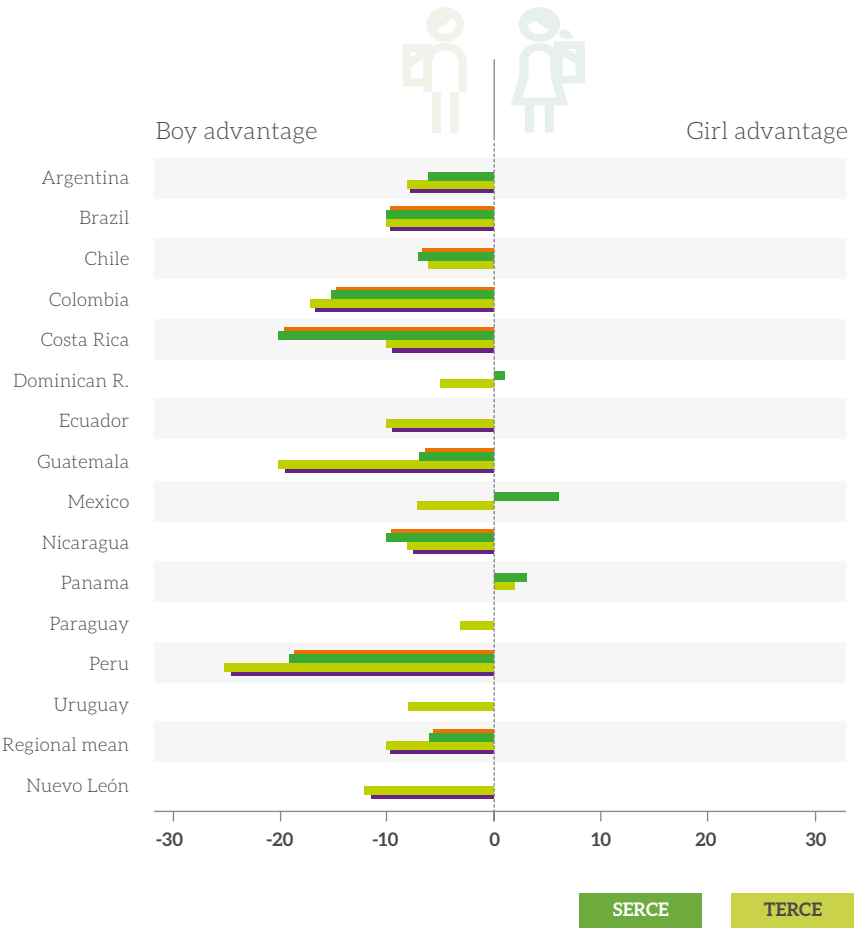
Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

(2) The mathematics trend in sixth grade

Analysis of mathematics performance among sixth graders in 2006 and 2013 provides good and bad news. On the one hand, gender inequality in Chile disappeared during this period. On the other hand, gender inequality (in favor of boys) became significant in Argentina, Ecuador and Nuevo León (see Graph 10). In addition, disparities remained (statistically) significant in Peru, Nicaragua, Guatemala, Costa Rica, Colombia and Brazil. In Guatemala, male students' mathematics increased from 7 to 20 points. In Colombia and Peru it increased by 2 and 6 points, respectively. However, male students' performance advantages decreased in Costa Rica and Nicaragua (by 10 points and 2 points, respectively).

Trends in the performance of boys and girls in mathematics score percentiles (variability) are also negative (see Table 21). In both the 2006 and the 2013 assessment, female sixth graders were at disadvantage in many percentiles. This implies that they achieved lower scores than boys in the extremes of the distribution or even in the entire score distribution . In 2006, girls in Colombia, Costa Rica, Nicaragua and Peru had a disadvantage in every percentile. In 2013 this disadvantage increased in Argentina, Brazil, Guatemala and Nuevo León. In addition, Colombia remained the most unequal country in terms of gender performance in mathematics, followed by Guatemala and Peru. In Ecuador, girls' disadvantage became significant by 2013 (10th, 25th and 75th percentile).

Graph 10 *Differences (Girl-Boy) in mathematics score - SERCE and TERCE (6th grade)*



Note: Orange shadow indicates that difference is statistically significant in SERCE and purple for TERCE (P<=0.05)

Source: Own elaboration based on SERCE and TERCE data.

Table 21

SECE-TERCE sixth grade mathematics percentile differences (Girl-Boy) by country

Country	Percentile 10		Percentile 25		Percentile 50		Percentile 75		Percentile 90	
	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	0	0	-3	**-8***	-7	**-14***	**-15***	-8	**-15***	**-16***
Brazil	0	0	-8	-5	**-13***	**-10***	-9	**-16***	-14	**-16***
Chile	2	-7	-1	0	-7	-5	**-9***	-2	**-16***	**-19***
Colombia	**-15***	**-20***	**-13***	**-11***	**-16***	**-24***	**-21***	**-17***	**-17***	-16
Costa Rica	**-13***	1	**-13***	-3	**-21***	**-17***	**-23***	**-18***	**-27***	-12
Dominican Republic	0	-8	**10***	0	0	0	0	-3	-4	-10
Ecuador	5	**-20***	0	**-9***	-7	-7	1	**-16***	0	-15
Guatemala	0	**-12***	-3	**-17***	**-7***	**-19***	**-9***	**-20***	**-16***	-27
Mexico	9	-9	7	0	**11***	-5	**15***	**-14***	4	**-12***
Nicaragua	**-11***	**-17***	**-8***	**-7***	**-12***	-3	**-14***	-3	**-11***	**-11***
Panama	**6***	3	2	0	0	-3	1	7	4	8
Paraguay	1	-8	6	3	0	-5	-2	-7	-3	-10
Peru	**-22***	**-17***	**-14***	**-21***	**-17***	**-28***	**-25***	**-22***	**-35***	-20
Uruguay	0	**-20***	0	-18	**-9***	-8	0	-3	7	0
Nuevo León	7	-2	4	-4	-1	**-18***	0	**-20***	0	**-12***

Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

Analyzing the representation of female and male students by level of achievement, Table 22 shows that boys outperform girls in Level III and IV, while female students concentrate in Level II. First, in Chile and Paraguay gender disparities by level of achievement have disappeared. Second, there were no gender differences in 2006 or 2013 in Uruguay. In Ecuador, Nicaragua and Peru, female students remain overrepresented in the lowest performance level, but by a small margin (1%). Third, female students have become more present in Level I, II and III. While in 2006, 2.3% more girls than boys achieved Level II in Argentina, the proportion increased to 7.3% in 2013. A similar trend is observed in Brazil, Colombia and Peru (in Level II). The overrepresentation of boys in Level III and Level IV persisted. By 2013, more boys than girls were in Level III achievement group in Colombia, Guatemala and Peru, or Level IV in Nicaragua and Guatemala. In Costa Rica, the overrepresentation of male students in Level IV decreased between 2006 and 2013.

Table 22

SERCE-TERCE sixth grade mathematics level of achievement differences (Girl-Boy) by country (Proportion)

Country	Below Level I		Level I		Level II		Level III		Level IV	
	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	**-0.9***	0.6	1.5	-1.8	**2.3***	**7.3***	-0.2	**-4.4***	**-2.7***	-1.7
Brazil	-0.4	0.4	1.2	-0.4	**3.6***	**5.9***	-1.7	-3.5	**-2.7***	-2.5
Chile	-0.3	-0.1	-0.6	0.2	**4.7***	0.2	-0.1	0.5	**-3.7***	-0.7
Colombia	-0.3	0.2	**4.2***	3.1	**4.1***	**7.1***	**-4.5***	**-7.3***	**-3.5***	**-3.1***
Costa Rica	**-0.1***	0.0	**1.7***	-0.5	**7.6***	**6.9***	-2.3	-2.6	**-6.8***	**-3.8***
Dominican Republic	-0.1	-0.1	-1.9	1.6	**4.3***	-0.4	**-2.0***	-0.2	**-0.3***	**-0.9***
Ecuador	-0.8	**0.8***	0.7	2.8	0.0	-0.5	0.6	-0.1	-0.5	**-3.0***
Guatemala	-0.3	0.5	**3.4***	**5.0***	0.7	3.8	**-2.9***	**-5.4***	**-0.8***	**-3.9***
Mexico	-0.2	0.1	0.3	**1.6***	**-3.7***	-1.4	1.6	3.1	**2.0***	-3.5
Nicaragua	**0.7***	**1.1***	**2.5***	1.9	1.8	1.3	**-4.1***	**-3.2***	**-0.9***	**-1.1***
Panama	**-1.5***	-0.6	0.2	2.6	-0.6	**-5.8***	2.3	3.7	-0.4	0.3
Paraguay	0.4	0.4	**-2.7***	-2.5	**4.0***	5.3	-1.7	-2.1	-0.1	-1.1
Peru	0.2	**0.9***	**3.6***	**4.7***	**5.1***	**6.4***	**-4.7***	**-7.7***	**-4.2***	**-4.3***
Uruguay	0.3	-0.2	-0.8	3.4	1.0	-0.8	0.7	-0.9	-1.2	-1.6
Nuevo León	0.0	0.1	**-1.4***	0.3	1.6	0.1	-0.4	**7.6***	0.3	**-8.1***

Note: Bold and asterisk indicates that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

In sum, comparison of assessment findings in 2006 (SERCE) and 2013 (TERCE) evidences a general improvement in gender equality in mathematics among third graders. On the one hand, the amount of countries with gender disparities reduced overtime. The magnitude of male students' performance advantage over female students also reduced. On the other hand, the variability analysis shows a general reduction of female disadvantage in the extremes of the distribution. Third, by 2013, less countries maintained gender differences by level of achievement. **The news is not encouraging for sixth graders; gender inequality in mathematics achievement increased in the period between assessments.**

b) Trends in gender inequality in reading

Different from mathematics where male students tend to outperform female students, female students have a performance advantage in reading both in third and sixth grade. Between 2006 and 2013, female third graders' performance advantage generalized in the region, but the score advantage reduced. Among sixth graders, the amount of countries where girls perform better than boys, and the magnitude of this advantage, scarcely reduced. Regarding variability, the advantage of girls over boys decreased between 2006 and 2013. However, female

sixth graders' advantage became stronger. The differences between female and male students were more extreme in terms of variability and levels of achievement among sixth graders than among third graders.

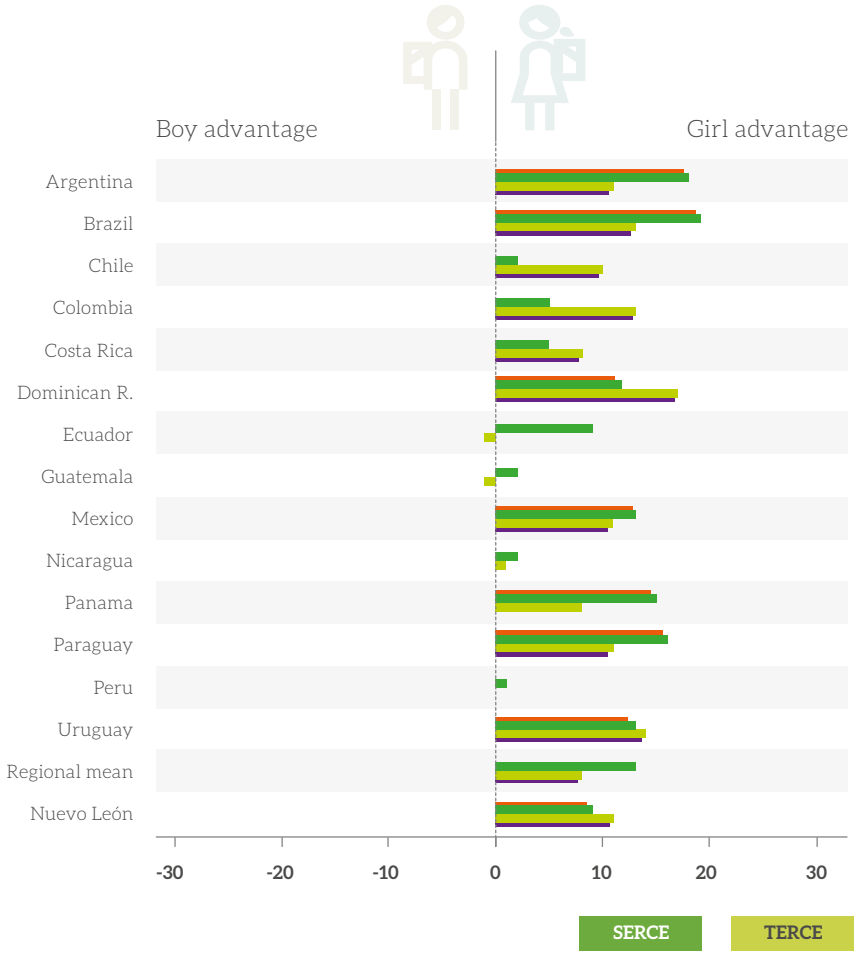
(1) The reading trend in third grade

In 2006, average scores for female third graders exceeded the scores of male third graders by between 9 and 19 points. The achievement advantage of female students was notable in Argentina, Brazil, Mexico, Panama, Paraguay, the Dominican Republic, Uruguay and Nuevo León. In 2013, the female students' advantage became more generalized. By then, female students outperformed male students in Chile, Colombia, Costa Rica and all the above mentioned countries except Panama (see Graph 11). The only countries that presented no gender inequality in average reading performance scores in 2013 were Peru, Nicaragua, Guatemala and Ecuador.

Despite this generalization, the magnitude of female advantage reduced in every country except Uruguay, Dominican Republic and the Mexican State of Nuevo León. Female learners advantage decreased by seven points in Panama and Argentina, six points in Brazil, and five points in Paraguay.

Graph 11

Differences (Girl-Boy) in reading score - SERCE and TERCE (3rd grade)



Note: Orange shadow indicates that difference is statistically significant in SERCE and purple for TERCE (P<=0.05)

Source: Own elaboration based on SERCE and TERCE data.

In terms of variability of reading achievement among third graders (Table 23), both SERCE and TERCE data indicated that female students in all of the study countries except Ecuador, Guatemala and Peru performed higher in many percentiles. Interestingly, this advantage was predominant in the lower percentiles of the distribution and not in the upper percentiles. Between SERCE and TERCE the magnitude of female advantage decreased in Uruguay, Paraguay, Brazil, Mexico, Panama, Paraguay and Nuevo León. In addition, female outperformance became statistically significant in many percentiles in Chile and Costa Rica. In sum, while female students continued to have an advantage in reading performance in many percentiles of the distribution by 2013, the magnitude of this advantage decreased between 2006 and 2013.

Analyzing levels of achievement by gender (Table 24), the number of countries with gender inequality reduced, namely Argentina, Brazil, the Dominican Republic, Mexico, Panama, Paraguay, Uruguay and the Mexican state of Nuevo León. Male students performed worse than female students and were therefore largely concentrated in the lowest achievement levels (Below Level I and Level I). On the other hand, female students tended to perform

Table 23 *SERCE-TERCE third grade reading percentile differences (Girl-Boy) by country*

	Percentile 10		Percentile 25		Percentile 50		Percentile 75		Percentile 90	
Country	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	**17***	**18***	**14***	**16***	**20***	**13***	**21***	5	**22***	9
Brazil	**24***	**23***	**25***	**18***	**26***	9	**17***	**11***	**16***	0
Chile	1	**17***	4	**14***	2	**10***	9	5	-1	0
Colombia	8	6	1	5	4	**17***	0	**16***	0	9
Costa Rica	1	**13***	7	**13***	2	5	0	2	0	6
Dominican Republic	**23***	**21***	5	**16***	5	4	**13***	**17***	**27***	**18***
Ecuador	8	-3	0	0	4	1	11	0	12	0
Guatemala	0	0	0	-2	6	0	7	0	-1	0
Mexico	9	**16***	**12***	5	**17***	**14***	**13***	**11***	4	**13***
Nicaragua	0	**16***	**7***	0	0	**-11***	6	0	0	2
Panama	6	0	**14***	2	**16***	**15***	**23***	2	10	2
Paraguay	**21***	**11***	6	**16***	**14***	**16***	14	9	19	8
Peru	1	5	0	2	2	0	-5	0	-4	**-9***
Uruguay	**24***	**21***	**18***	14	**17***	6	1	10	6	5
Nuevo León	**18***	**15***	**17***	**14***	**17***	**13***	9	8	-1	4

Note: Bold and asterisk indicate that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

better and were therefore more present in the rest of the achievement levels, especially in Level III. Interestingly, the proportion of this overrepresentation was low in the lowest and highest levels of achievement and larger in Levels I and III. By 2013, gender inequality got concentrated in Level I, where boys were at disadvantage in Argentina, Brazil, Colombia, Costa Rica, Panama and Nuevo León.

