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Sufficiency, equity and effectiveness of school infrastructure in Latin America according to TERCE

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UNESCO Santiago prioriza la perspectiva de género; sin embargo, para facilitar la lectura se utilizará un lenguaje neutro o se hará referencia a lo masculino o femenino según corresponda a la literatura presentada.

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Introduction

Just like physical space determines human experience, school infrastructure is an essential component of the complex environment where school learning happens (Lefebvre, 1991 and OECD, 2013). It is in the school's physical environment where the interactions and dynamics between students, teachers, pedagogical contents and technology take place, generating what it is finally understood as "education" (OECD, 2013).

Traditionally, the analysis of the possible effects of school infrastructure on indicators of school success (with respect to learning, education or welfare) constituted merely one factor within a wider scope that focused on the factors associated with learning achievement. In subsequent studies, mainly in the United States and other developed countries, researchers started to look more closely at the associations between different variables of the physical characteristics of schools and the scores on standardized tests (Berner, 1993; Cash, 1993; Earthman et al., 1996; Hines, 1996; Andersen, 1999; Ayres, 1999; O'Neill, 2000 y Earthman, 1998).

Recently, the debate in the academic world has been reconceptualized. The validity of the traditional concepts of "school infrastructure" or "school" has been challenged in favor of broader views, such as "learning environments", "physical learning spaces" or "learning spaces." This new conceptualization now includes "spaces" located outside of schools, but considered key to the learning process, such as libraries, museums, parks or even the architectural and urban context that surround educational buildings. It also allowed for an acknowledgement of the increased use of "virtual environments" and the new information technologies in education. This new paradigm has also taken into account the relations between the different actors who interact in the educational process: who learns, who teaches, what is being taught and what are the resources being used to generate learning (OECD, 2013). These new approaches seek to emphasize "learning" over "schooling". They focus more on the environments where learning (whatever it may be) happens, rather than on the school as the traditional place where education takes place (OECD, 2010).

Similarly, contemporary studies about school infrastructure and quality education are increasingly focusing on trying to understand how physical learning spaces create the necessary conditions and mediations that foster both academic results and the well-being of the students. They place more emphasis on the quality of the spaces rather than their mere existence, and they highlight architec-

tural design, organization and planning, flexibility, quality of air or lighting, temperature, circulation and links with outdoor spaces or other cultural, social or communal spaces used by students (see Blackmore et al, 2011, for a bibliographic review in developed countries).

This area of study is still in progress, so the results are not conclusive yet, especially since, in order to grasp the (causal) effects of learning spaces within the complex environment where school learning happens, it is necessary to develop adequate analytical tools, from both quantitative and qualitative research (OECD, 2014). Nevertheless, in developed countries there are many studies that have found effects of the physical factors of schools over different dimensions that influence learning. For example, in the United States, several studies found that the quality of the air, light, acoustics and temperature have a significant impact on the health and welfare of both the students and the teachers (Taner, 2009; Higging et al, 2005; Duran-Nakury, 2005; Earthman and Lemasters, 2009). In the United Kingdom, Barrett et al (2013) examined design characteristics and environmental types of classrooms and found significant improvement in student learning. Strong links were also found between the physical school spaces and the perceptions of quality of the educational process among students, parents and teachers in the United Kingdom (PricewaterhouseCoopers, 2003 and Temple, 2007), New Zealand (ACNeilsen, 2004) and the United States.

Schools with quality architectural designs seem to be associated with positive mediating effects between teaching practices and student behavior, but the empirical evidence is still insufficient to establish a clear connection with learning (Blackmore, 2011; Cleveland, 2009 and Woodman, 2011). It has also been shown that new or renovated school buildings can change the perception of communities about the role of local governments (Blackmore et al, 2011), improve the academic results of students (Bullock, 2007) or improve the team work of teachers (McGregor, 2003 and Morton, 2005).