(2) The reading trend in sixth grade

Trends in average reading scores among sixth graders between 2006 and 2013 (Graph 12) indicate that girls are still at advantage. In 2006, the study countries with the largest gender difference in mean reading scores were Uruguay, the Dominican Republic, Panama, Mexico and Brazil. Mean reading scores for female students were between 20 and 13 points higher than male student

Table 24

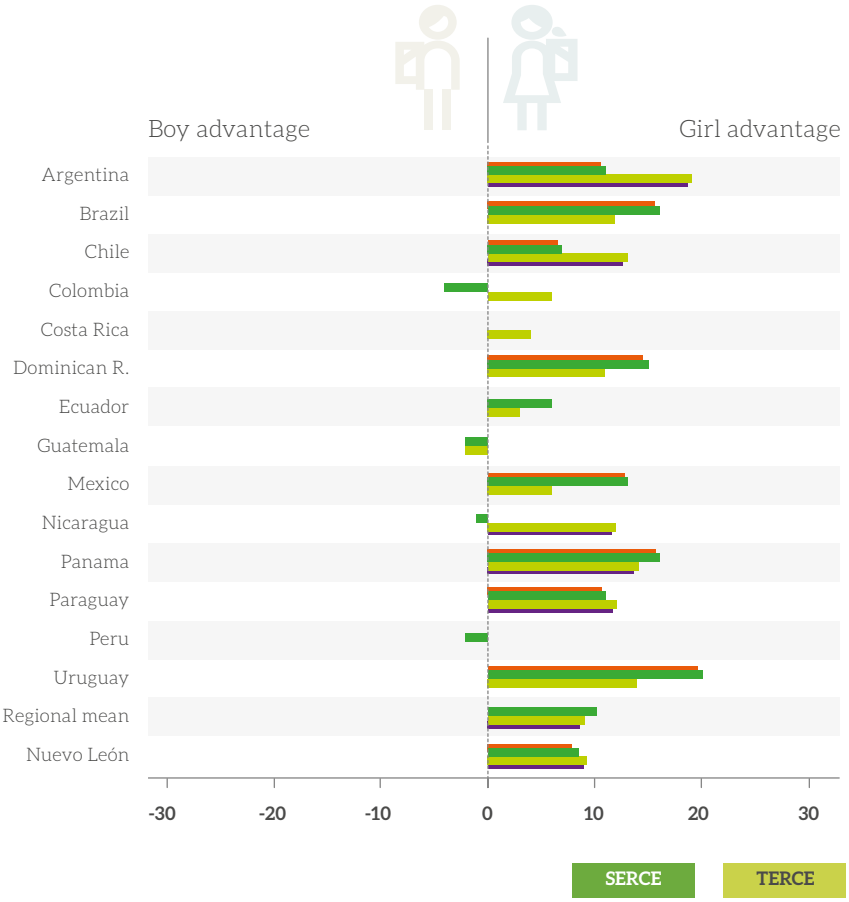
SERCE-TERCE third grade reading level of achievement differences (Girl-Boy) by country (Proportion)

	Below Level I		Level I		Level II		Level III		Level IV	
Country	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	-1.2	-1.0	**-5.3***	**-6.5***	-0.6	2.2	**4.0***	**4.7***	**3.2***	0.5
Brazil	**-2.6***	-1.7	**-7.1***	**-7.3***	**3.6***	**5.4***	**4.8***	3.2	**1.2***	0.4
Chile	-0.4	-0.3	-0.9	-1.8	0.1	-4.0	1.3	2.9	-0.2	3.2
Colombia	-1.0	-0.4	-2.4	**-4.9***	2.7	-1.2	0.7	5.5	-0.1	1.0
Costa Rica	**-**0.6	-0.2	-1.3	**-3.7***	-0.7	-0.3	2.8	2.0	-0.2	2.1
Dominican Republic	-3.2	**-4.1***	-2.5	-3.9	**3.6***	3.4	**2.0***	**4.6***	0.1	0.1
Ecuador	-0.9	0.1	-2.9	-0.3	0.5	-1.0	2.4	1.7	0.9	-0.5
Guatemala	0.2	0.8	-2.0	-1.7	2.6	0.1	-0.3	1.8	-0.6	**-1.0***
Mexico	-1.1	**-1.2***	**-3.9***	-3.6	-0.9	1.1	**4.1***	1.7	**1.8***	**2.1***
Nicaragua	-0.7	-1.7	1.2	2.3	-0.2	-1.3	0.0	0.5	-0.4	0.2
Panama	-1.8	-1.0	**-5.4***	**-7.5***	**2.8***	**7.5***	**3.4***	0.6	0.9	0.3
Paraguay	**-2.9***	-2.8	-2.8	-1.6	1.4	2.1	**3.1***	1.9	1.3	0.4
Peru	-0.7	0.6	-0.9	-1.7	3.3	0.4	-1.0	0.8	-0.7	-0.2
Uruguay	**-2.4***	-1.1	**-4.3***	-2.8	1.8	-2.6	**4.9***	3.4	0.1	3.0
Nuevo León	-0.8	-0.8	**-3.8***	**-3.5***	-2.1	-1.2	**5.1***	**4.0***	1.6	1.5

Note: Bold and asterisk indicate that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

Graph 12

Differences (Girl-Boy) in reading score - SERCE and TERCE (6th grade)



Note: Orange shadow indicates that difference is statistically significant in SERCE and purple for TERCE (P<=0.05)

Source: Own elaboration based on SERCE and TERCE data.

scores in these countries. In 2013, female sixth graders' reading performance advantage decreased; the magnitude increased in Argentina, Chile, Paraguay, Nuevo León and Nicaragua. However, the girls' performance advantage reduced in Panama, and even disappeared in Uruguay, Brazil, Dominican Republic and Mexico.

In 2006, female students demonstrated a performance advantage across the percentile distribution; throughout the region girls achieved higher scores than boys regardless of the considered percentile (see Table 25). In the Dominican Republic, Panama and Uruguay girls performed better in the entire distribution of the SERCE assessment, especially in the 90th percentile. In Brazil, higher achievement among female sixth graders was clear in the lowest percentiles (10th to 50th), while in Mexico and Paraguay the advantage was concentrated in the 25th and 50th percentiles. By 2013, girls' higher achievement increased and became more extreme. In Argentina, Brazil, Chile, Nicaragua, Paraguay and Nuevo León, girls performed better than boys in the highest scores (90th percentile). However, in Peru boys' reading performance in the 10th percentile increased too, and they scored 12 points higher than girls. Another interesting finding is that gender inequality decreased in Uruguay and concentrated in the 25th and 50th percentile but increased in Nicaragua, Chile and Argentina.

Table 25

SERCE-TERCE sixth grade reading percentile differences (Girl-Boy) by country

	Percentile 10		Percentile 25		Percentile 50		Percentile 75		Percentile 90	
Country	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	7	**20***	10	**23***	**16***	**24***	12	9	2	**12***
Brazil	**25***	9	**16***	7	**20***	6	16	**11***	14	**22***
Chile	5	**14***	**13***	**18***	2	**15***	5	**14***	0	**12***
Colombia	-4	8	0	7	-7	2	-8	7	-7	3
Costa Rica	0	6	0	8	-3	1	0	-4	0	8
Dominican Republic	**12***	5	**17***	6	**14***	**15***	**14***	12	**17***	4
Ecuador	0	9	10	7	7	6	11	1	8	-5
Guatemala	-9	0	0	4	0	0	-2	-7	-1	-5
Mexico	8	2	**10***	10	**13***	8	11	6	17	0
Nicaragua	0	**10***	0	**12***	0	**8***	0	**18***	-3	**17***
Panama	**15***	6	**12***	14	**16***	**25***	**23***	**15***	**18***	9
Paraguay	8	**17***	**10***	**17***	**14***	6	9	**14***	10	**15***
Peru	0	**-12***	0	-6	0	3	-5	6	-6	0
Uruguay	**16***	12	**23***	**19***	**19***	**17***	**22***	5	**25***	5
Nuevo León	4	8	**10***	**12***	10	**15***	7	6	6	**11***

Note: Bold and asterisk indicate that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

The variability analysis indicates three general trends or scenarios. First, in some countries gender inequality increased (Argentina, Chile, Nicaragua, Paraguay and Peru) or moved to the upper percentiles (Brazil). Second, several countries that did not have a gender gap in reading performance in 2006 maintained similar levels of gender parity between assessments (Colombia, Costa Rica, Ecuador and Guatemala). Third, in a few countries gender inequality in reading disappeared (Mexico) or got reduced (Uruguay and Panama).

In addition, analysis of gender differences in achievement levels (Table 26) suggests that boys´ disadvantage in reading was mostly explained by their low performance (Level I) and girls´ advantage was explained by their high performance (Level IV). These overrepresentations have increased with time. By 2013, girls have improved their performance (Level IV) in Argentina, Brazil, Chile, Nicaragua, Paraguay and, Nuevo León.

Table 26

SERCE-TERCE sixth grade reading level of achievement differences (Girl-Boy) by country (Proportion)

Country	Below Level I		Level I		Level II		Level III		Level IV	
	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	-0.3	0.0	**-2.8***	**-6.9***	-2.3	-3.1	1.6	**5.5***	**3.7***	**4.5***
Brazil	-0.5	-0.6	**-6.0***	-3.2	-1.3	1.2	**4.2***	-3.2	**3.6***	**5.7***
Chile	**-0.3***	0.0	**-2.3***	**-2.3***	0.5	**-3.8***	1.0	1.0	1.2	**5.1***
Colombia	0.0	0.4	0.8	-2.5	1.0	-0.5	0.5	-0.5	-2.2	3.1
Costa Rica	-0.2	-1.0	0.0	-1.4	0.1	3.2	2.0	-0.8	-1.9	-
Dominican Republic	-1.2	0.6	**-7.8***	**-8.7***	**5.8***	5.6	**2.7***	1.4	0.5	1.0
Ecuador	0.0	-1.0	-2.1	-0.8	-0.4	1.7	2.7	1.1	-0.1	-0.9
Guatemala	0.8	-0.7	-1.3	0.5	1.4	1.9	-0.9	-0.7	-0.1	-1.1
Mexico	0.0	0.1	**-2.7***	-0.9	**-3.7***	-4.7	2.0	2.9	**4.3***	2.6
Nicaragua	-0.2	-0.3	-0.5	**-4.9***	0.2	-3.0	2.3	**5.9***	**-1.8***	**2.3***
Panama	**-0.8***	-0.6	**-5.8***	**-4.8***	-0.2	-1.4	**3.9***	**4.6***	3.0	2.2
Paraguay	-1.5	-0.3	**-4.5***	**-6.5***	2.9	2.0	1.7	2.2	1.4	**2.6***
Peru	0.0	0.4	0.2	2.1	2.2	**-5.4***	-1.5	1.3	-0.8	1.7
Uruguay	-0.1	-0.5	**-3.8***	-3.8	**-4.6***	-5.1	1.3	6.9	**7.1***	2.4
Nuevo León	0.0	-0.2	-1.0	-0.7	-2.8	-3.4	1.2	0.3	2.7	**4.1***

Note: Bold and asterisk indicate that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

In sum, comparison of assessment results from 2006 and 2013 indicates a general increase in gender inequalities in reading performance among third graders over time. The advantage of female students noted in the analysis of TERCE's third grade reading assessment (see previous section) may have resulted in part from a generalization of this advantage in terms of both average score and score distribution between 2006 and 2013. However, it is important to note that the magnitude of female third grader's advantage in reading also reduced in almost all of the study countries during this period. **Greater gender inequalities in sixth grade reading performance in comparison with third graders were also apparent in the 2006 data. As with mathematics, this suggests the tendency for the gender gap in reading to increase with additional schooling is not new.**

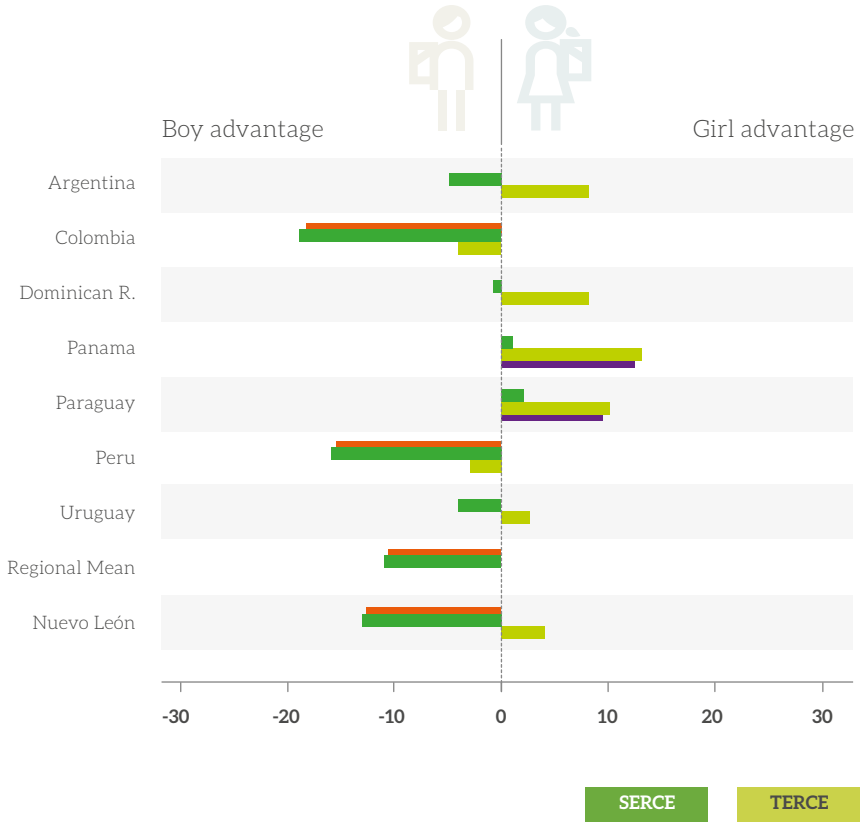
c) Trends in gender inequality in science

The sixth grader science performance was assessed through SERCE in Argentina, Colombia, Panama, Paraguay, Peru, the Dominican Republic, Uruguay and the Mexican State of Nuevo León. For the sake of comparability, TERCE data used in this analysis included only the above-mentioned

countries. Unlike in mathematics and reading where a clear achievement advantage for one gender over another was generally maintained from 2006 to 2013, achievement advantages in science reversed. In 2006, male students performed better in science than their female peers in Nuevo León, Peru and Colombia (by between 13 and 19 points). However, in 2013 girls performed better than boys in Paraguay and Panama (Graph 13).

This change may be explained by examining the distribution of female and male students (variability analysis). Male students dominated the group of highest performers (75th and 90th percentile) in 2006 (SERCE). However, by 2013 the scene had changed. Girls became the top performers in the Dominican Republic. Boys remained among the top performers only in Colombia and Peru, but at a smaller rate than in 2006. In 2006, male students from Nuevo León outperformed female students in the 50th, 75th and 90th percentiles, but in TERCE this advantage disappeared. Only female students outperformed male students in the 25th percentile (see Table 28). In the case of Colombia, boys outperformed girls in the entire SERCE score distribution except in the 25th percentile. However, in TERCE this relative performance advantage decreased in several of the percentiles and concentrated in the upper percentiles (75th and 90th). The greatest improvement in

Graph 13 *Differences (Girl-Boy) in science score - SERCE and TERCE (6th grade)*



Note: Orange shadow indicates that difference is statistically significant in SERCE and purple for TERCE (P<=0.05)

Source: Own elaboration based on SERCE and TERCE data.

gender equality in science performance took place in Peru, where boys outperformed girls in all the percentiles in 2006 but only in the 75th percentile by 2013.

Variability analysis also provides interesting information about countries which presented no gender differences in their mean scores. For example, the male student advantage in the 90th percentile observed in the entire SERCE sample (except the Dominican Republic and Paraguay) in 2006 had almost completely disappeared by the TERCE assessment in 2013. Changes in Argentina are also interesting. While in 2006 boys outperformed girls in the 90th percentile, in 2013 this advantage disappeared and female students outperformed boys in the lowest percentiles, improving their general achievement.

The variability analysis also demonstrates that while in SERCE gender gaps in science performance were concentrated in the 90th percentile (showing male outperformance), in TERCE gender inequality was concentrated between the 25th and 75th percentiles. Higher female student outperformance was concentrated in the 25th and 50th percentiles. Gender representation in the upper percentiles differed by country. For example, while in Colombia boys still outperformed girls at the highest percentiles in 2013, in Dominican Republic boys no longer outperformed female students. These findings suggest that from 2006 to 2013 male and female sixth grader performance in science became more equivalent.

Table 27 *SERCE-TERCE sixth grade science percentile differences (Girl-Boy) by country*

	Percentile 10		Percentile 25		Percentile 50		Percentile 75		Percentile 90	
Country	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	0	**18***	1	**16***	-1	8	-5	11	**-13***	4
Colombia	**-17***	19	-7	-3	**-18***	0	**-19***	**-16***	**-21***	**-15***
Dominican Republic	0	0	**13***	**8***	0	4	0	9	-3	**14***
Panama	8	9	**9***	**15***	4	**19***	0	5	**-15***	4
Paraguay	**11***	10	4	5	**10***	**20***	0	5	-5	4
Peru	**-12***	0	**-10***	0	**-20***	0	**-16***	**-11***	**-23***	-5
Uruguay	0	5	1	0	-2	3	**-7***	9	**-17***	0
Nuevo León	-6	4	-6	**14***	**-12***	5	**-18***	-3	**-18***	0

Note: Bold and asterisk indicate that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

Table 28

SERCE-TERCE sixth grade science level of achievement differences (Girl-Boy) by country (Proportion)

	Below Level I		Level I		Level II		Level III		Level IV	
Country	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE	SERCE	TERCE
Argentina	-0.5	-2.3	1.7	0.3	2.0	1.7	**-2.2***	0.8	**-1.0***	-0.5
Colombia	0.7	-0.3	**6.1***	-0.7	2.0	**5.8***	**-8.1***	-4.1	**-0.7***	-0.7
Dominican Republic	-0.3	-0.6	2.2	**-4.6***	-1.2	**4.9***	**-0.8***	0.6	-	-0.2
Panama	-0.5	-2.3	-1.7	**-4.9***	**3.9***	**6.5***	-1.1	0.3	**-0.7***	0.4
Paraguay	**-2.2***	-3.3	1.9	-1.3	1.0	3.7	-0.2	1.0	-0.5	-0.1
Peru	**2.8***	0.5	**5.1***	-1.9	**-4.9***	2.8	**-2.7***	-0.6	-0.2	-0.8
Uruguay	**0.8***	-	-2.1	-	**3.2***	-	-0.7	-	**-1.2***	-
Nuevo León	0.5	-	2.6	-	**3.2***	-	**-5.2***	-	-1.1	-

Note: Bold and asterisk indicate that values are statistically significant (P<=0.05)
Source: Own calculations based on SERCE and TERCE data.

Analysis of achievement levels further supports these findings. Table 28 presents a clear trend; disparity in female and male student representation in the achievement levels has reduced over time. Indeed, in 2013 disparities remained statistically significant only in Colombia, the Dominican Republic and Panama. In SERCE, boys were overrepresented in the upper levels of achievement (Levels III and IV) and girls tended to be overrepresented in the lowest levels (Below I, I and II). In TERCE, differences in gender representation in the extreme achievement levels (Below Level I and Level IV) have disappeared. However, gender representation differences did become more pronounced at Level I and II, evidencing an improvement in achievement among girls and a deterioration for boys.

Analysis of sixth grader performance in the SERCE and TERCE assessments by gender reveals that gender gaps in science achievement changed between 2006 and 2013. First, the analysis of gender differences in the mean (average) score presented a mixed trend; gender performance advantages changes from being in favor or boys to favoring girls. Second, analyses of the distribution of girls and boys by percentile and level of achievement demonstrates that gender equity was obtained in 2013. Equity was achieved at the upper level and lowest level of the score distribution as well as at the upper (Level III and Level IV) and lowest achievement level (Below Level I) in the period between 2006 and 2013. This is an encouraging trend that requires further analysis, especially regarding which aspects led to this change.

In conclusion, trends between 2006 and 2013 reveal different scenarios. On the one hand, gender inequality in science has changed (sixth grade). Some countries that showed an advantage for male students in science in 2006 reached gender equity in 2013. In two countries a science performance advantage for female students emerged in 2013. Regarding mathematics and reading, in both assessment years gender inequalities were greater among sixth graders than third graders; inequalities increased throughout the school process. Regarding mathematics, it is a positive sign that the presence of female students in the lowest achievement levels reduced

between 2006 and 2013. The situation of third graders is mixed in terms of reading achievement. The mean score difference between girls and boys indicates a clear increase of the female advantage in reading. However, the variability analysis reveals a reduction of the magnitude of this advantage. Analysis of the levels of achievement also shows a reduction in this gender inequality over time. Evidence for reading in sixth grade suggests an increase in inequality in terms of variability. One possible explanation of the persistence of inequality over time may be that boys are overrepresented in the lowest levels of achievement and girls in the highest.

iii) Looking for associated factors with gender inequality in TERCE[17]

The purpose of this section is to identify and explore factors that may explain gender gaps in achievement. In order to examine these factors the analysis adjusts a series of hierarchical linear models by discipline and grade for each country that demonstrated statistically significant gender gaps in the TERCE assessment[18]. The results are organized by discipline and grade.

The analysis to explain gender inequalities in third grade includes variables at both the school and student levels. The school characteristics variables - *school socioeconomic status (SES)*, *rural school*, *urban public school* - act as control variables. *Student SES* is also used as a control variable. The main variables of interest for these analyses are *female student*, *retention*, *time dedicated to study*, *mother education*, *family educational expectations that the student will reach higher education* and *parental supervision*. These main variables represent hypotheses based on research on gender inequalities that can be tested with TERCE data. The *female student* variable is the main variable of interest because it captures the gender gap in achievement. When *female student* variable has a positive and statistically significant coefficient, this indicates that girls have an academic advantage over boys. If the *female student* variable is negative and statistically significant, this indicates a disadvantage in academic performance for girls. The *retention* variable is related to lower achievement and may explain gender differences in performance. The *time dedicated to study* variable expresses the commitment of students to study outside of school. The *mother education* variable establishes if the mother has completed higher education. This variable tries to capture the modeling role that mothers may play for girls in relation to student achievement by including it along socioeconomic status in the models. The *parental expectations about reaching higher education* variable tries to tease out if these expectations are related to gender disparities. Finally, the *parental supervision* variable captures the level of parental oversight of education.

The models that explain gender disparities in sixth grade include the previously stated control variables (*school SES*, *rural school*, *urban public school* and *student SES* as the control in the student level regression) and main variables of interest. Additional student-level variables incorporated in models for analysis of mathematics and reading include *reading habits* and *student perception of the school climate*. The *student perception of school climate* variable measures if the relationships among students in the school are related to student achievement and to the gender gap. The analyses of reading and science substitute

17 *It is important to note that the models presented in this section are the result of several previous analyses which included testing interactions between predictors of interests (such as parental expectations, beliefs about the skills associated to boys and girls, and parental supervision, among others) and the variable female student. These interactions aimed at studying if any of these predictors had a differential association with the achievement of girls and boys. None of these interactions significantly predicted achievement. Furthermore, the interactions did not demonstrate any significant association with the reduction (or increase) of the gender achievement gap. Finally, the interactions were tested in both models that only included the variables of interest (female student and the predictor) and also in the complete models presented in this section.*

18 *This section focuses on the substantive findings about the factors that explain gender gaps. Those interested in the methods used in the study can refer to Appendix III.*

the *teacher practices* variable for the *student perception of school climate* variable. The *teacher practices* variable measures the level of classroom organization, as well as the levels of emotional and pedagogical support, displayed by teachers in their classroom practices. These features should be conceptually linked to student achievement and they may be differentially experienced by boys and girls. The models for analysis of science include the *perception of parents that girls are skilled in science* variable. This variable is a core hypothesis because if parents believe that girls are skilled in science they may shape their messages to and interactions with girls in a way that supports involvement the discipline[19].

When explaining gender gaps in different countries, *female student* is the key variable for the analyses. The variable *female student* denotes mean of the test score gender gap (measured as girls-boys). If the variable *female student* is statistically significant after including different explanatory factors, this indicates that such variables do not totally explain the gender gap. If the variable is significant but its magnitude decreases after including the predictors, this indicates that the explanatory factors only account for a portion of the gender gap. When the female student variable is not statistically significant in the models, this indicates that the variables considered in the analyses explain the test score difference between girls and boys.

a) Factors that explain achievement gap in mathematics

Gender gaps in mathematics increase with additional schooling. In third grade mathematics, the majority of the countries do not register statistically significant differences in achievement between girls and boys; their situation is characterized by gender parity. Only six countries showed gender disparities in mathematics. The gender advantage in countries with a statistically significant difference was split; female third graders scored higher in half of the countries and male third graders higher in the other half. The situation changes dramatically for sixth grade. Gender gaps are widespread in ten countries. Male students have a mathematics performance advantage over female students in each of those countries.

The analysis to explain the gender gaps in mathematics performance reveals similar results across the region. The selected study variables, as a whole account for girls' advantages in mathematics (only in third grade). However, the same explanatory factors could not account boys' advantages in the same subject. Parental expectations of higher education were a key explanatory variable related to the hypotheses of the study. However, importantly, the study finds no statistically significant differences in parental expectations of higher education for boys and girls. Furthermore, this variable does not relate differently to the achievement of female and male learners. In the case of sixth grade mathematics performance, time dedicated to study at home is a relevant variable to explain difference in achievement, but it does not show a differential relationship for boys and girls.

(1) Factors that explain mathematics gap in third grade

Gender gaps in mathematics performance among third graders occur in 6 of the 15 participant countries. However, gender disparities favor girls in half of the countries and boys in the other half. This suggests that there is no a clear pattern of gender inequalities in third grade mathematics achievement. In Argentina, Brazil and the Dominican Republic female students have higher performance scores in mathematics. However, in Costa Rica, Nicaragua and Peru male students performed higher. Table 29 shows the magnitude of the gender gaps in each of the cited countries.

The models to explain the gender gap take the following variables into consideration: school SES, rural school, urban public school, female student, retention, student SES, time dedicated to study, mother with higher education, parental expectations of higher education

19 *Appendix III describes all the variables considered in the analysis.*

and parental supervision. Out of these variables, mother education, parental expectations and parental supervision are the main explanatory factors that should account for the gender gap. On the other hand, retention and time dedicated to study are related to another group of hypotheses for explaining the gender gap; they capture important features of schooling and learning processes that can explain achievement disparities.

Our analysis show that, jointly, the group of variables included in the model explains the gender gap in the cases where girls have a performance advantage, i.e. when girls are ahead of boys in mathematics achievement. However, the same explanatory factors could not account for male-learner's advantages in the same subject. Parental expectations of higher education are a key explanatory variable related to the hypotheses of the study. However, importantly, the analysis found no statistically significant differences in parental expectations of higher education for boys and girls. Furthermore, none of the variables included in the model show a differential influence by gender[20]. For that reason, the analyses presented here only include the relevant findings showing that the gender gap is explained, in some cases, by the group of variables simultaneously considered.

The advantage of girls in mathematics achievement in third grade is explained by the group of factors included in the model in Argentina, Brazil, and Dominican Republic (Table 30). In Nicaragua, the variables considered in the analysis can explain the disadvantage of girls in mathematics performance. On the other hand, girls are at disadvantage in Costa Rica and Peru after controlling for all of the explanatory factors. Furthermore, the results show that disadvantages for girls increases in Costa Rica (it increases from 8 points found in the descriptive analysis to 9.7 points as reported in the coefficient of Female student in the table) and Peru (from 13 points to 14.7 points). This means that in these countries the gender gap increases when considering the explanatory factors. In simple terms, when introducing all the explanatory variables the comparison by gender test score gap is done by equalizing the boys and girls in whatever difference they may have in the variables used to explain achievement differences.

Table 29 *TERCE third grade mathematics score differences (Girl-Boy) by country*

Country	Achievement gap
Argentina	9
Brazil	14
Costa Rica	-8
Dominican Republic	11
Nicaragua	-8
Peru	-13

Source: Own calculation using TERCE database.

20 *The analyses tested if there was a differential influence of each of the predictors on boys and girls by interacting with the female student variable for the models of all grades, disciplines and countries. The predictors could not explain the achievement gap and the interaction was not significant, meaning that each variable did not differentially influence performance of boys and girls.*

Table 30

Hierarchical linear models for mathematics in third grade by country

Country	Argentina	Brazil	Costa Rica	Dominican Republic	Nicaragua	Peru
Intercept	740.38***	675.55***	782.80***	638.82***	702.58***	746.08***
	(30.56)	(20.23)	(22.92)	(12.91)	(18.20)	(17.11)
School SES	21.37	60.07***	0.79	10.28	-19.67	1.24
	(16.07)	(10.98)	(10.06)	(13.02)	(29.66)	(22.31)
Rural school	24.63	49.98**	-7.22	-7.64	-33.69	-78.48
	(27.64)	(19.37)	(27.40)	(13.63)	(42.19)	(46.38)
Urban public school	-38.53	11.58	-40.86*	-31.30*	-47.03	-37.99
	(20.46)	(13.37)	(18.12)	(13.95)	(31.39)	(24.67)
Female student	2.19	1.94	-9.70*	5.68	-8.22	-14.73***
	(4.75)	(5.54)	(4.15)	(3.78)	(5.41)	(3.45)
Retention	-50.77***	-47.20***	-35.15***	-25.09***	-19.08***	-26.62***
	(6.80)	(7.21)	(4.44)	(4.93)	(5.43)	(5.94)
Student SES	-0.29	18.90**	16.15***	11.40***	10.22*	7.09*
	(4.97)	(5.98)	(3.47)	(2.97)	(4.25)	(3.04)
Time dedicated to study	-2.82	5.70	0.90	5.60	-1.01	9.36
	(7.22)	(6.76)	(3.20)	(4.78)	(4.13)	(4.84)
Mother with higher education	-0.70	14.57	5.62	13.50**	7.80	6.63
	(7.61)	(7.62)	(5.50)	(5.22)	(6.67)	(8.01)
Parental expectations of higher education	-4.29	12.40	12.75***	6.52	4.70	21.63***
	(5.50)	(7.10)	(3.68)	(4.67)	(4.01)	(4.92)
Parental supervision	6.59	2.26	0.70	1.33	1.34	5.47**
	(3.97)	(2.90)	(2.78)	(2.31)	(2.36)	(1.97)
% of the Variance explained at Level 2	11%	27%	16%	14%	5%	26%
% of the Variance explained at Level 1	4%	5%	7%	5%	2%	2%

*Note: * P value <=0.05 ** P value <=0.01 *** P value<=0.001*

Source: Own calculation using TERCE database.

(2) Factors that explain mathematics gap in sixth grade

Disparities in mathematics achievement between male and female sixth graders are both more generalized and more pronounced in comparison to gaps among third graders. As Table 31 demonstrates, girls perform significantly lower than boys in mathematics in Argentina, Brazil, Colombia, Costa Rica, the Dominican Republic, Ecuador, Guatemala, Mexico, Nicaragua and the Mexican State of Nuevo León.

The models for explaining gender gaps in sixth grade mathematics include predictor variables at both the school and student levels. The factors used to explain the achievement gap are the school SES, rural school, urban public school, female student, retention, student SES, reading habits, time dedicated to study, mother with higher education, parental expectations of higher education and student´s perception of school climate. None of these variables showed a differential influence for either boys or girls. As described below, gender gaps may only be accounted for after considering all of the variables as a group.

Gender gaps in sixth grade mathematics cannot be explained by the hypothesized variables. Ecuador is the only country where the factors considered explain test score differences between girls and boys (see Table 32). This means that, throughout the region, the measured variables are not able to explain the gender gap. The magnitude of those test score gaps ranges from 11 to 29 points in 10 countries and the Mexican State of Nuevo León (after controlling for the explanatory variables).

The main explanatory factors theoretically related to achievement gaps are parental expectations that students will reach higher education, mother with higher education and teacher practices. However, these variables do not show statistically significant differences between boys and girls. This means that boys and girls exhibit similar parental expectations, levels of mother education and appreciation of teacher practices.

Table 31 *TERCE sixth grade mathematics score differences (Girl-Boy) by country*

Country	Achievement gap
Argentina	-9
Brazil	-14
Colombia	-20
Costa Rica	-15
Dominican Republic	-6
Ecuador	-11
Guatemala	-19
Honduras	-9
Mexico	-14
Nicaragua	-15
Peru	-21
Nuevo León	-15

Source: Own calculation using TERCE database.

A second order group of variables hypothesized to be related to the gender gap includes retention, time dedicated to study and reading habits. These variables do show that, in comparison with boys, girls have lower retention, dedicate more time to study and have better reading habits. Despite these differences, these variables do not have a differential influence on achievement for girls and boys.

Among the main factors expected to explain achievement gaps, parental expectations of higher education show a consistent, significant relationship to test scores across countries. In fact, parental expectations significantly relate to mathematics achievement in Brazil, Colombia, Costa Rica, Ecuador, Honduras, Mexico, Nicaragua and Nuevo León, but they are not significant in Argentina, Dominican Republic, Peru and Guatemala.

Table 32

Hierarchical Linear models for mathematics in sixth grade by country

Country	Argentina	Brazil	Colombia	Costa Rica	Dominican Republic	Ecuador	Guatemala	Honduras	Mexico	Nicaragua	Peru	Nuevo León
Intercept	712.42***	692.12***	688.41***	751.23***	632.49***	685.46***	725.28***	716.19***	732.36***	669.60***	712.89***	747.62***
	(22.35)	(15.05)	(10.63)	(19.22)	(6.60)	(12.93)	(16.21)	(15.65)	(18.30)	(9.55)	(13.26)	(16.89)
School SES	37.78***	37.00***	36.78***	11.37	12.48*	24.14*	17.61**	-11.28	20.03*	2.47	24.90**	21.95**
	(11.44)	(9.81)	(6.71)	(8.26)	(5.38)	(9.68)	(5.82)	(9.77)	(9.15)	(13.90)	(10.10)	(7.00)
Rural school	8.03	-8.99	15.79	-32.64	-10.27	35.07*	-33.21*	-59.23**	20.68	-23.36	-35.82	12.73
	(17.29)	(19.75)	(11.28)	(19.21)	(8.74)	(16.06)	(16.22)	(23.06)	(20.89)	(22.66)	(29.63)	(14.98)
Urban public school	-13.84	-6.95	-1.25	-33.59*	-2.78	19.36	-32.04*	-62.16***	10.14	-23.74	-10.23	3.82
	(13.60)	(10.12)	(8.89)	(14.15)	(5.40)	(13.43)	(14.26)	(20.82)	(14.91)	(13.71)	(16.74)	(11.66)
Female student	-20.00***	-18.55***	-22.41***	-18.28***	-11.41*	-7.43	-20.58***	-14.02**	-17.00***	-11.16**	-20.43***	-28.65***
	(5.35)	(4.25)	(4.39)	(3.86)	(4.61)	(4.78)	(3.36)	(4.98)	(4.55)	(3.50)	(4.17)	(4.88)
Retention	-37.76***	-25.88***	-14.18**	-28.81***	-13.34***	-13.68	-27.72***	-10.71	-40.55***	-7.39	-29.53***	-58.72***
	(6.45)	(6.27)	(4.56)	(4.97)	(3.99)	(7.14)	(4.15)	(7.81)	(6.20)	(4.55)	(5.46)	(8.81)
Student SES	7.71	22.74***	8.02**	14.83***	16.33***	19.23***	8.98***	3.24	18.00***	7.87*	11.20***	10.09**
	(4.52)	(4.16)	(3.19)	(3.04)	(3.71)	(3.40)	(2.53)	(3.45)	(3.95)	(3.15)	(3.04)	(4.03)
Reading habits	3.63	-0.96	3.72	-1.62	3.79	8.48***	0.47	4.47	7.44**	2.97	13.05***	5.78*
	(2.51)	(2.55)	(2.24)	(2.27)	(2.08)	(1.89)	(2.41)	(2.5)	(3.01)	(1.78)	(2.7)	(2.52)
Time dedicated to study	-6.56	10.86*	8.43*	3.71	12.16*	4.85	5.79	5.75	20.90***	6.62	25.02***	28.46***
	(5.75)	(4.71)	(3.78)	(3.39)	(5.30)	(7.58)	(4.29)	(5.54)	(5.05)	(5.62)	(5.88)	(5.52)
Mother with higher education	5.69	-8.66	10.66	10.96	6.43	0.95	1.36	12.90	6.04	4.75	22.38***	9.90
	(9.34)	(8.79)	(5.52)	(7.61)	(5.00)	(5.05)	(8.96)	(7.33)	(6.95)	(4.58)	(6.86)	(6.43)
Parental expectations of higher education	4.86	13.37*	16.69***	20.88***	5.33	14.32***	4.59	13.73**	38.67***	12.34**	26.05	43.23***
	(5.09)	(6.17)	(4.57)	(4.58)	(6.88)	(3.69)	(4.56)	(4.87)	(5.24)	(3.89)	(4.05)	(5.94)
Student perception of school climate	-4.35	-2.77	-2.47	-3.73	-1.96	-2.91	0.67	-3.13	-7.08*	-0.59	-1.29	-4.33
	(2.24)	(2.47)	(1.74)	(2.43)	(1.37)	(1.71)	(1.94)	(1.91)	(2.89)	(1.90)	(1.93)	(2.33)
% of the Variance explained at Level 2	18%	28%	25%	14%	13%	11%	32%	7%	18%	20%	36%	13%
% of the Variance explained at Level 1	5%	5%	5%	8%	9%	4%	4%	1%	9%	3%	5%	10%

*Note: * P value <=0.05 ** P value <=0.01 *** P value<=0.001*

Source: Own calculation using TERCE database.