In Latin America and the Caribbean, there are only a few studies that shed light on the relationship between physical school spaces and the academic achievement of the students. A recent meta-analysis by Cuesta, Glewwe, and Krause (2014) found only 16 studies on the topic between 1990 and 2012, and the results were mixed and inconclusive. Only one study found causal evidence that classroom furniture was important for learning. Several studies found evidence that school libraries have positive effects on the results of student assessments. Finally, another set of studies also found positive links between school infrastructure indexes and student's test scores, but the authors point out that the results are weak because there is no clear information as to which components of the indexes are the most important. Generally, the authors emphasize that more research on the topic is required in the region, through the use of more sophisticated analytical methods[1].

1 *See also, Glewwe (Ed.) (2016), especially chapter 1.*

In line with the more traditional literature on access to education, Paxson and Schady (2002) focused on the effect of investment in construction and remodeling projects of schools in poor districts of Peru and found positive impacts on school attendance rates. On the other hand, Trevino et al (2010), using the database of the 2006 Second Regional Comparative and Explanatory Study (SERCE), found positive associations between school infrastructure variables (existence of library, labs, and other school spaces) and student's test scores.

Duarte, Gargiulo and Moreno (2013) examined the conditions of the infrastructure of basic education schools in Latin America, also using the SERCE database, and analyzed the connections between school infrastructure conditions and student scores in Language and Mathematics, both in third and sixth grade of primary school. They concluded that the conditions of the educational infrastructure and access to basic services (electricity, water, sewerage and telephone) of the schools in the region are highly deficient; there are wide disparities between countries and between urban-private, urban-public and rural-public schools; and that there are large gaps in infrastructure in schools attended by children from high and low income families. They also analyzed the relationship between school infrastructure and academic results in the SERCE tests and found that the categories which are more largely and more significantly associated with learning outcomes are: the existence of support areas for teachers (libraries, science and computer labs); connection to electricity and phone systems; and the existence of drinking water, sewage and an adequate number of bathrooms.

One of the main reasons behind the lack of studies on learning environments in Latin American and the Caribbean is the shortage of up-to-date information on the condition of school infrastructure in the region, which is also one of the greatest challenges for investment planning. In almost all the countries, the Ministries of Education have information about the characteristics of their schools, but in most cases this information is based on forms filled in by school principals, and which, most of the time, have not been validated by third-parties. Another important source of information are censuses on school infrastructure. However, not all countries have chosen to carry them out, and in those countries which have, large-scale operating efforts are involved, with prohibitively high costs, that take a long time to implement, and are usually outdated by the time the data is released[2].

2 *In a recent IDB study, information from 12 Latin American and Caribbean countries was reviewed, and was found that three countries did not have an infrastructure census, two countries carried out census between 2005 and 2010, and other two countries were still in the collecting process. The implementation of the census took between 2 and 4 years (Giulia Salieri, Andres Ramos (IDEA Foundation), "Comparative analysis of the planning models and management of school infrastructure of 12 Latin American and Caribbean countries", October 2015). See also documents of regional technical cooperation for the IDB RG-T2011 BID, Learning in the Schools of the 21st century, aimed to foster the creation of educational spaces that encourage modern school management and contribute to the improvement of school performance, where these issues are discussed.*

Currently, the databases of the physical characteristics of school institutions in Latin America and the Caribbean that is most useful to researchers come from the regional comparative studies coordinated by *the Latin American Laboratory for Assessment of the Quality of Education* (LLECE) of the Education Office of UNESCO for Latin America and the Caribbean (UNESCO-OREALC Santiago), in particular the aforementioned SERCE and the Third Regional Comparative and Explanatory Study (TERCE). The information originated from SERCE in the past and from TERCE now provides unique opportunities to make a comparative analysis between countries, not only of the condition of school infrastructure in the region, but also of the possible connections between school infrastructure and learning.

The purpose of this analysis is to investigate the characteristics of school infrastructure in Latin America and the Caribbean, using information from TERCE comparatively around the concepts of sufficiency, equity and effectiveness. We start by enquiring whether the physical spaces where Latin American children and youth study are adequate and sufficient to ensure learning. Next, we examine how school spaces are distributed, both according to the geographical area of the students and their socioeconomic and cultural status. Finally, we look at the effectiveness of physical resources within schools, that is, the association between physical spaces and learning (using the results of the TERCE tests as proxy).