Teacher practices and mother education do not significantly relate to achievement and do not explain the gender gap. The study expected girls and boys to have different appreciation of teacher practices and that these differences could explain the gender gap in sixth grade mathematics. But the analyses rejects this hypothesis. When girls have mothers who hold a higher education degree, they have an important role model at home that offers an example and inspiration to excel educationally; this motivation can be a source for reducing the gender gap. However, this hypothesis was rejected in the analyses, because the variable of mother with higher education is not related to student achievement in general and is not differentially related to the academic performance of boys and girls.

Retention, time dedicated to study and reading habits are associated with student achievement, although they do not have a differential influence on boys' and girls' performance and cannot explain the gender gap in sixth grade mathematics. Retention is significantly associated with achievement in all of the countries, with the exceptions of Ecuador, Guatemala and Honduras. Time dedicated to study is positively related to mathematics achievement in sixth grade in Brazil, Colombia, the Dominican Republic, Ecuador, Mexico, Peru and the Mexican State of Nuevo León. Meanwhile, reading habits predict mathematics achievement in Ecuador, Mexico, Peru and Nuevo León. Finally, teacher practices are significantly and inversely related to achievement in Mexico. This finding is contrary to the initial study hypothesis.

The analysis of sixth grade performance shows that the gender gap disadvantaging girls remains even after considering a set of school and student variables. The factors considered in the model can only explain the achievement gap in Ecuador, where the variable female student is not significantly related to academic performance in sixth grade mathematics. Therefore, in Ecuador the variables included in the model explain the gender gap; when considering all the variables simultaneously, the differences in students and schools characteristics account for the achievement gap in that country.

Findings from both the third and sixth grade mathematics models clearly indicate that mathematics achievement decreases for girls as education continues. In third grade, gender achievement in mathematics is split between female and male students; in three countries the gender gap favored girls and in three other countries the gap favored boys. Argentina, Brazil and the Dominican Republic show advantages for girls. In Costa Rica, Nicaragua and Peru the advantage is for boys. However, sixth grade girls lag behind boys in Argentina, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Peru and the Mexican State of Nuevo León.

The gender gap in mathematics is only explained in the cases where girls have a performance advantage. In the countries where boys score higher than girls, the factors considered do not explain gender disparities (with the exception of Ecuador). These findings suggest that performance gaps favoring girls are due to differences in the characteristics of boys and girls. Conversely, this also indicates that the advantages for boys in mathematics are not due to measurable characteristics; if this were the case the explanatory factors should have accounted for the gender gap. Therefore, it is highly likely that cultural practices, difficult to capture through quantitative studies, are behind the gender gaps in mathematics. In fact, the early literature on gender wage disparities qualifies these unexplained inequalities as discrimination in the labor market against women (Blinder, 1973; Oaxaca, 1973; Oaxaca & Ransom, 1999). In sum, the unexplained achievement gaps in favor of boys may reflect cultural practices implicit in the societies that schools reproduce. Such practices may convey systematic, implicit and almost imperceptible messages that shape opportunities and expectation about the potential of girls and boys for the different disciplines taught in school.

None of the variables considered as source of the gender gap could directly explain the disadvantages of girls in mathematics achievement. Furthermore, all the explanatory factors considered as a whole could not account for the gender gap when it favored boys (with the only exception of sixth graders in Ecuador).

The models for third grade mathematics considered retention, student SES, time dedicated to study, mother with higher education, parental expectations of higher education and parental supervision as possible sources of explanatory factors for the gender gap. Parental expectations of higher education showed a consistent, statistically significant relation to achievement across countries, along with grade retention.

Parental expectations that students will reach higher education, mother with higher education, teacher practices, retention, time dedicated to study and reading habits do not have differential influence for boys' and girls' achievement in sixth grade. Furthermore, jointly, these variables cannot explain the gender gap in sixth grade mathematics (with the exception of Ecuador). These variables do show that, in comparison with boys, girls have lower retention, dedicate more time to study and have better reading habits. Despite these differences, these variables do not have a differential influence on achievement for girls and boys. **This finding reinforces the idea that there are hidden cultural assumptions and practices that end up producing gender disparities in mathematics achievement.**

Table 33 *Third grade reading score differences (Girl-Boy) by country*

Country	Achievement gap
Argentina	22
Brazil	20
Chile	28
Colombia	20
Costa Rica	17
Dominican Republic	20
Mexico	21
Nicaragua	11
Panama	14
Paraguay	17
Nuevo León	24

Source: Own calculation using TERCE database.

b) Factors that explain achievement gap in reading

Analysis of TERCE assessment data also reveals gender disparities in reading achievement in both third and sixth grade. This section analyzes the factors that may explain these gaps in all of the study countries that show significant differences in achievement between boys and girls.

(1) Factors that explain reading gap in third grade

A significant gap in reading achievement between male and female third graders occurred in 10 of the 15 TERCE study countries. Third grade boys' scores are significantly lower than girls on reading assessments in Argentina, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Mexico, Nicaragua, Panama, Paraguay and the Mexican State of Nuevo León. The magnitude of these gaps ranges from 11 to 28 points (see Table 33).

In order to account for the gender gaps detected, the analyses considered the impact of the following explanatory variables: school SES, rural school, urban public school, female student, retention, student SES, time dedicated to study, mother with higher education, parental expectations of higher education and parental supervision.

As stated in previous sections there are two groups of variables that represent the main hypotheses of the study. First, mother education, parental expectations and parental supervision are the main explanatory factors that should

account for the gender gap. Second, retention and time dedicated to study represent secondary hypotheses for explaining the gender gap; these variables were chosen because they capture important features of schooling and learning processes that may explain achievement disparities.

As in previous analyses, those variables included in the models do not directly influence the gender gap because they do not show a differential association with achievement for boys and girls. The variables as a group can explain higher female student's reading achievement in third grade in Colombia and Paraguay, but the gender gap remains unexplained in the remaining countries (see Table 34).

Parental expectations of higher education, mother with higher education and parental supervision represent the key hypotheses to explain the gender gap. Out of these variables, parental expectations are consistently associated with achievement in Brazil, Chile, Costa Rica, Mexico, Panama, Paraguay and the Mexican State of Nuevo León. It is interesting that parental expectations are not significantly associated with achievement in Colombia where the model can explain the achievement gap; this means that the rest of the factors included in the model are responsible for explaining gender disparities. Mother education is associated with sixth grade mathematics performance in Brazil, Colombia, Nicaragua, Panama and the Mexican State of Nuevo León. Finally, parental supervision is positively linked to student achievement only in Nuevo León.

Grade retention and time dedicated to study are consistently associated with achievement in reading across countries. However, these factors cannot explain gender gaps, even though girls show lower levels of grade retention and they devote more time to study. Grade retention significantly predicts performance in all of the countries. Time dedicated to study is significant in Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Mexico, Nicaragua, Panama and the Mexican State of Nuevo León.

Summarizing, the factors included in the models could only explain gender gaps in third grade reading in Colombia and Paraguay. None of the variables have a direct influence on the gender gap because they do not have different associations with achievement for boys and girls. The gender gap in Colombia and Paraguay is explained by the group of variables as a whole. When including all the variables simultaneously in the model, and statistically equalizing the characteristics of girls and boys, these factors are able to explain the achievement gap in only two of the study countries.

(2) Factors that explain reading gap in sixth grade

A gender gap in sixth grade reading test scores in favor of girls is present in 10 out of 15 countries that participated in TERCE, and the Mexican state of Nuevo León. As can be seen in Table 35, boys lag behind girls in terms of reading performance in Argentina, Brazil, Chile, Costa Rica, the Dominican Republic, Mexico, Nicaragua, Panama, Paraguay, Uruguay and Nuevo León.

The study proposes that parental expectations that students will reach higher education, mother with higher education, parental supervision and teacher practices are the main explanatory factors theoretically related to gender gaps in sixth grade reading. It is important to recall that these variables do not show statistically significant differences between boys and girls. This means that boys and girls exhibit similar parental expectations, levels of mother education, appreciation of teacher practices and parental supervision.

Another group of factors hypothesized to relate to gender disparities in reading achievement are retention, time dedicated to study and reading habits. In comparison to boys, girls have lower retention, dedicate more time to study and have better reading habits. Despite these differences, these variables do not have a differential influence on achievement for girls and boys.

Table 34

Hierarchical linear models for reading in third grade by country

Country	Argentina	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Mexico	Nicaragua	Panama	Paraguay	Nuevo León
Intercept	706.67***	671.20***	743.51***	687.04***	736.80***	629.19***	695.87***	690.40***	671.47***	710.62***	698.10***
	(20.22)	(13.85)	(13.74)	(12.13)	(19.96)	(11.61)	(14.52)	(12.61)	(15.32)	(27.22)	(13.48)
School SES	28.57**	41.99***	31.07***	40.47***	21.18*	26.35*	22.08**	17.37	25.13**	-10.04	20.31**
	(10.20)	(7.76)	(8.07)	(7.26)	(9.09)	(10.24)	(8.09)	(16.41)	(9.60)	(22.24)	(6.39)
Rural school	-32.23*	-0.72	-6.06	5.06	-16.85	-16.97	-13.83	-8.25	-13.06	-61.33*	-16.18
	(13.59)	(9.67)	(11.85)	(8.59)	(14.89)	(10.36)	(10.68)	(18.69)	(13.20)	(26.98)	(8.97)
Urban public school	7.01	27.54	9.40	9.37	17.07	6.38	-3.94	9.95	-12.91	-65.43*	-8.24
	(23.09)	(14.17)	(12.80)	(13.52)	(30.98)	(11.27)	(17.87)	(24.27)	(16.37)	(30.18)	(11.99)
Female student	15.90**	17.31**	12.67**	8.69	13.04**	13.52**	16.87**	8.68*	12.23**	9.83	15.04***
	(5.21)	(5.70)	(4.44)	(5.92)	(4.27)	(4.95)	(5.31)	(4.10)	(3.95)	(5.35)	(3.44)
Retention	-51.55***	-38.79***	-40.22***	-30.38**	-44.70***	-25.69***	-44.99***	-21.46***	-28.27***	-26.86***	-65.24***
	(7.11)	(7.42)	(6.76)	(8.52)	(6.40)	(5.72)	(6.02)	(4.90)	(7.25)	(5.61)	(5.82)
Student SES	-0.30	2.61	-1.48	5.10	-0.33	8.56	18.60****	-5.51	6.93	5.87	20.56***
	(7.15)	(5.09)	(4.78)	(6.02)	(3.96)	(5.39)	(4.56)	(5.14)	(9.13)	(6.23)	(3.74)
Time dedicated to study	1.79	18.77***	9.18**	15.14***	10.38*	12.71**	13.12**	12.78**	13.43**	9.89	10.00**
	(4.32)	(4.00)	(3.25)	(3.77)	(4.58)	(4.67)	(4.82)	(4.19)	(4.65)	(5.04)	(3.30)
Mother with higher education	-3.15	15.72*	10.90	13.13*	4.05	12.25	8.91	16.89*	12.27*	9.98	13.67*
	(9.47)	(7.87)	(7.44)	(6.21)	(6.95)	(6.24)	(7.40)	(7.08)	(5.96)	(7.94)	(6.52)
Parental expectations of higher education	-0.42	17.86**	19.71***	12.70	19.55***	4.94	33.09***	-0.35	19.42***	15.11**	28.12***
	(5.00)	(5.89)	(4.77)	(7.33)	(4.50)	(6.26)	(5.21)	(4.51)	(4.99)	(5.52)	(4.60)
Parental supervision	0.20	4.40	2.02	0.45	6.54	-0.87	5.53	4.42	0.47	6.49	4.44**
	(4.43)	(2.56)	(3.30)	(2.92)	(3.39)	(2.19)	(2.71)	(2.64)	(2.60)	(3.15)	(1.61)
% of the Variance explained at Level 2	17%	27%	15%	37%	21%	17%	23%	10%	31%	8%	18%
% of the Variance explained at Level 1	4%	7%	4%	5%	8%	4%	10%	3%	4%	3%	13%

*Note: * P value <=0.05 ** P value <=0.01 *** P value<=0.001*

Source: Own calculation using TERCE database.

Table 35

TERCE sixth grade reading score differences (Girl-Boy) by country

Country	Achievement gap
Argentina	26
Brazil	17
Chile	28
Costa Rica	9
Dominican Republic	18
Mexico	10
Nicaragua	11
Panama	24
Paraguay	16
Uruguay	15
Nuevo León	17

Source: Own calculation using TERCE database.

Gender disparities in reading performance in sixth grade are explained by student and school variables in Costa Rica, the Dominican Republic, Mexico, Paraguay, Uruguay and Nuevo León (see Table 36). In these countries, the gender gap is not significant once all the explanatory factors are considered in the model, which means that the observed characteristics of schools and students can explain the gender gap.

Regarding the main predictors of achievement hypothesized as possible explanations of gender gaps in sixth grade reading, the models show that parental expectations are positively related to academic achievement in all the countries except Argentina. Mother education shows a positive association with performance in Argentina, Chile, Panama and Nuevo León. Teacher practices predict reading achievement in Mexico, Nicaragua and Paraguay. Finally, parental supervision is linked to test scores in Paraguay, Uruguay and Nuevo León. However, parental supervision shows a negative relationship with achievement in Uruguay, a finding that arises because of the inclusion of multiple variables in the model. These main factors do not directly explain the gender gap in sixth grade reading because they do not show significantly different associations with the achievement of girls and boys.

Grade retention, time dedicated to study and reading habits comprise the second group of explanatory variables. Retention has a negative relationship with student performance in all of the participating countries. Time dedicated to study predicts achievement in three countries -the Dominican Republic, Mexico and Uruguay- and the state of Nuevo León. The habit of frequently reading predicts achievement in Argentina, Nicaragua and Panama.

Three conclusions emerge from he analysis of gender gaps in reading. First, the variables included in the models could not directly explain the achievement gaps in favor of girls, in most of the countries. In other words, the explanatory variables show a similar relationship with test scores for girls and boys. Second, **the predictors included in the models explained the achievement gap in several countries, but the results differed by grade**. In third grade, school SES, rural school, urban public school, female student, retention, student SES, time dedicated to study, mother with higher education, parental expectations of higher education and parental supervision are the variables considered to explain the achievement gap. Jointly, these variables explained the gender gap in reading in third grade only in Colombia and Paraguay. In sixth grade, school SES, rural school, public urban school, female student, retention, student SES, reading habits, time dedicated to study, mother with higher education, parental expectations of higher education, parental supervision and teacher practices were the variables used to explain the achievement gap. Only when introduced as a group in the model,

Table 36

Hierarchical linear models for reading in sixth grade by country

Country	Argentina	Brazil	Chile	Costa Rica	Dominican Republic	Mexico	Nicaragua	Panama	Paraguay	Uruguay	Nuevo León
Intercept	699.22***	713.93***	730.93***	751.79***	615.41***	712.85***	683.55***	651.52***	647.50***	717.99***	701.38***
	(26.14)	(14.44)	(10.34)	(16.05)	(10.47)	(15.72)	(10.26)	(10.94)	(11.79)	(30.44)	(14.14)
School SES	36.62**	23.43**	18.85**	16.75*	29.44***	13.85	24.13*	29.50***	30.69***	13.12	25.55***
	(13.00)	(9.00)	(6.36)	(7.11)	(7.31)	(7.78)	(9.81)	(6.15)	(8.87)	(13.23)	(6.34)
Rural school	-27.38	-31.03	-11.85	-32.47	-1.19	-6.33	-1.66	6.79	-28.89*	-1.13	5.35
	(19.34)	(16.46)	(12.52)	(18.29)	(12.93)	(19.41)	(19.28)	(12.77)	(14.57)	(25.77)	(12.39)
Urban public school	-30.47	-14.54	-5.90	-24.41*	15.18	-5.17	-14.26	-9.39	-10.81	-28.19	9.87
	(15.82)	(8.87)	(8.08)	(10.83)	(12.26)	(11.46)	(13.50)	(10.41)	(8.77)	(19.90)	(10.22)
Female student	17.31**	11.73*	22.93***	4.67	0.62	7.92	9.90**	12.00**	10.59	7.75	7.22
	(6.16)	(5.55)	(4.18)	(3.93)	(4.90)	(4.42)	(3.79)	(3.80)	(5.22)	(6.59)	(3.61)
Retention	-49.63***	-39.07***	-40.06***	-35.11***	-19.64**	-39.10***	-23.47***	-24.83***	-16.37*	-53.89***	53.61***
	(7.00)	(6.08)	(7.08)	(5.39)	(6.03)	(6.89)	(5.46)	(6.88)	(6.82)	(9.10)	(7.65)
Student SES	-2.37	26.15***	1.32	14.21***	18.59***	20.45***	9.85***	14.46***	13.31***	19.86**	12.96***
	(4.32)	(5.43)	(3.88)	(3.42)	(3.16)	(4.07)	(2.84)	(3.86)	(3.92)	(7.51)	(2.72)
Reading habits	7.06**	1.21	1.18	0.30	3.76	4.56	6.45*	8.99**	4.39	5.07	2.37
	(2.68)	(2.55)	(2.05)	(1.74)	(2.74)	(2.73)	(2.59)	(3.05)	(2.41)	(5.00)	(1.99)
Time dedicated to study	-3.19	4.92	7.00	2.37	15.75**	15.06**	3.68	7.85	8.93	17.98*	14.70***
	(5.57)	(4.91)	(4.83)	(3.79)	(4.74)	(4.99)	(5.44)	(5.90)	(6.36)	(8.50)	(4.22)
Mother with higher education	17.94*	-14.33	18.60**	11.25	6.85	13.26	10.52	20.21***	9.94	1.36	17.08*
	(8.14)	(8.98)	(7.21)	(7.37)	(6.59)	(6.86)	(5.38)	(5.77)	(6.70)	(17.35)	(6.65)
Parental expectations of higher education	8.96	23.64***	37.09***	26.18***	25.58***	34.73***	13.00**	27.52***	24.18***	39.72***	36.85***
	(5.02)	(5.93)	(5.75)	(5.48)	(5.26)	(4.75)	(4.14)	(5.96)	(5.97)	(9.04)	(4.76)
Parental supervision	-2.52	0.53	5.20	-0.21	-1.83	3.63	-3.02	0.31	7.48**	-7.42*	3.99*
	(3.22)	(2.39)	(3.49)	(2.93)	(1.95)	(1.96)	(2.68)	(3.30)	(2.58)	(3.55)	(1.72)
Teacher practices	-1.11	2.92	2.63	-2.70	3.46	6.15**	7.29***	4.26	7.47**	-0.82	2.94
	(2.81)	(2.40)	(2.15)	(1.93)	(3.49)	(2.02)	(2.12)	(2.25)	(2.88)	(2.85)	(2.23)
% of the Variance explained at Level 2	20%	24%	13%	16%	18%	23%	17%	32%	30%	16%	19%
% of the Variance explained at Level 1	5%	9%	7%	9%	8%	10%	5%	7%	6%	12%	11%

*Note: * P value <=0.05 ** P value <=0.01 *** P value<=0.001*

Source: Own calculation using TERCE database.

these variables jointly explain the achievement gap in Costa Rica, the Dominican Republic, Mexico, Paraguay, Uruguay and Nuevo León. In sum, despite the fact that the variables do not show a differential influence over girls' and boys' achievement, they are able to explain the reading achievement gap in several countries (although more accurately in sixth grade).