About TERCE

TERCE was implemented in 2013 and assessed the performance of students in third and sixth grade from 15 Latin American and Caribbean countries in the areas of Language (Reading and Writing), Mathematics, and Science (only for sixth grade). Together with the test, context questionnaires were applied to the students, the families, the teachers and the school principals in order to capture the factors associated to achievement[3].

The set of data used for this study combines the basis of student scores in tests with additional bases, which include questions to students and their families about their socioeconomic characteristics on one hand, and to school principals about the characteristics of the schools, on the other.

To evaluate student achievement, TERCE tested common elements of the official curricula of the countries of the region and the "life skills" approach promoted by UNESCO. The sample of TERCE was designed with the student as a sample unit and is representative of third and sixth grade students in each participating country. A total of 135,417 students participated, 67,730 attending third grade and 67,687 attending sixth grade. The students that took the test came from 3,250 third grade schools and 3,115 sixth grade schools[4] (see UNESCO-OREALC, 2015).

The questionnaire administered to school principals included a section on the environment and infrastructure of their schools. It asked about the facilities within the schools: principal's office, additional administrative offices, teachers' meeting room, sports field, gymnasium, computer lab, auditorium, arts and/or music room, health room, science lab and school library. On the other hand, principals were also asked whether the schools had electricity, drinking water, sewage, phone, fax,

3 *The countries included in this study are: Brazil, Chile, Colombia, Costa Rica, Guatemala, Honduras, Mexico, Panama, Paraguay, Peru, Dominican Republic and Uruguay. Ecuador and Nicaragua are included only for the analyses that not have variables of classroom equipment, due to a low rate of response. Although the students of Argentina participated in the test, the country has not been included in this study because of the low rate of response to the principals' questionnaire. The state of Nuevo León in Mexico also participated in the study, but the results are not included in this report because of its national approach.*

4 *Annexes A1 and A2 show data of students and participating schools by country, by test, by geographical area and by type of school management.*

bathrooms in good condition, internet connection, garbage collection and student transportation. In addition, it included questions about classroom equipment: chalk, tables, chairs, and blackboards[5]. The TERCE Technical Report describes in detail the tools used for gathering information (learning assessments and context questionnaires, including school infrastructure issues), the methodological design, sampling weights, and data analysis strategies (see UNESCO-OREALC, 2016).

Even though the TERCE database is the richest source of comparative information on school infrastructure, it somewhat limits our study. First, when it comes to operationalizing the newest conception of "learning spaces", the TERCE data only addresses the presence or absence of physical spaces and does not provide any additional information about the quality of such spaces, or their use by different actors, or about the perception that the actors have of these spaces, all of which are key concepts in the modern understanding of learning environments. Also, it does not include data about learning spaces other than those within the school itself. Finally, information on the condition of the classrooms is very limited.

5 *Questions about the materials to which the students had access, such as computers, library books and school textbooks were also included, but these variables have not been included in this report, because they shall be the subject of a special study of the matter.*

The conditions of school infrastructure in Latin America and the Caribbean: sufficiency and equity

In this section, we describe the current condition of school infrastructure in Latin America and the Caribbean according to TERCE, specifically we seek to answer the following questions in two areas:

- **Sufficiency:** how many students attend schools with minimal infrastructure requirements to ensure learning?

- **Equity:** are there inequalities in the distribution of the educational infrastructure in Latin America and the Caribbean by socioeconomic groups, geographical areas or public vs. private sector?

The information collected by TERCE in the school principals' questionnaire (questions 14, 16 and 17) allows us to examine the conditions of school infrastructure in the countries that participated in the study with similar parameters and slice and dice the data according to the geographical area of the schools, its public or private status and according to the socioeconomic status of the students' families. For exposition purposes, we have grouped infrastructure variables into six categories: water and sanitation; connection to services; educational or academic spaces; offices areas; multipurpose rooms and classroom equipment (see Table 1)[6].

6 *The percentage of omitted data in the different infrastructure categories is low. The average omitted data (from the 14 countries included in the analysis) in the categories of water and sanitation and connection to utilities is 3.5%; in the categories of educational/academic spaces; office areas and multipurpose spaces is 3.9%. The classroom equipment category is not included in the Ecuador and Nicaragua analysis because they had no information available on one of the five variables: chairs for the students. Without those two countries, the average omitted data for the remaining 12 countries is 4.3%. No correlations were found between omitted data and academic achievement or student socioeconomic status variables, and for that reason it was decided not to make any kind of imputation.*

Table 1

Grouping of variables by categories of school infrastructure[7]

Categories	Variables (or items)
Water and sanitation	Drinking water; sewage; bathrooms in good condition; garbage. collection
Connection to services	Electricity; phone; Internet connection.
Educational or academic spaces	Arts and/or music room; science lab; computer lab; and school library.
Office areas (including health room)	Principal's office; additional offices (assistants, administrative, etc.); teachers' meeting room; and health room.
Multipurpose room	Gymnasium, auditorium and sports field.
Classroom equipment	Chalk or whiteboard markers; table for the teacher; chair for the teacher; table for each student and chair for each student.

7 *See Annexes B1to B12 with information of the six categories of school infrastructure disaggregated by variable, for third and sixth grade by country.*

Sufficiency of school infrastructure in Latin America and the Caribbean

The key stakeholders involved in the education process- students, teachers and administrators - must have a minimum level of welfare in order to focus on learning, that is, they must have a level of infrastructure that is sufficient to achieve their goals. As defined by the OECD (2014), the sufficiency of the physical school resources are "the baseline components of the built environment which are considered necessary conditions for providing the affordances likely to impact on student learning (e.g. access to safety, water, natural light, power, heat and technology)." This concept of sufficiency of school infrastructure must take into account the different geographical and socioeconomic contexts of each country[8].

Following the conceptualization of the OECD, and of the Duarte et al (2013) and Willms et al (2014) studies, the sufficiency criteria that we have used for this analysis are the following:

- Students attend a school with sufficient water and sanitation, if the school has drinking water, sewage, bathrooms in good condition, and garbage collection.
- For *connection to services*, the school has to have, at least, electricity and telephone.
- For *academic spaces*, the school has to have, at least, a library.
- For the *offices* area, the school has to have at least 2 of the following components: a principal's office, additional offices (assistants, management, etc.), teachers meeting room, or health room.
- For *multipurpose rooms*, the school has to have, at least, one of the following 3 components: gymnasium, auditorium, or sports field.

8 *Certainly, in the developed world, the requirements for a school establishment to be "sufficient" are different and more sophisticated than those for developing countries.*

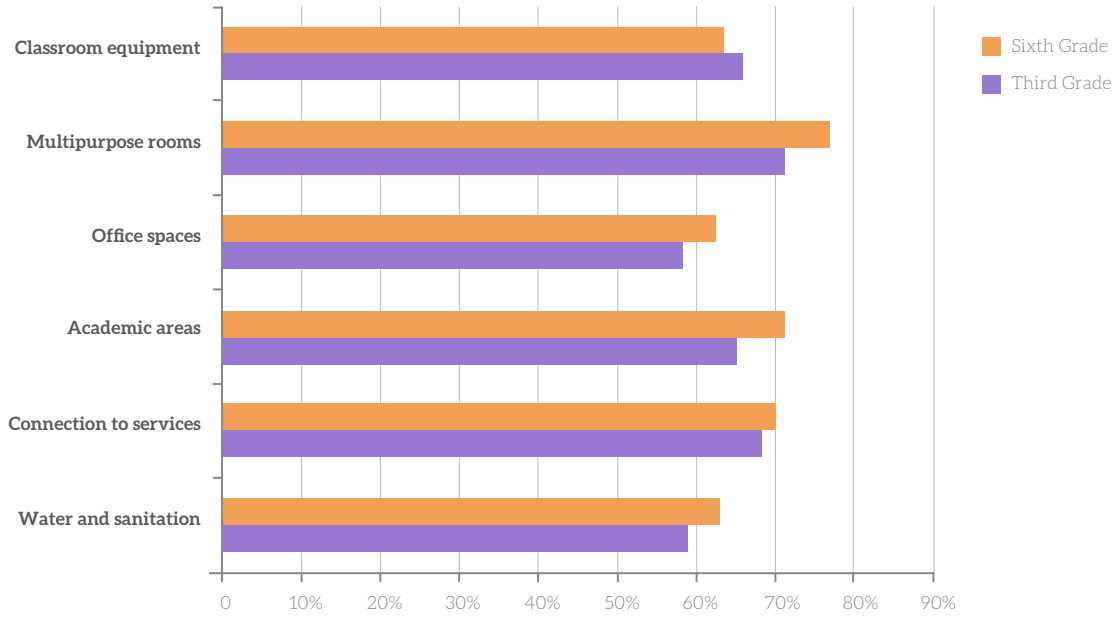
- For the *classroom equipment* area, sufficiency is defined as the school having all the components in every classroom (chalk or whiteboard markers; table for the teacher; chair for the teacher and chair for every student).