Finally, in the above-mentioned countries, differences in the characteristics of girls and boys— measured by the variables used in the models — explain the achievement gaps in reading. **This finding supports the idea that females' performance advantages, at least in some countries, are not due to cultural patterns of socialization that shape opportunities for exceling in specific disciplines in the school.** However, the evidence only partially supports this idea as the models could only explain the reading advantages for third grade girls in Colombia and Paraguay in third grade and sixth grade girls in Costa Rica, the Dominican Republic, Mexico, Paraguay, Uruguay and Nuevo León.

Table 37

TERCE sixth grade science score differences (Girl-Boy) by country

Country	Achievement gap
Argentina	8
Chile	12
Costa Rica	-10
Guatemala	-14
Nicaragua	-8
Panama	14
Paraguay	11
Peru	-7

Source: Own calculation using TERCE database.

c) Factors that explain achievement gap in science

Analysis of TERCE assessment data for science achievement revealed gender disparities in performance among sixth graders in half of the study countries. However, the disparity advantage in these countries was evenly split between male and female students. This section analyzes factors that may explain these disparities in all of the study countries that show where significant differences in achievement between boys and girls.

Gaps in science performance between male and female sixth graders occurred in 8 of the 15 study countries. As Table 37 demonstrates female students have higher test scores than male students in Argentina, Chile, Panama and Paraguay. In contrast, male students have higher test scores in Costa Rica, Guatemala, Nicaragua and Peru.

The models for explaining gender gaps in science included the following predictive variables: school SES, female teacher, rural school, urban public school, female student, retention, student SES, reading habits, time dedicated to study, mother with higher education, parental expectations of higher education, parents' belief in girls´ higher ability for science and teacher practices.

Female teacher, mother with higher education, parental expectations of higher education, parents' belief of female higher ability for science and teacher practices are the main variables of interest for explaining the achievement gaps. These factors analyze role models for female students by investigating the influence on achievement of having a female teacher, as well as having a mother with higher education. On other hand, parental expectations of higher education, parents' belief of female higher ability for science and teacher practices reflect cultural assumptions and classroom interactions that may account for gender disparities in science. It is important to note that these variables do not have a direct association with the gender gap in science because they have a similar influence on boys and girls test scores.

Table 38

Hierarchical linear models for science in sixth grade by country

Country	Argentina	Chile	Costa Rica	Guatemala	Nicaragua	Panama	Paraguay	Peru
Intercept	689.50*** (20.33)	737.80*** (16.44)	778.45*** (21.76)	716.25*** (11.90)	693.22*** (13.42)	657.34*** (14.22)	648.96*** (22.22)	701.94*** (18.29)
School SES	51.51*** (8.87)	21.39* (9.68)	17.25 (11.03)	35.07*** (5.91)	22.69 (12.04)	24.36** (7.68)	20.25 (11.84)	29.18* (11.11)
Female teacher	-14.10 (12.31)	19.45 (13.50)	-8.95 (10.18)	2.49 (9.13)	-2.86 (12.83)	8.82 (8.40)	-5.69 (16.65)	-7.27 (11.06)
Rural school	-1.88 (16.50)	-32.35 (20.91)	-30.37 (29.16)	-9.34 (13.74)	11.50 (18.31)	0.00 (14.76)	-5.50 (22.22)	-14.17 (31.01)
Urban public school	-17.47 (12.85)	-40.16** (13.78)	-31.10 (16.13)	-13.33 (12.10)	-17.36 (15.43)	-18.14 (11.87)	-22.76 (14.64)	-5.67 (16.05)
Female student	-4.11 (6.30)	-2.35 (4.99)	-14.19** 5.22	-16.74** (4.60)	-7.01 (3.98)	5.24 (5.21)	7.86 (4.85)	-8.67* (3.52)
Retention	-44.01*** (7.75)	-39.46*** (7.23)	-34.91*** (5.47)	-20.38*** (4.88)	-17.89** (5.28)	-18.32* (8.22)	-15.22 (8.19)	-30.10*** (6.02)
Student SES	0.95 (4.34)	0.99 (4.97)	13.13** (3.92)	11.35*** (3.14)	7.06** (2.69)	10.97** (3.72)	15.02*** (4.01)	13.99*** (3.49)
Reading habits	11.59*** (2.60)	5.21 (2.75)	1.74 (2.28)	5.02* (2.38)	5.78* (2.45)	9.37** (3.19)	3.77 (2.81)	15.49*** (1.95)
Time dedicated to study	0.90 (6.38)	3.49 (5.60)	1.44 (5.95)	2.00 (4.11)	5.72 (6.26)	12.89 (8.46)	7.86 (5.74)	14.89** (4.88)
Mother with higher education	3.49 (9.21)	23.18** (9.12)	6.94 (8.29)	-0.85 (10.70)	4.46 (5.91)	20.46* (8.15)	6.25 (8.70)	15.42* (6.28)
Parental expectations of higher education	5.44 (4.90)	36.84*** (6.19)	29.84*** (4.66)	7.09 (3.92)	12.58*** (3.86)	28.93*** (7.02)	25.45** (6.99)	23.65*** (4.05)
Parents' belief of female higher ability for Science	-4.30 (11.23)	2.90 (10.18)	4.42 (11.75)	-16.06 (11.36)	-11.11 (7.59)	-14.30 (11.21)	4.37 (8.25)	-14.19 (7.73)
Teacher practices	-2.32 (2.89)	3.79 (2.76)	-4.95* (2.29)	2.51 (2.07)	5.04* (2.14)	5.25* (2.43)	4.96 (2.82)	4.91 (2.57)
% of the Variance explained at Level 2	20%	19%	14%	31%	11%	25%	11%	35%
% of the Variance explained at Level 1	4%	4%	9%	3%	4%	6%	5%	7%

*Note: * P value <=0.05 ** P value <=0.01 *** P value<=0.001*

Source: Own calculation using TERCE database.

Retention, reading habits and time dedicated to study are variables expected to explain the achievement gap in science. These factors reveal characteristics of the schooling and studying habits that may account for gender disparities. Although, in comparison with boys, girls students exhibit lower grade retention, better reading habits and more time dedicated to study, these variables do not directly explain the achievement gap. In other words, these variables do not seem to influence the test score differences between boys and girls. However, they partially account for the test score gap in science.

Analysis of the achievement gap in science indicates that in the countries where female students had higher performance levels gender inequality could be explained by observed variables (see Table 38). This finding is based on the fact that the coefficient of the variable that identifies female students becomes non-significant in explaining achievement in Argentina, Chile, Panama and Paraguay once student and school factors are taken into account. In the majority of the countries where the test score gap in science favors boys, the gap remains significant even after controlling for student and school variables. In Costa Rica, Guatemala and Peru boys maintain their performance advantage over girls after considering the observed factors related to achievement. Nicaragua is the only exception because in this country the variable for identifying female students becomes non-significant after controlling for all of the factors included in the model.

Regarding the main group hypotheses, the results show that having a female teacher and parents' belief of female higher ability for science do not significantly predict student achievement in all of the countries analyzed. Parental expectations hold the most consistent relation with performance, they significantly and positively predict achievement in Chile, Costa Rica, Nicaragua, Panama, Paraguay and Peru. Students whose mothers have reached higher education show higher test scores in Chile, Panama and Peru. Teacher practices are positively linked to science achievement in Nicaragua and Panama. In Costa Rica, teacher practices have an inverse association with science test scores, a finding that may have occurred because of the inclusion of several variables in the model.

Retention, reading habits and time dedicated to study comprise the second group of variables hypothesized to explain the gender gap in science. Grade retention is inversely associated with achievement in Argentina, Chile, Costa Rica, Guatemala, Nicaragua, Panama and Peru. The habit of regularly reading at home positively predicts student achievement in Argentina, Guatemala, Nicaragua, Panama and Peru. Finally, time dedicated to study only predicts science achievement in Peru.

Analysis of the gender gap in science confirms a trend that girls' achievement advantages can be explained when considering the differences in boys and girls characteristics. **In science, as in third grade mathematics and to a lesser extent in reading, the girls' advantages are due to measurable characteristics that account for the gender gap. Conversely, boys' advantages in science are not related to these measurable characteristics. Rather they seem to be related to the subtle processes of socialization embedded in everyday interactions that are very difficult to capture in large scale studies.**

IV Conclusions and recommendations

The need to address gender inequalities in education is globally recognized. Existing research from other regions suggests that male learners have clear advantages in mathematics and female learners have clear advantages in reading and writing. Research attributes these differences, at least in part, to institutional and economic participation/representation, learner attitudes and self-confidence and cultures values and gender beliefs. Research on such educational gender gaps in the Latin American region is relatively scarce. This report aims to contribute to the existing literature on gender inequalities in education and to help address the current gap in research on this subject in Latin America. Our conclusions are presented in four sections. The first section summarizes gender achievement gaps in the TERCE assessment. The second section summarizes educational trends between 2006 and 2013 based on comparisons of the SERCE and TERCE results. The third section summarizes findings regarding factors associated with the previously identified gender achievement gaps in the TERCE assessment. The final section outlines policy recommendations based on our findings.

i) Gender gap in TERCE

Analysis of the 2013 TERCE assessment results revealed several notable gender gaps among third and sixth graders in Latin America. The relative advantage of female or male students varied primarily by subject. Test results revealed a strong general advantage for male learners in mathematics. Conversely, female students tended to perform significantly better on reading and writing tests. These findings align with the findings from existing research on gender inequalities in education summarized in Chapter II of this report.

Analysis of the TERCE assessment results by grade, provided varying insight into how the gender gaps in these subjects may have developed. Female students in both third and six grade obtained consistently higher test scores than their male cohorts in both reading and writing. While not always statistically significant, female advantages in reading and writing appeared across the various percentiles in the score distribution in both grades. Female students of both grades also tended to be underrepresented in the lower TERCE reading achievement levels (Levels I and II) and overrepresented in the higher achievement levels (Level III and IV). However, analysis demonstrated that these findings were more generalized for sixth graders than for third graders.

The gender gap in reading and writing performance is generalized, but the fact that the advantage increased among female sixth graders suggests that this gap may in some way be related to continuing primary school education. The fact that female students' writing scores (in both grades) were not only higher but also statistically significant in every country confirms the widespread advantage of female students in literacy. The advantage of girls in literacy may be due to the provision of more opportunities for girls to practice and develop

language skills in the schools. More opportunities for oral presentations and writing reports of group work can be easily identified as tasks that girls perform more often in classrooms. Furthermore, since literacy performance is closely linked to the socioeconomic status of the families, it is also plausible that socialization processes at home reinforce the opportunities of exceling in literacy activities such as oral and written communications, and families may also more intensively promote reading activities among girls.

Male learners showed a general performance advantage in the TERCE mathematics assessments. However, the extent of this advantage differed notably by grade. Analysis of TERCE's third grade mathematics assessment revealed gender gaps in test performance, but relative gender advantages varied between countries. Female students scored higher in half of the study countries with statistically significant gender performance gaps and male students scored higher in the other half. Thus, while analysis identified some gender gaps in mathematics performance, the mixed nature of these findings did not indicate a consistent advantage for either gender. However, analysis of sixth grade mathematics performance revealed a clear gender gap in favor of male students. A generalized pattern of lower achievement in mathematics among sixth grade girls was apparent.

As with reading and writing, the fact that the mathematics gender gap in favor of boys was greater among sixth graders suggests that this gap may in some way be related to continuing primary school education. Schools may reinforce the idea that boys are better in mathematics by shaping learning opportunities differently for male and female students. Differing subject opportunities and paths beginning as early as primary school may be a cause for the overrepresentation of males in STEM careers, which hold a higher symbolic status and higher long run earnings. While female students will tend to be overrepresented in the humanities and social sciences, fields associated with lower symbolic status and earning opportunities, as a result. Again, other societal factors may reinforce gendered messages, expectations and opportunities present in school.

In contrast to the results for reading, writing and mathematics, the test results for science were fundamentally mixed in terms of gender achievement inequalities. As in the third grade mathematics results, only a few countries had a statistically significant gender gap in science achievement and the gender advantage was split; female learners scored significantly higher in half of the countries and male learners scored significantly higher in the other half. However, male students tended to be overrepresented in both the lowest and highest achievement levels. In addition, the score distribution suggests, in part, that there may be limited statistically significant differences in achievement between boys and girls across countries. Primary school socialization may not be the only factor contributing to the overrepresentation of male students in the highest student achievement level but further consideration of this process may help researchers understand gender achievement inequalities in science as well as how teaching practices may shape future opportunities for students of different genders.

In sum, TERCE test results indicate clear gender inequalities in mathematics and reading achievement, but not in science. Male learners tended to outperform female learners in mathematics increasingly by grade and female learners more uniformly outperformed male learners in reading and writing in every grade.

ii) Trend of the gender gap (2006-2013)

In general, comparison of TERCE assessment results (2013) with SERCE results from 2006 indicated that clear gender gaps in certain subjects were not new occurrences. As in 2013, test results from 2006 revealed strong general advantages for male learners in mathematics and for female learners in reading. Again, examination of the results by grade provides further insight. Between 2006 and 2013 the performance advantage of female third graders in reading generalized across the participant countries. However, the degree of this advantage reduced

in almost all of the study areas during this same period. Sixth grade girls' performance advantage in reading scarcely changed between assessments. Importantly, in both assessments the reading performance advantage was greater among sixth grade girls than third grade girls. As we previously indicated this fact suggests that the gender gap in reading performance may in some way be related to continuing primary school education.

Comparison of SERCE and TERCE data revealed that male third grader's performance advantage in mathematics decreased between 2006 and 2013. The number of countries with gender inequalities in third grade mathematics achievement and the extent of those inequalities decreased. Gender inequalities in sixth grade mathematics performance also decreased in some countries between assessments. However, male students' mathematics advantage generally increased in the study countries in terms of both average score and variability. As with reading, in both assessments the mathematics performance advantage was greater among sixth grade boys than third grade boys, suggesting a possible correlation with primary school socialization.

Notably, comparison of sixth grade science assessment results from 2006 and 2013 indicated a reversal in gender inequalities. During this period gender inequalities in average test scores dramatically reduced. In several countries the gender advantage reversed (these new scores were not statistically significant). Changes in the score distribution and achievement level representation further demonstrated this reversal. This encouraging trend requires further analysis. In particular, research regarding factors that supported these changes is needed.

iii) Associated factors with gender inequality in mathematics, reading and science

None of the study variables in the adjusted models could directly explain the achievement gap in all of the considered disciplines and school grades. Individually, these variables do not differently influence male or female achievement. However, when considered jointly and as a whole, the study variables did provide some insight. Analysis to explain the gender gaps in mathematics achievement found similar results across the region. The selected study variables, as a whole accounted for female-learners' advantages in mathematics (only in third grade). However, the same explanatory factors could not account male-learner's advantages in the same subject. Parental expectations of higher education were a key explanatory variable related to the hypotheses of the study. However, importantly, our analysis found no statistically significant differences in parental expectations of higher education for boys and girls. Furthermore, this variable did not relate differently to the achievement of female and male learners. In the case of sixth grade mathematics performance, time dedicated to study at home was a relevant variable to explain difference in achievement, but it did not show a differential relationship for boys and girls.

Analysis of potential explanatory factors for gender gaps in reading performance revealed that the variables included in the model could not directly explain the achievement gaps favoring girls; the explanatory variables showed a similar relationship to test scores of girls and boys. The predictors included in the model did explained the achievement gap in several countries, but results differed by grade. The model for third grade analysis tested the following variables: school SES, rural school, urban public school, female student, retention,

student SES, time dedicated to study, mother with higher education, parental expectations of higher education and parental supervision. Jointly, these variables explained the gender gap in reading in third grade only in Colombia and Paraguay. The models for the sixth grade reading performance analysis tested included: school SES, rural school, public urban school, female student, retention, student SES, reading habits, time dedicated to study, mother with higher education, parental expectations of higher education, parental supervision and teacher practices. These variables explained the achievement gap in Costa Rica, the Dominican Republic, Mexico, Paraguay, Uruguay and Nuevo León only when introduced as a group in the model.

In sum, despite the fact that the selected variables did not have a differential influence on female and male achievement in mathematics, they were able to explain the reading achievement gap in several countries (more intensively in sixth grade). This finding supports the idea that female learner advantages, at least in some countries, are not due to cultural patterns of socialization that shape opportunities for exceling in specific disciplines in the school. However, the evidence only partially supports this idea as the models could only explain the reading advantages for third grade girls in Colombia and Paraguay and sixth grade girls in Costa Rica, the Dominican Republic, Mexico, Paraguay, Uruguay and Nuevo León.

Analysis of factors influencing on science achievement showed that having a female teacher and parents that believed girls had a higher ability for science did not significantly predict female student achievement in all the analyzed countries. Parental expectations held the most consistent relation with science performance; they significantly and positively predicted achievement in Chile, Costa Rica, Nicaragua, Panama, Paraguay and Peru. Students whose mothers had reached higher education showed higher test scores in Chile, Panama and Peru. Teacher practices were positively linked to science achievement in Nicaragua and Panama. In Costa Rica, teacher practices had an inverse relation to science test scores, a finding that may have occurred because of the inclusion of several variables in the model. The second group of variables hypothesized to explain the gender gap in science were retention, reading habits and time dedicated to study. Grade retention was inversely associated with achievement in Argentina, Chile, Costa Rica, Guatemala, Nicaragua, Panama and Peru. The habit of regularly reading at home positively predicted student achievement in Argentina, Guatemala, Nicaragua, Panama and Peru. Finally, time dedicated to study only predicted science achievement in Peru.