Graph 1 shows the percentage of students who attend schools with sufficient infrastructure according to each of the categories, for all countries as a whole. For countries participating in TERCE, we found that a high percentage of students are attending schools with insufficient school infrastructure. In third grade, only slightly more than 50% of students attend schools with an appropriate level of water and sanitation services; only three out of five have sufficiently equipped classrooms or attend schools that have at least one additional academic space besides the classrooms (library, science labs, etc.); just slightly more than half attend schools with sufficient administrative offices; and only two of every three students attend schools with access to electricity and telephone and some kind of multipurpose spaces (gymnasium, auditorium, sports field). Sixth grade infrastructure sufficiency is similar to that of third grade.

Graph 1

The sufficiency of the infrastructure in schools attended by students of the region is low

Percentage of students that attend schools with sufficient infrastructure
TERCE 2013



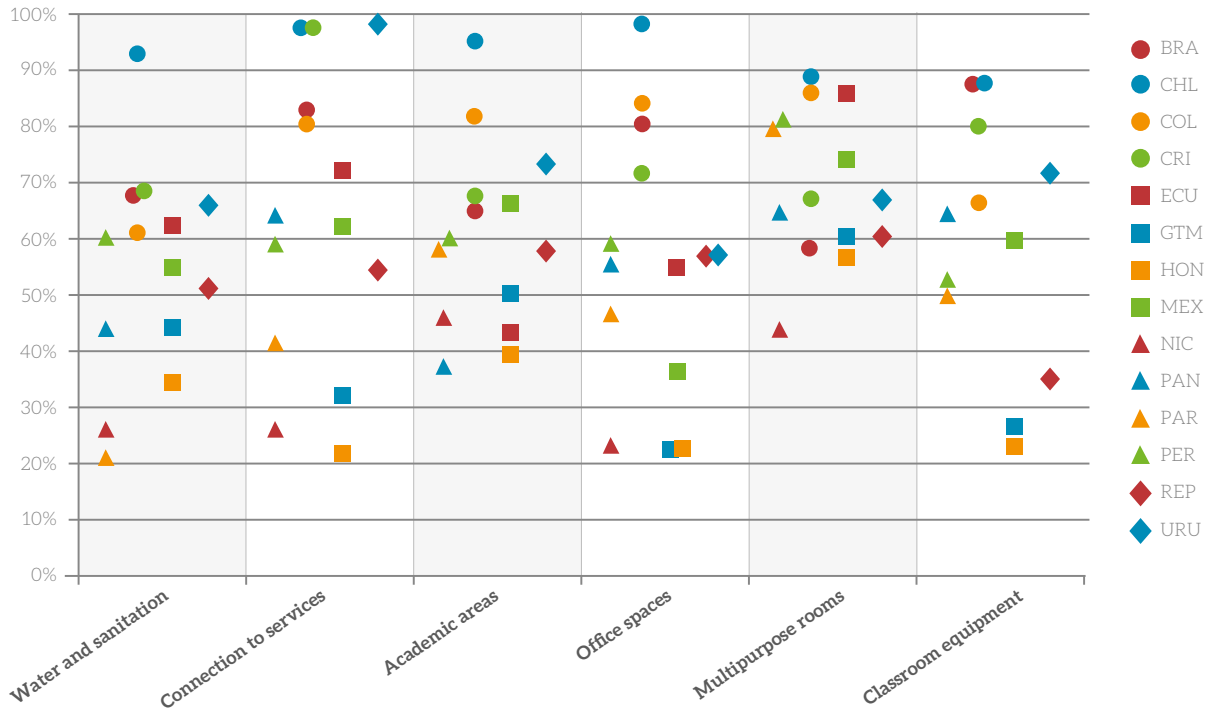
Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the classroom equipment index (see footnote # 6).