The above mentioned analysis showed a consistent trend in which female learner achievement advantages could be explained by considering the differences in boys and girls characteristics. In science, as in third grade mathematics, and to a lesser extent in reading, the female-learner advantages were due to measurable characteristics. However, male learner advantages in science were not explained. Therefore, male-learner achievement may be related to the subtle processes of socialization embedded in daily life interactions, which are very difficult to capture in large scale studies. Advantages for boys in mathematics were also not due to measurable characteristics, because if this were the case the explanatory factors should have accounted for the gender gap. Therefore, it is highly likely that cultural practices, difficult to capture through quantitative studies, are behind the gender gaps in mathematics. In fact, early literature on gender wage disparities qualifies these unexplained inequalities as discrimination in the labor market against women (Blinder, 1973; Oaxaca, 1973; Oaxaca & Ransom, 1999). In sum, while female-learner performance advantages may be explained by the considered variables in the statistical models, the achievement gaps in favor of boys cannot be similarly explained and may reflect cultural practices implicit in societies that schools reproduce. Cultural practices may convey systematic, implicit and almost imperceptible messages that shape opportunities and expectations about the potential achievement of girls and boys in various disciplines.

iv) Policy Recommendations

Based on our findings, we suggest a set of policy recommendations. First, national and local governments should make gender inequality a priority issue in terms of public policy. This implies a reinforcement of the messages and orientations to the educational system regarding the need to provide opportunities so that female learners can improve their achievement in mathematics and male learners in literacy. Moreover, it is necessary to constantly monitor gender inequalities in education in terms of access, educational paths and learning achievement. Official national reports are necessary in order to raise awareness in the educational system and the general population about gender inequality as a problem that needs to be solved.

Second, it is necessary to make a revision of the curriculum, textbooks and teaching materials in order to capture and eliminate gender bias. Furthermore, the curriculum and teaching materials are required to equally portray men and women in different activities. For instance, images and messages need to equally include men and women in scientific activities, in childcare activities and in house chores, among others.

Third, it is necessary to reformulate pre-service and in-service teacher training with a gender focus, concerned with providing equal opportunities to female and male learners, as well as tools to implement equal interactions in the daily classroom activities. Moreover, this training should provide tools to allow teachers to observe and evaluate their own practices with a gender approach.

Finally, we need more research in order to understand the educational aspects behind gender inequality in Latin America. In particular, we require studies regarding the interactions in the classroom that address how learning opportunities are shaped. In addition, it is necessary to study the expectations and messages transmitted by families to girls and boys regarding their gender roles and what type of education they are encouraged to seek. Accumulating this evidence, will contribute to the design of more effective policies directed towards the social practices that shape gender opportunities and, in the end, inequalities.

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Appendices

Appendix I

SERCE Achievement Levels

Apendix I

Third grade: skills for each achievement level in mathematics test

Level IV

- Recognize the rule governing the formation of a numerical sequence and identify its formulation.
- Solve multiplication problems involving one unknown or that require making use of equivalency between the usual measures of length.
- Identify an element on a two dimensional plane and the properties of the sides of a square or rectangle to solve a problem.

Level III

- Solve multiplication problems or addition problems that involve an equation or require two operations.
- Solve addition problems using units of measure and their equivalents or problems that include common fractions.
- Recognize the rule governing a graphic sequence or additive numerical sequence and continue it.
- Identify elements of unusual geometric figures and interpret the different types of figures for extracting information and solving problems using the data

Level II

- Recognize the decimal and positional organization of the numbering system and the elements of geometric figures.
- Identify a path on a plane and the most appropriate unit of measure for measuring an attribute of a known object.
- Interpret tables and charts in order to extract and compare data.
- Solve addition or multiplication problems involving proportions in the field of natural numbers.

Level I

- Recognize the relationship of order between natural numbers and common two-dimensional geometric figures in simple drawings.
- Locate relative positions of an object in a spatial representation.
- Interpret tables and graphs in order to extract direct information.

Below Level I

- Students who do not achieve the skills required for Level I

Apendix I

Third grade: skills for each achievement level in reading test

Level IV

- Integrate and generalize information given in a paragraph or in verbal and graphic codes.
- Replace non-explicit information.
- Follow the text, Including locating new information.
- Understand translations from one code to another (from numeric to verbal, and verbal to graphic).

Level III

- Locate information, distinguishing it from adjacent information.
- Interpret reformulations that summarize several data.
- Infer information based on knowledge about the world.
- Distinguish, based on the text, the meaning of words that have more than one meaning.

Level II

- Locate information in a brief text that is not distinguished from other, conceptually similar information.
- Distinguish words with a single meaning.
- Recognize simple sentence reformulations.
- Recognize redundancies between graphic and verbal codes.

Level I

- Locate information with a single meaning, in a prominent part of the text, repeated literally or synonymously, and isolated from other information.

Below Level I

- Students who do not achieve the skills required for Level I

Apendix I

Sixth grade: skills for each achievement level in mathematics test

Level IV

- Find averages and solve calculations, combining the four basic operations in natural numbers.
- Identify parallelism and perpendicularity in a real situation, and represent a percentage in graphic form.
- Solve problems involving properties of angles in triangles and quadrilaterals incorporating areas of different shapes, or two operations with decimal numbers.
- Solve problems involving fractions.
- Make generalizations in order to continue a graphic sequence following a complex pattern.

Level III

- Compare fractions, use the concept of percentages when analyzing information and solving problems that require this type of calculation.
- Identify perpendicularity and parallelism on a plane, as well as bodies and their elements, without graphic support.
- Solve problems that require interpreting the constituent elements of a division or measurement equivalence.
- Recognize central angles and commonly used geometrical shapes, including the circle; make use of their properties to solve problems.
- Solve problems involving areas and perimeters of triangles and quadrilaterals.
- Make generalizations in order to continue a graphic sequence or find the numerical sequence rule that applies to a relatively complex pattern.

Level II

- Analyze and identify the structure of the positional decimal number system, and estimate weight (mass) expressing it in units consistent with the attribute being measured.
- Recognize commonly used geometrical figures and their properties in order to solve problems.
- Interpret, compare and work with information presented through various graphic representations.
- Identify the regularity of a sequence following a simple pattern.
- Solve addition problems in different numerical fields (natural numbers and decimals), including commonly used fractions or measurement equivalence.
- Solve multiplication or division problems, or two operations with natural numbers, or operations that include direct proportionality relations.

Level I

- Arrange natural numbers (up to five digits) and decimals (up to thousandths) in sequence.
- Recognize common geometrical figures and the measurement unit consistent with the attribute being measured.
- Interpret information in graphic representations in order to compare it and change it to a different form of representation.
- Solve problems involving a single addition using natural numbers.

Below Level I

- Students who do not achieve the skills required for Level I

Apendix I

Sixth grade: skills for each achievement level in reading test

Level IV

- Integrate, rank and generalize information distributed across the text.
- Establish equivalences between more than two codes (verbal, numeric and graphic).
- Restate implicit information associated with the entire text.
- Recognize the possible meanings of technical terms or figurative language.
- Distinguish various tenses and nuances (certainty, doubt) used in a text.

Level III

- Locate information, distinguishing it from adjacent information.
- Interpret reformulations and syntheses.
- Integrate data distributed across a paragraph.
- Restate information implicit in the paragraph.
- Re-read in search of specific data.
- Distinguish the meaning of words that have more than one meaning.
- Recognize the meaning of parts of words (affixes) using the text as a reference

Level II

- Locate information in the middle of a text to be distinguished from a different piece of information in a different segment.
- Integrate stated information and exemplified information.
- Distinguish words with a single meaning.

Level I

- Locate information with a single meaning, in a central or prominent part of the text (the end or the beginning), repeated literally or synonymously, and isolated from other information.

Below Level I

- Students who do not achieve the skills required for Level I

Apendix I

Sixth grade: skills for each achievement level in reading test

Level IV

- Integrate, rank and generalize information distributed across the text.
- Establish equivalences between more than two codes (verbal, numeric and graphic).
- Restate implicit information associated with the entire text.
- Recognize the possible meanings of technical terms or figurative language.
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- Distinguish words with a single meaning.

Level I

- Locate information with a single meaning, in a central or prominent part of the text (the end or the beginning), repeated literally or synonymously, and isolated from other information.

Below Level I

- Students who do not achieve the skills required for Level I

Apendix I

Sixth grade: skills for each achievement level in natural science test

Level IV

- Use and transfer scientific knowledge involving a high degree of formalization and abstraction to diverse types of situation.
- Identify the scientific knowledge involved in a problem at hand which is more formally stated and may relate to aspects, dimensions or analyses that are detached from the pupil's immediate setting.

Level III

- Explain everyday situations on the basis of scientific evidence, use simple descriptive models to interpret natural phenomena and draw conclusions from a description of experimental activities.

Level II

- Apply school-acquired scientific knowledge: compare, organize and interpret information presented in various formats (tables, figures, diagrams, images), recognize causal relationships and classify living beings in accordance with a criterion.
- Access information presented in various formats, interpretation and treatment of which require more complex skills.

Level I

- Relate scientific knowledge with everyday situations which are common in their surroundings.
- Explain the immediate world based on their own observations and experiences; establish a relation between these and their previously acquired scientific knowledge, and put them to simple, linear use.
- Describe simple, concrete events involving cognitive processes such as remembering and identifying.

Below Level I

- Students who do not achieve the skills required for Level I.

Source: UNESCO, 2015d.

Appendix II

TERCE Description of Performance Levels

Apendix II

Description of mathematics performance levels of third grade students

Level IV

- Solving more complex problems in the area of natural numbers.
- Solving problems that involve the comparison and conversion of measurements.
- Solving more complex problems that involve elements of geometric figures or flat representations of geometric shapes;

Level III

- Identifying rules or patterns in the formation of more complex sequences (graphical and numerical), determining missing elements or continuing with the sequences.
- Solving problems that involve elements of geometric figures or flat representations of geometric shapes;
- Solving problems that require the interpretation of simple fractions.
- Solving problems that require the application of natural number operations.
- Comparing and estimating measurements of objects and solving problems that involve measurements.
- Interpreting information from tables and graphs.

Level II

- Reading and writing natural numbers.
- Interpreting simple fractions.
- Identifying units of measurement or the most appropriate instruments to measure the attributes of a known object.
- Identifying relative positions of objects on maps.
- Identifying elements in geometric figures or flat representations of geometric shapes.
- Extracting information from tables and graphs..

Level I

- Ordering natural numbers and comparing quantities.
- Identifying basic geometric shapes.
- Identifying missing elements in simple sequences (graphical and numerical);
- Reading explicit data in tables and graphs.

Apendix II

Description of reading performance levels of third grade students

Level IV

- Interpreting figurative language and actions of characters within narratives.
- Reflecting on and casting judgments about the resources and characteristics of the content and structure of literary and non-literary texts.
- Recognize types of texts with unfamiliar structures.

Level III

- Locating and associating explicit information (causal relationships and in a time sequence), repeated literally or through synonyms, present in different parts of a text, differentiating it from competing information.
- Inferring information from connections suggested by the text, and founded in knowledge of the world.
- Inferring the meaning of unknown and unfamiliar words from clues given by the text.
- Identifying relationships that demonstrate understanding of the overall meaning of the text, such as differentiating the main topic from recognized explicit information and information in the text.
- Recognizing characteristics of the content and structure of literary and non-literary texts.

Level II

- Locating and associating explicit information (causal relationships), repeated literally or through synonyms, found in the body of a text, which must be differentiated from other information nearby.
- Infer information from connections suggested by the text (not necessarily evident).
- Identifying relationships that demonstrate understanding of the overall meaning of the text, such as distinguishing the main topic through recognized explicit information and information repeated in the text.
- Recognizing the communicative purpose of a non-literary text.

Level I

- Locating explicit information, repeated literally or through synonyms, found in a highlighted place in the text (beginning or end) and that is clearly distinguishable from other information.
- Drawing conclusions from connections between clear ideas.
- Inferring the meaning of known and familiar words from clues given by the text.
- Recognizing types of short texts of familiar structure.

Apendix II

Description of mathematics performance levels of sixth grade students

Level IV

- Solving more complex problems that involve operations of natural numbers, decimal numbers, and fractions, or proportional variations.
- Solving more complex problems that involve the calculation of perimeters and areas of polygons, or angles of polygons.
- Solving problems that require the conversion of units of measurement.
- Solving problems that require the interpretation of data presented in more complex tables or graphs.

Level III

- Solving problems of proportional variations that require the provided information.
- Converting units of measurement and solving problems that involve measurement.
- Solving problems that involve angles and identifying relations of perpendicularity and parallelism on a plane.
- Interpreting formation patterns of numerical sequences.
- Solving problems that involve the calculation of perimeters and areas of polygons.
- Solving problems that require reading and interpreting information in tables and graphs.

Level II

- Solving simple problems that involve natural numbers, decimal numbers, fractions, and proportional variations.
- Relating different spatial views.
- Determining missing terms or continuing graphic or numerical sequences.
- Identifying acute, right, and obtuse angles, and solving simple problems that involve angles.
- Determining measures of length or the mass of objects through graduated instruments.
- Calculating perimeters and areas of polygons.

Level I

- Estimating weight (mass) and length of objects.
- Identifying relative positions on maps.
- Identifying rules or patterns in the formation of simple number sequences and continuing them.
- Ordering natural numbers and decimals.
- Utilizing the structure of the decimal system and monetary systems.
- Solving simple problems that involve proportional variations.
- Reading explicit data in tables and graphs.

Apendix II

Description of reading performance levels of sixth grade students

Level IV

- Inferring the meaning of words used with different meanings depending on the context in which they are found.
- Reflecting on the purpose and resources of a text.
- Relating two texts, based on their communicative purposes.

Level III

- Locating explicit information, repeated predominantly through synonyms (paraphrased), that is found in different parts of the text, and that is necessary to differentiate from other relevant information competing with it.
- Relating explicit information (causal relationships and time sequence), repeated predominantly through synonyms (paraphrased) in different parts of the text, differentiating between relevant information competing with each other.
- Inferring information from connections suggested by the text, and founded in knowledge of the world.
- Interpreting literary figures and expressions in figurative language.
- Recognizing the function of different elements and resources of a text.
- Recognizing elements that establish links of co-reference in a text (substitution by synonyms, syntagmas or pronouns), near and/or far from one another, with elements that compete with them.
- Recognizing the purpose of connectors, verbs, and spelling signs in literary and non-literary texts.

Level II

- Locating and associating explicit information (causal relationships and in time sequences), repeated literally or through synonyms (paraphrased), found predominately in the body of a text, which must be differentiated from other competing information.
- Inferring information from connections suggested by the text, and founded in knowledge of the world.
- Inferring the meaning of known and familiar words from clues given by the text.
- Identifying relationships that demonstrate understanding of the overall meaning of the text, such as differentiating the main topic, main idea, and the main characteristics of characters from explicit and implicit information in the text.
- Recognizing functions of discontinuous texts present in various texts.
- Recognizing the speaker, audience, and communicative purpose in different texts.
- Relating two texts, according to their characteristics, and the information that both texts provide.
- Replace connectors according to their meaning in the text. that they provide.
- Replace connectors according to their meaning in the text.

Level I

- Locating and associating explicit information, repeated literally or through synonyms (paraphrased), found in different parts of a text (beginning, body, or end), and differentiated from other information.
- Establishing causal relationships between explicit information from the text.
- Interpreting expressions in figurative language.
- Recognizing types of text from their familiar structure; recognize the speaker of a text.
- Recognize elements that establish links of co-reference in the text (substitution by synonyms, syntagmas, or pronouns) which are close and are clearly distinguishable.

Apendix II

Description of science performance levels of sixth grade students

Level IV	Level III	Level II	Level I
• Analyzing research activities in order to identify the variables involved, inferring the question to which they wish to respond and choosing the pertinent information. • Distinguishing among various questions those that can be responded to scientifically. • Utilizing scientific terms in order to name phenomena that are not within their immediate environment. • Utilizing scientific knowledge in order to understand natural processes, the factors involved, and the impact of their variation.	• Interpreting varied information presented in graphs of different formats and/or with more than one data series, in order to make comparisons and recognize conclusions. • Recognizing conclusions from the description of research activities. • Applying their scientific knowledge in order to explain phenomena in the natural world in various situations. • Recognizing parts of structures of living systems and associating them with the role that they have in the greater system.	• Interpreting simple information presented in different formats (tables, graphs, diagrams); comparing and choosing information to make decisions and recognizing conclusions. • Classifying living beings and recognizing the criteria of classification from the observation or description of its characteristics. • Establishing relationships of cause and effect in familiar situations.	• Recognizing actions aimed at satisfying vital needs and taking care of one's health in everyday contexts.

Source: UNESCO, 2015d.

Appendix III

Independent variables and source

This appendix describes the main independent variables considered in the Hierarchical Linear Models, in order to identify the factors associated with gender gaps in reading, mathematics and science.

Three school level variables were also considered, namely, school location (rural or urban), school type (urban public or other) and the mean cultural and socio-economic status (computed as the mean of the student cultural and socio-economic status at the school).

The test score for each assessment and grade was calculated considering the five plausible values and using PISA Macros for the analysis and computations (of mean, standard errors and regressions).

Apendix III *Independent variables and source*

Variable	Source (Question in TERCE)	Computation
Retention	DQA3IT09 (3rd grade student survey) DQA6IT18 (6th grade student survey)	No Yes
Student sex	DQA3IT02 (3rd grade student survey) DQA6IT02 (6th grade student survey)	Male Female
Time dedicated to study	DQFIT27 (Parent survey)	Less than 30 minutes 30 minutes or more
Family educational expectations	DQFIT29 (Parent survey)	Less than higher education Higher education or more
Reading habits	DQA6IT24_01- DQA6IT24_04 (6th grade student survey)	Index (Confirmatory Factor Analysis)
Household cultural and socio-economic index	DQFIT09_02, DQFIT11_02, DQFIT12, DQFIT14, DQFIT15_03 - DQFIT15_07, DQFIT16_01 - DQFIT16_08, DQFIT21 (Parent survey)	Index (Confirmatory Factor Analysis)
Parental supervision (homework and studies)	DQFIT32_01 - DQFIT32_03 (Parent survey)	Index (Confirmatory Factor Analysis)
Mother´s education	DQFIT09_02 (Parent survey)	Less than higher education Higher education or more
Teacher practices	DQA6IT17_18, DQA6IT17_20, DQA6IT17_21, DQA6IT17_22 (6th grade student survey)	Index (Factor Analysis)
Female higher ability in Science	DQFIT37_01 (Parent survey)	No Yes
Student perception of school climate	DQA6IT19_02, DQA6IT19_03, DQA6IT19_04, DQA6IT19_06 (6th grade student survey)	Index (Factor Analysis)

In order to identify the variables for HLM models, we considered the literature review and searched for proxies. For instance, as a proxy for gender role models, we considered mother education and mother occupation. The latter was largely correlated with mother education, so we excluded it from the HLM models (in order to avoid collinearity). We also considered the sex of the teacher but the reduced sample of male teachers prevented its inclusion in most HLM models.

As a proxy for gender stereotypes, we considered a question asked to teachers and parents, regarding boys and girls differential ability in mathematics, science and reading. However, these variables were only associated with the gender gap in science score, and that is the reason why we only considered it in that model. As a complement to this question, TERCE asks for the reasons behind these gendered differences, being innate characteristics one of the possible answers. Due to the low amount of affirmative answers to this question, we could not consider it in the HLM models.

As a proxy for teacher practices, we created an index based on the following answers from the sixth grade student survey: "When teachers begin with a new topic, they ask what we already know"; "Teachers ask me whether I understood or not"; "If we do not understand something, teachers try different explanations"; "If I am wrong, teachers help me to identify my mistakes".

As a proxy for student´s perception on school climate, we created an index based on the following answers from the 6th grade student survey: "I feel threatened by some of my classmates"; "I am afraid the one of my classmates may hit me or hurt me"; "My classmates make fun of me"; "My classmates force me to do thigs I do not want to do".

As a proxy for reading habits, we considered the following answers from the 6th grade student survey: " I read to entertain myself"; I read to learn what is going on"; I read to know more about things I am interested in"; "I read to do homework or school work".

In order to identify the variables to include as associated factors with gender gaps in mathematics, reading and science, we followed several steps. First, we ran crosstabs with each of these variables and mean score differences by gender (See Appendix IV). Then, we ran simple regressions in order to identify whether these variables were associated with gender gap score in each assessment and course. Third, we ran regressions with interactions terms considering those variables that appeared more associated with the gender gap in each assessment. With all these information, we proceeded to run HLM models in order to account for the complex dataset (nested) and the complex dependent variable (plausible values). Based on the results from the regressions, we defined different models by assessment, maintaining the main control variables (school variables and student SES).

Apendix IV

Descriptive – science sixth grade

Appendix IV

	Argentina		Brazil		Chile		Colombia		Costa Rica		Dominican Republic		Ecuador		Guatemala		Honduras		Mexico		Nicaragua		Nuevo León		Panama		Paraguay		Peru		Uruguay	
Students variables	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**
SES (mean)	0.6	0.7	0.3	0.4	0.8	0.8	0.1	0.2	0.4	0.4	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4	-0.8	-0.8	0.1	0.1	-0.7	-0.7	0.5	0.6	-0.2	-0.1	-0.1	0.0	-0.4	-0.4	0.8	0.8
Reading habits (mean)	-0.4	-0.3	-0.2	-0.1	-0.8	-0.6	-0.2	-0.1	-0.4	-0.4	0.4	0.5	0.3	0.3	0.5	0.6	0.2	0.3	0.0	0.1	0.1	0.2	0.0	0.1	-0.1	0.0	0.2	0.3	0.1	0.2	-0.4	-0.2
Teacher practices (mean)	-0.1	0.0	-0.5	-0.3	-0.4	-0.3	-0.3	-0.2	-0.1	0.1	0.1	0.3	0.3	0.4	0.2	0.4	0.1	0.2	-0.3	-0.1	0.1	0.2	-0.2	0.0	-0.1	0.0	0.2	0.2	0.1	0.1	-0.1	0.1
Parental supervision of studies (mean)	0.2	0.2	-0.7	-0.7	-0.1	-0.1	-0.1	-0.2	0.3	0.4	-0.1	0.0	0.2	0.3	0.0	0.0	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	0.2	0.3	-0.3	-0.2	-0.2	-0.1	0.4	0.3
School climate (mean)	0.2	0.1	0.1	0.0	0.0	-0.1	0.2	-0.1	-0.1	-0.2	0.2	0.1	0.1	0.0	-0.1	-0.2	0.1	0.1	-0.1	-0.2	0.1	0.0	-0.1	-0.2	0.0	0.0	0.0	-0.1	0.2	0.1	0.0	-0.1
Retention																																
No (%)	79.9	85.5	61.0	74.1	80.7	87.5	60.3	73.5	75.6	80.9	61.5	77.5	81.5	84.2	64.9	73.3	70.5	77.3	86.8	89.1	69.2	73.0	90.5	93.3	80.4	86.8	76.5	82.0	76.6	81.4	78.1	82.3
Yes (%)	20.1	14.5	39.0	25.9	19.3	12.5	39.7	26.5	24.4	19.1	38.5	22.5	18.5	15.8	35.1	26.7	29.5	22.7	13.2	10.9	30.8	27.0	9.5	6.7	19.6	13.2	23.5	18.0	23.4	18.6	21.9	17.7
Time dedicated to study																																
Does not study or studies less than 30 minutes per day (%)	32.8	25.6	45.3	37.3	50.3	43.2	31.2	21.5	41.2	34.0	27.6	18.5	13.2	11.1	24.8	22.3	30.2	27.5	36.1	28.4	36.9	30.4	35.7	26.7	19.0	13.3	35.3	29.9	19.4	16.3	32.7	25.7
Studies more than 30 minutes per day (%)	67.2	74.4	54.7	62.7	49.7	56.8	68.8	78.5	58.8	66.0	72.4	81.5	86.8	88.9	75.2	77.7	69.8	72.5	63.9	71.6	63.1	69.6	64.3	73.3	81.0	86.7	64.7	70.1	80.6	83.7	67.3	74.3
Parental expectations																																
Will complete Tertiary Education or more (%)	44.1	49.6	53.7	63.5	54.5	59.1	61.9	73.1	51.2	57.5	74.0	80.3	51.9	57.8	38.1	44.1	32.5	43.0	42.1	47.3	53.8	56.8	43.9	51.7	51.8	62.5	51.7	60.2	59.2	64.1	33.9	40.0
Will not complete Tertiary Education (%)	55.9	50.4	46.3	36.5	45.5	40.9	38.1	26.9	48.8	42.5	26.0	19.7	48.1	42.2	61.9	55.9	67.5	57.0	57.9	52.7	46.2	43.2	56.1	48.3	48.2	37.5	48.3	39.8	40.8	35.9	66.1	60.0

	Argentina	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	Guatemala	Honduras	Mexico	Nicaragua	Nuevo León	Panama	Paraguay	Peru	Uruguay
Parents Variables																
Mother education																
Primary education or less (%)	42.0	52.0	26.2	35.0	55.0	41.1	56.7	71.8	72.9	68.9	52.0	58.7	42.1	48.1	37.5	37.7
Secondary education (%)	49.6	39.0	59.3	55.6	37.1	36.9	30.9	24.5	20.0	20.6	34.8	27.8	41.6	38.3	53.0	53.8
Tertiary education (%)	8.4	9.1	14.5	9.4	7.9	21.9	12.5	3.7	7.1	10.5	13.2	13.5	16.3	13.6	9.5	8.6
Mother occupation																
Mother has a seasonal /occasional job (%)	29.9	34.1	29.8	47.9	32.3	40.5	52.1	49.1	50.8	41.7	47.7	29.2	38.9	45.1	60.9	23.4
Mother has a stable paid job (%)	52.9	53.4	49.2	40.8	43.3	45.3	34.0	40.0	34.1	41.3	42.8	49.1	44.9	47.0	28.0	66.6
Mother studies/ does not work/ works without payment (%)	17.3	12.5	20.9	11.3	24.3	14.3	13.9	10.9	15.1	16.9	9.4	21.7	16.2	8.0	11.1	10.0
Parental gender stereotypes																
Boys and girls have similar ability (%)	88.1	80.7	92.2	90.2	94.9	81.4	93.3	92.7	89.2	94.2	90.1	93.4	88.1	87.0	92.3	92.0
Boys have more ability (%)	4.4	5.5	3.7	4.2	2.0	5.7	1.7	3.2	3.4	1.8	3.1	2.7	4.7	3.8	3.9	3.4
Girls have more ability (%)	7.5	13.7	4.1	5.6	3.1	13.0	4.9	4.1	7.4	4.0	6.8	3.9	7.2	9.1	3.8	4.6
Teacher Variables																
Teacher gender stereotypes																
Boys and girls have similar ability (%)	94.0	88.8	90.6	93.1	94.2	90.5	94.8	95.4	96.7	97.1	94.5	90.1	91.2	91.1	90.9	96.7
Boys have more ability (%)	2.1	1.3	7.8	0.5	2.7	0.5	1.2	1.4		1.7	1.3	2.5	2.5	3.2	8.9	2.0
Girls have more ability (%)	4.0	9.8	1.6	6.4	3.2	9.0	4.0	3.3	3.3	1.2	4.2	7.4	6.3	5.6	0.1	1.3
Teacher´s sex																
Female (%)	83.6	85.5	72.2	62.5	85.7	82.7	67.3	66.7	62.3	52.1	73.8	56.1	59.2	73.9	68.4	88.2
Male (%)	16.4	14.5	27.8	37.5	14.3	17.3	32.7	33.3	37.7	47.9	26.2	43.9	40.8	26.1	31.6	11.8

Apendix IV

Descriptive – reading sixth grade

	Argentina		Brazil		Chile		Colombia		Costa Rica		Dominican Republic		Ecuador		Guatemala		Honduras		Mexico		Nicaragua		Nuevo León		Panama		Paraguay		Peru		Uruguay	
Students variables	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**
SES (mean)	0.6	0.7	0.3	0.4	0.8	0.8	0.1	0.1	0.5	0.4	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4	-0.8	-0.7	0.1	0.1	-0.7	-0.7	0.5	0.6	-0.2	-0.1	-0.1	-0.1	-0.4	-0.3	0.8	0.8
Reading habits (mean)	-0.4	-0.3	-0.2	-0.1	-0.8	-0.6	-0.2	-0.1	-0.4	-0.4	0.4	0.5	0.3	0.3	0.5	0.6	0.2	0.3	0.0	0.1	0.1	0.2	0.0	0.1	-0.1	0.0	0.2	0.3	0.1	0.2	-0.4	-0.2
Teacher practices (mean)	-0.1	0.0	-0.5	-0.3	-0.4	-0.3	-0.3	-0.2	-0.1	0.1	0.1	0.3	0.3	0.4	0.2	0.4	0.1	0.2	-0.3	-0.1	0.1	0.2	-0.2	0.0	-0.1	0.0	0.2	0.2	0.1	0.1	-0.1	0.1
Parental supervision of studies (mean)	0.2	0.2	-0.7	-0.7	-0.1	-0.1	-0.1	-0.2	0.3	0.4	-0.1	0.0	0.2	0.3	0.0	0.0	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	0.2	0.3	-0.3	-0.2	-0.2	-0.1	0.4	0.3
Bullying (mean)	0.2	0.2	0.1	0.0	0.0	-0.1	0.2	-0.1	-0.1	-0.2	0.2	0.1	0.1	0.0	-0.1	-0.2	0.1	0.0	-0.1	-0.2	0.1	0.0	-0.1	-0.2	0.0	0.0	0.0	-0.1	0.2	0.1	0.0	0.0
Retention																																
No (%)	79.6	83.9	60.6	72.8	80.4	87.7	60.9	72.9	75.3	80.6	61.5	77.5	81.3	84.2	64.3	73.3	71.2	78.6	86.8	89.1	69.0	73.3	90.3	93.0	81.2	86.2	75.7	82.0	76.8	81.4	77.2	81.5
Yes (%)	20.4	16.1	39.4	27.2	19.6	12.3	39.1	27.1	24.7	19.4	38.5	22.5	18.7	15.8	35.7	26.7	28.8	21.4	13.2	10.9	31.0	26.7	9.7	7.0	18.8	13.8	24.3	18.0	23.2	18.6	22.8	18.5
Time dedicated to study																																
Does not study or studies less than 30 minutes per day (%)	32.0	26.5	45.8	37.0	50.4	43.2	30.3	21.6	41.1	33.7	27.6	18.5	13.2	10.9	24.4	22.1	30.2	26.5	36.5	28.7	37.2	29.7	35.6	26.9	19.1	13.1	35.9	29.4	19.3	16.2	32.3	25.4
Studies more than 30 minutes per day (%)	68.0	73.5	54.2	63.0	49.6	56.8	69.7	78.4	58.9	66.3	72.4	81.5	86.8	89.1	75.6	77.9	69.8	73.5	63.5	71.3	62.8	70.3	64.4	73.1	80.9	86.9	64.1	70.6	80.7	83.8	67.7	74.6
Parental expectations																																
Will complete Tertiary Education or more (%)	44.5	50.2	53.2	62.8	54.4	59.0	61.7	73.0	51.5	57.1	73.8	80.1	51.5	57.8	37.7	44.0	32.2	42.3	42.2	47.0	54.0	57.8	43.7	51.5	52.6	62.5	51.6	59.7	59.3	64.2	33.6	40.8
Will not complete Tertiary Education (%)	55.5	49.8	46.8	37.2	45.6	41.0	38.3	27.0	48.5	42.9	26.2	19.9	48.5	42.2	62.3	56.0	67.8	57.7	57.8	53.0	46.0	42.2	56.3	48.5	47.4	37.5	48.4	40.3	40.7	35.8	66.4	59.2

	Argentina	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	Guatemala	Honduras	Mexico	Nicaragua	Nuevo León	Panama	Paraguay	Peru	Uruguay
Parents Variables																
Mother education																
Primary education or less (%)	42.0	52.2	26.4	35.1	54.9	41.2	56.7	72.0	72.5	69.2	52.0	58.7	42.3	48.3	37.5	38.2
Secondary education (%)	49.4	38.6	59.3	55.6	37.2	37.1	30.8	24.4	20.4	20.4	34.9	27.8	41.8	38.4	53.1	53.0
Tertiary education (%)	8.6	9.2	14.3	9.3	7.8	21.7	12.5	3.7	7.1	10.4	13.2	13.5	15.9	13.3	9.4	8.8
Mother occupation																
Mother has a seasonal /occasional job (%)	30.1	34.0	30.1	48.2	32.3	40.4	52.1	49.2	50.8	41.9	47.7	29.1	38.7	45.4	60.9	24.1
Mother has a stable paid job (%)	52.8	53.4	49.1	41.0	43.5	45.4	34.0	40.0	34.4	41.2	42.8	49.3	44.8	46.6	28.1	65.8
Mother studies/ does not work/ works without payment (%)	17.1	12.6	20.8	10.8	24.2	14.2	13.9	10.8	14.9	16.9	9.4	21.6	16.5	8.0	11.0	10.1
Parental gender stereotypes																
Boys and girls have similar ability (%)	76.3	71.1	81.6	87.4	90.7	77.5	90.5	89.7	89.2	92.8	88.1	90.4	87.4	83.0	89.3	82.9
Boys have more ability (%)	4.2	3.8	2.5	2.3	1.4	5.0	2.4	3.5	3.4	1.3	3.1	1.7	2.6	3.9	3.5	1.4
Girls have more ability (%)	19.5	25.1	16.0	10.3	7.9	17.5	7.1	6.8	7.4	5.9	8.8	7.9	10.0	13.2	7.2	15.6
Teacher Variables																
Teacher gender stereotypes																
Boys and girls have similar ability (%)	81.5	78.2	73.4	85.0	80.4	79.0	81.3	85.6	78.5	90.2	83.6	80.0	80.1	86.8	83.9	77.6
Boys have more ability (%)	1.0	1.5	2.7	2.4	2.7	2.6	2.9	1.1		0.4		0.4	1.3	4.6	0.2	0.7
Girls have more ability (%)	17.5	20.3	23.9	12.6	16.9	18.4	15.8	13.3	21.5	9.4	16.4	19.6	18.7	8.6	16.0	21.7
Teacher´s sex																
Female (%)	93.1	92.6	78.0	75.3	86.2	86.8	60.6	66.6	65.6	52.0	75.9	56.5	59.1	75.0	66.2	88.2
Male (%)	6.9	7.4	22.0	24.7	13.8	13.2	39.4	33.4	34.4	48.0	24.1	43.5	40.9	25.0	33.8	11.8

Apendix IV

Descriptive – mathematics sixth grade

	Argentina		Brazil		Chile		Colombia		Costa Rica		Dominican Republic		Ecuador		Guatemala		Honduras		Mexico		Nicaragua		Nuevo León		Panama		Paraguay		Peru		Uruguay	
Students variables	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**
SES (mean)	0.6	0.7	0.3	0.4	0.8	0.8	0.1	0.2	0.4	0.4	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4	-0.8	-0.8	0.1	0.1	-0.7	-0.7	0.5	0.6	-0.2	-0.1	-0.1	0.0	-0.4	-0.3	0.8	0.8
Reading habits (mean)	-0.5	-0.3	-0.2	-0.1	-0.8	-0.6	-0.2	-0.1	-0.4	-0.4	0.4	0.5	0.3	0.3	0.5	0.6	0.2	0.3	0.0	0.1	0.1	0.2	0.0	0.1	-0.1	0.0	0.2	0.3	0.1	0.2	-0.4	-0.2
Teacher practices (mean)	-0.1	0.0	-0.5	-0.3	-0.4	-0.3	-0.3	-0.2	-0.1	0.1	0.1	0.3	0.3	0.4	0.2	0.4	0.1	0.2	-0.3	-0.1	0.1	0.2	-0.1	0.0	-0.1	0.0	0.2	0.2	0.1	0.1	-0.1	0.1
Parental supervision of studies (mean)	0.2	0.2	-0.7	-0.7	-0.1	-0.1	-0.1	-0.2	0.3	0.4	-0.1	0.0	0.2	0.3	0.0	0.0	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	0.2	0.3	-0.3	-0.2	-0.2	-0.1	0.4	0.3
Retention																																
No (%)	80.1	85.3	60.6	74.1	80.6	87.6	60.7	73.6	75.5	80.9	61.6	77.5	81.6	84.2	64.9	73.3	70.6	78.0	86.7	89.1	69.5	72.7	90.5	93.3	80.7	86.5	76.7	82.1	76.7	81.5	77.9	82.3
Yes (%)	19.9	14.7	39.4	25.9	19.4	12.4	39.3	26.4	24.5	19.1	38.4	22.5	18.4	15.8	35.1	26.7	29.4	22.0	13.3	10.9	30.5	27.3	9.5	6.7	19.3	13.5	23.3	17.9	23.3	18.5	22.1	17.7
Time dedicated to study																																
Does not study or studies less than 30 minutes per day (%)	32.6	26.4	45.3	37.3	50.2	43.3	31.4	21.4	41.2	34.0	27.4	18.5	13.2	11.0	24.7	22.1	30.1	27.3	35.9	28.5	37.7	30.1	35.7	26.6	18.8	13.6	35.4	29.7	19.4	16.1	32.5	25.6
Studies more than 30 minutes per day (%)	67.4	73.6	54.7	62.7	49.8	56.7	68.6	78.6	58.8	66.0	72.6	81.5	86.8	89.0	75.3	77.9	69.9	72.7	64.1	71.5	62.3	69.9	64.3	73.4	81.2	86.4	64.6	70.3	80.6	83.9	67.5	74.4
Parental expectations																																
Will complete Tertiary Education or more (%)	44.3	49.0	53.6	63.5	54.6	59.0	62.2	73.3	51.2	57.5	73.9	80.3	51.9	57.8	38.0	44.1	32.5	43.1	42.2	47.4	54.0	56.8	44.0	51.6	52.2	62.1	51.9	60.3	59.3	64.2	33.8	40.1
Will not complete Tertiary Education (%)	55.7	51.0	46.4	36.5	45.4	41.0	37.8	26.7	48.8	42.5	26.1	19.7	48.1	42.2	62.0	55.9	67.5	56.9	57.8	52.6	46.0	43.2	56.0	48.4	47.8	37.9	48.1	39.7	40.7	35.8	66.2	59.9

	Argentina	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	Guatemala	Honduras	Mexico	Nicaragua	Nuevo León	Panama	Paraguay	Peru	Uruguay
Parents Variables																
Mother education																
Primary education or less (%)	42.3	51.9	26.2	35.0	55.2	41.1	56.6	71.7	72.8	68.9	52.2	58.6	42.0	48.1	37.4	37.6
Secondary education (%)	49.3	39.0	59.3	55.5	37.0	37.0	30.9	24.6	20.2	20.6	34.7	27.8	41.6	38.4	53.2	53.8
Tertiary education (%)	8.4	9.1	14.5	9.5	7.8	21.9	12.5	3.7	7.1	10.5	13.1	13.5	16.4	13.5	9.5	8.6
Mother occupation																
Mother has a seasonal /occasional job (%)	30.1	34.1	29.9	48.0	32.5	40.5	52.1	49.0	50.9	41.8	48.1	29.2	38.8	45.2	60.8	23.5
Mother has a stable paid job (%)	52.7	53.4	49.3	40.8	43.1	45.2	34.0	40.2	34.1	41.2	42.3	49.1	45.0	46.9	28.0	66.5
Mother studies/ does not work/ works without payment (%)	17.2	12.5	20.8	11.2	24.4	14.3	13.9	10.9	15.1	17.0	9.5	21.7	16.2	7.9	11.1	10.1
Parental gender stereotypes																
Boys and girls have similar ability (%)	81.7	70.5	83.1	87.3	91.5	75.0	90.3	90.2	87.4	91.3	87.4	89.6	85.2	82.0	88.3	88.9
Boys have more ability (%)	10.8	18.8	12.5	8.5	4.5	14.6	5.2	5.5	4.4	3.9	6.2	4.7	5.6	7.0	7.7	6.5
Girls have more ability (%)	7.5	10.6	4.4	4.2	4.0	10.4	4.5	4.3	8.2	4.8	6.4	5.7	9.2	11.0	4.0	4.6
Teacher Variables																
Teacher gender stereotypes																
Boys and girls have similar ability (%)	87.5	85.8	81.4	86.3	85.6	74.8	87.4	84.1	92.9	90.6	78.0	74.9	78.4	81.4	81.8	85.8
Boys have more ability (%)	10.1	10.6	13.6	12.4	11.8	16.9	9.8	10.3		6.8	14.1	20.8	12.9	10.9	15.7	9.8
Girls have more ability (%)	2.5	3.6	5.0	1.2	2.6	8.3	2.9	5.5	7.1	2.6	7.9	4.3	8.7	7.7	2.4	4.4
Teacher´s sex																
Female (%)	85.3	64.0	65.0	56.9	85.3	71.8	63.0	65.0	63.9	52.1	74.5	56.5	55.3	74.6	62.6	88.2
Male (%)	14.7	36.0	35.0	43.1	14.7	28.2	37.0	35.0	36.1	47.9	25.5	43.5	44.7	25.4	37.4	11.8

Apendix IV

Descriptive - reading third grade

	Argentina		Brazil		Chile		Colombia		Costa Rica		Dominican Republic		Ecuador		Guatemala		Honduras		Mexico		Nicaragua		Nuevo León		Panama		Paraguay		Peru		Uruguay	
Students variables	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**	**Boy**	**Girl**
SES (mean)	0.6	0.7	0.3	0.4	0.8	0.8	0.1	0.1	0.5	0.4	-0.2	-0.2	-0.2	-0.2	-0.4	-0.4	-0.8	-0.7	0.1	0.1	-0.7	-0.7	0.5	0.6	-0.2	-0.1	-0.1	-0.1	-0.4	-0.3	0.8	0.8
Parental supervision of studies (mean)	0.2	0.2	-0.7	-0.7	-0.1	-0.1	-0.1	-0.2	0.3	0.4	-0.1	0.0	0.2	0.3	0.0	0.0	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.2	-0.2	0.2	0.3	-0.3	-0.2	-0.2	-0.1	0.4	0.3
Retention																																
No (%)	79.6	83.9	60.6	72.8	80.4	87.7	60.9	72.9	75.3	80.6	61.5	77.5	81.3	84.2	64.3	73.3	71.2	78.6	86.8	89.1	69.0	73.3	90.3	93.0	81.2	86.2	75.7	82.0	76.8	81.4	77.2	81.5
Yes (%)	20.4	16.1	39.4	27.2	19.6	12.3	39.1	27.1	24.7	19.4	38.5	22.5	18.7	15.8	35.7	26.7	28.8	21.4	13.2	10.9	31.0	26.7	9.7	7.0	18.8	13.8	24.3	18.0	23.2	18.6	22.8	18.5
Time dedicated to study																																
Does not study or studies less than 30 minutes per day (%)	25.7	25.3	41.7	34.4	44.1	42.9	28.0	20.0	38.9	35.7	35.0	27.6	12.9	12.2	30.5	23.8	36.5	30.8	38.9	32.7	42.1	35.0	33.3	29.4	17.6	17.4	41.1	31.4	22.1	19.8	40.6	28.7
Studies more than 30 minutes per day (%)	74.3	74.7	58.3	65.6	55.9	57.1	72.0	80.0	61.1	64.3	65.0	72.4	87.1	87.8	69.5	76.2	63.5	69.2	61.1	67.3	57.9	65.0	66.7	70.6	82.4	82.6	58.9	68.6	77.9	80.2	59.4	71.3
Parental expectations																																
Will complete Tertiary Education or more (%)	44.5	50.2	53.2	62.8	54.4	59.0	61.7	73.0	51.5	57.1	73.8	80.1	51.5	57.8	37.7	44.0	32.2	42.3	42.2	47.0	54.0	57.8	43.7	51.5	52.6	62.5	51.6	59.7	59.3	64.2	33.6	40.8
Will not complete Tertiary Education (%)	55.5	49.8	46.8	37.2	45.6	41.0	38.3	27.0	48.5	42.9	26.2	19.9	48.5	42.2	62.3	56.0	67.8	57.7	57.8	53.0	46.0	42.2	56.3	48.5	47.4	37.5	48.4	40.3	40.7	35.8	66.4	59.2

	Argentina	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	Guatemala	Honduras	Mexico	Nicaragua	Nuevo León	Panama	Paraguay	Peru	Uruguay
Parents Variables																
Mother education																
Primary education or less (%)	42.0	52.2	26.4	35.1	54.9	41.2	56.7	72.0	72.5	69.2	52.0	58.7	42.3	48.3	37.5	38.2
Secondary education (%)	49.4	38.6	59.3	55.6	37.2	37.1	30.8	24.4	20.4	20.4	34.9	27.8	41.8	38.4	53.1	53.0
Tertiary education (%)	8.6	9.2	14.3	9.3	7.8	21.7	12.5	3.7	7.1	10.4	13.2	13.5	15.9	13.3	9.4	8.8
Mother occupation																
Mother has a seasonal /occasional job (%)	30.1	34.0	30.1	48.2	32.3	40.4	52.1	49.2	50.8	41.9	47.7	29.1	38.7	45.4	60.9	24.1
Mother has a stable paid job (%)	52.8	53.4	49.1	41.0	43.5	45.4	34.0	40.0	34.4	41.2	42.8	49.3	44.8	46.6	28.1	65.8
Mother studies/ does not work/ works without payment (%)	17.1	12.6	20.8	10.8	24.2	14.2	13.9	10.8	14.9	16.9	9.4	21.6	16.5	8.0	11.0	10.1
Parental gender stereotypes																
Boys and girls have similar ability (%)	76.3	71.1	81.6	87.4	90.7	77.5	90.5	89.7	89.2	92.8	88.1	90.4	87.4	83.0	89.3	82.9
Boys have more ability (%)	4.2	3.8	2.5	2.3	1.4	5.0	2.4	3.5	3.4	1.3	3.1	1.7	2.6	3.9	3.5	1.4
Girls have more ability (%)	19.5	25.1	16.0	10.3	7.9	17.5	7.1	6.8	7.4	5.9	8.8	7.9	10.0	13.2	7.2	15.6
Teacher Variables																
Teacher gender stereotypes																
Boys and girls have similar ability (%)	81.5	78.2	73.4	85.0	80.4	79.0	81.3	85.6	78.5	90.2	83.6	77.6	80.0	80.1	86.8	83.9
Boys have more ability (%)	1.0	1.5	2.7	2.4	2.7	2.6	2.9	1.1		0.4		0.7	0.4	1.3	4.6	0.2
Girls have more ability (%)	17.5	20.3	23.9	12.6	16.9	18.4	15.8	13.3	21.5	9.4	16.4	21.7	19.6	18.7	8.6	16.0
Teacher´s sex																
Female (%)	93.1	92.6	78.0	75.3	86.2	86.8	60.6	66.6	65.6	52.0	75.9	56.5	59.1	75.0	66.2	88.2
Male (%)	6.9	7.4	22.0	24.7	13.8	13.2	39.4	33.4	34.4	48.0	24.1	43.5	40.9	25.0	33.8	11.8

Apendix IV

Descriptive - mathematics third grade

	Argentina		Brazil		Chile		Colombia		Costa Rica		Dominican Republic		Ecuador		Guatemala		Honduras		Mexico		Nicaragua		Nuevo León		Panama		Paraguay		Peru		Uruguay	
Students variables	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl
SES (mean)	0.6	0.6	0.3	0.4	0.9	0.9	0.1	0.2	0.5	0.5	-0.3	-0.3	-0.1	-0.2	-0.6	-0.6	-0.8	-0.8	0.1	0.1	-0.8	-0.9	0.5	0.5	-0.2	-0.2	-0.1	-0.1	-0.4	-0.4	0.8	0.9
Parental supervision of studies (mean)	0.3	0.4	-0.4	-0.3	-0.1	-0.1	-0.1	0.0	0.5	0.5	-0.3	-0.3	0.3	0.2	-0.1	-0.1	-0.2	-0.2	-0.3	-0.2	-0.1	-0.2	0.0	0.0	0.3	0.3	-0.4	-0.2	-0.2	-0.2	0.4	0.4
Retention																																
No (%)	75.8	81.0	71.4	81.0	82.3	89.3	66.2	81.1	78.0	82.6	56.5	64.9	79.1	83.8	68.2	72.0	69.8	74.5	82.3	85.3	67.6	71.8	83.4	88.3	79.6	83.7	70.4	74.9	81.9	83.8	73.9	85.8
Yes (%)	24.2	19.0	28.6	19.0	17.7	10.7	33.8	18.9	22.0	17.4	43.5	35.1	20.9	16.2	31.8	28.0	30.2	25.5	17.7	14.7	32.4	28.2	16.6	11.7	20.4	16.3	29.6	25.1	18.1	16.2	26.1	14.2
Time dedicated to study																																
Does not study or studies less than 30 minutes per day (%)	26.0	26.2	42.6	34.8	44.4	42.8	28.5	20.0	38.6	35.7	36.3	28.0	12.9	12.2	30.7	23.9	36.8	31.0	38.7	32.8	42.2	34.9	33.0	29.1	18.9	16.9	41.0	31.5	22.0	19.8	40.1	30.0
Studies more than 30 minutes per day (%)	74.0	73.8	57.4	65.2	55.6	57.2	71.5	80.0	61.4	64.3	63.7	72.0	87.1	87.8	69.3	76.1	63.2	69.0	61.3	67.2	57.8	65.1	67.0	70.9	81.1	83.1	59.0	68.5	78.0	80.2	59.9	70.0
Parental expectations																																
Will complete Tertiary Education or more (%)	45.7	47.3	55.4	65.2	59.8	65.4	63.6	67.9	53.5	60.8	73.6	76.3	56.1	55.4	33.7	35.5	35.9	45.7	43.6	44.6	51.3	53.7	45.2	53.0	53.3	58.6	51.4	56.7	60.5	59.0	32.4	43.4
Will not complete Tertiary Education (%)	54.3	52.7	44.6	34.8	40.2	34.6	36.4	32.1	46.5	39.2	26.4	23.7	43.9	44.6	66.3	64.5	64.1	54.3	56.4	55.4	48.7	46.3	54.8	47.0	46.7	41.4	48.6	43.3	39.5	41.0	67.6	56.6

	Argentina	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	Guatemala	Honduras	Mexico	Nicaragua	Nuevo León	Panama	Paraguay	Peru	Uruguay
Parents Variables																
Mother education																
Primary education or less (%)	40.3	47.5	24.7	36.4	52.8	45.5	54.5	71.7	72.8	66.2	52.1	55.5	44.2	49.7	37.9	33.6
Secondary education (%)	49.3	41.2	61.2	51.6	38.9	33.8	33.6	25.1	19.5	22.2	35.7	28.5	40.6	37.3	54.8	56.8
Tertiary education (%)	10.4	11.3	14.2	12.0	8.3	20.6	11.8	3.2	7.7	11.7	12.3	16.0	15.2	13.0	7.3	9.5
Mother occupation																
Mother has a seasonal /occasional job (%)	32.6	33.8	28.6	48.1	32.8	42.9	50.3	50.8	52.1	40.3	49.6	28.9	39.4	47.3	64.6	23.0
Mother has a stable paid job (%)	47.4	52.5	49.9	39.6	40.5	41.9	32.8	36.7	31.5	40.7	38.6	46.7	41.9	42.9	22.7	66.2
Mother studies/ does not work/ works without payment (%)	20.0	13.8	21.5	12.2	26.8	15.2	16.9	12.5	16.4	19.0	11.8	24.4	18.7	9.8	12.7	10.8
Parental gender stereotypes																
Boys and girls have similar ability (%)	82.0	70.2	85.0	88.6	91.1	74.3	91.7	89.1	88.7	91.2	86.4	89.5	87.5	85.0	88.8	88.2
Boys have more ability (%)	10.2	19.3	11.5	8.1	5.2	13.8	4.5	5.6	5.0	3.1	6.9	4.8	5.8	6.5	6.2	7.8
Girls have more ability (%)	7.8	10.6	3.5	3.3	3.8	11.9	3.8	5.3	6.3	5.6	6.7	5.6	6.7	8.5	5.1	4.0
Teacher Variables																
Teacher gender stereotypes																
Boys and girls have similar ability (%)	87.2	66.0	72.9	84.2	82.8	78.2	91.7	85.2	97.0	91.3	81.9	87.2	83.5	88.2	86.3	96.2
Boys have more ability (%)	10.9	29.3	23.4	15.8	11.8	17.2	5.5	9.8	-	6.2	11.0	10.5	8.9	7.1	12.1	3.8
Girls have more ability (%)	1.9	4.7	3.8	-	5.4	4.5	2.8	5.0	3.0	2.4	7.1	2.3	7.7	4.7	1.6	-
Teacher´s sex																
Female (%)	97.0	91.2	89.6	83.4	88.1	86.9	73.2	77.7	70.4	67.4	82.7	70.8	78.4	77.8	71.4	96.4
Male (%)	3.0	8.8	10.4	16.6	11.9	13.1	26.8	22.3	29.6	32.6	17.3	29.2	21.6	22.2	28.6	3.6

United Nations
Educational, Scientific and
Cultural Organization

Third Regional
Comparative
and Explanatory Study

Existing research identifies several significant, subject-based gender inequalities in education. Male learners have significant advantages in math and female learners have no less significant advantages in reading and writing. Low literacy skills among boys may increase the likelihood of grade repetition (retention) and early dropout and, as a result, lower male participation in higher education and reduced career opportunities. Similarly low achievement in math and science among girls may reduce their interest in science, technology, engineering and math (STEM) careers (considered to offer greater opportunities for higher incomes).

In order to shed light on this phenomenon in Latin America, this report analyzes the gender gaps in educational achievement in the Third Regional Comparative and Explanatory Study (TERCE) led by the Latin American Laboratory for Assessment of the Quality of Education (LLECE) at OREALC/UNESCO Santiago.