Graph 2 shows the sufficiency by category for each of the countries in the sample and for third grade students[9]. Country situations are quite diverse, although it tends to be better in the countries of the Southern Cone of the continent (except for Paraguay) and worse in Central America (except for Costa Rica). Mexico, Colombia, Ecuador, and Peru are closer to the first group than to the second. Chile, for example, has a sufficiency over 88% in the six areas; Honduras and Guatemala have sufficiency levels below 35% in four and three areas, respectively, while Nicaragua has levels under 50% in five areas.

Graph 2

Sufficiency of school infrastructure varies broadly by country

Percentage of students who attend schools with a sufficient infrastructure according to category and country TERCE 2013, Third Grade



Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the classroom equipment index

9 *Statistic Annex C1 presents the tables corresponding to sixth grade students.*

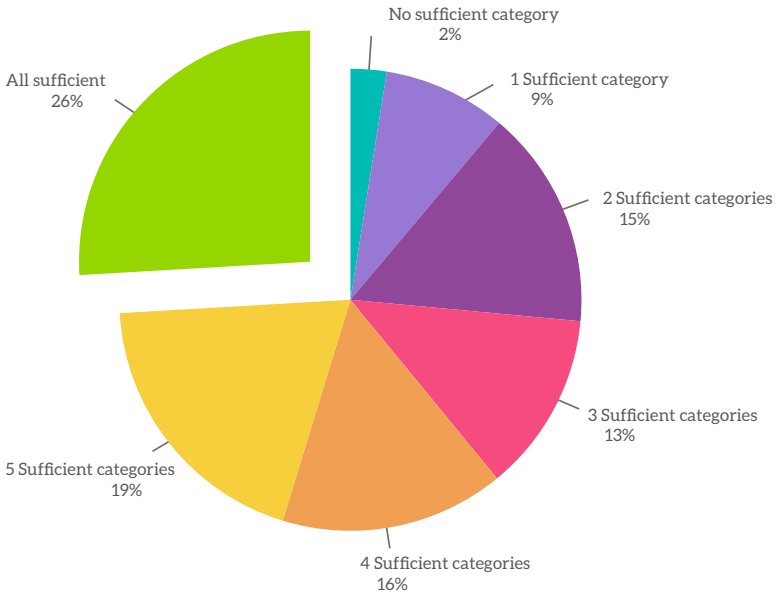
Also, it is important to examine the presence of academic or educational spaces other than the classroom with more detail, since this topic has been highly associated to student learning (see Duarte et al 2013 and Cuesta, 2014). Unfortunately, the TERCE data suggests major deficiencies in these spaces in Latin American and Caribbean schools. For example, despite the importance that the academic literature gives to the presence of libraries in schools, only Chile is close to an optimal situation (95% of the third grade students have libraries in their schools). In Uruguay, Colombia, Costa Rica, Brazil, and Mexico only two out of every three students attend schools with libraries. In Ecuador, Honduras, Nicaragua and Panama, less than half of the students attend schools with libraries (see Annex B3). On the other hand, only Colombia and Chile stand out in relation to the presence of science labs in their schools (66% and 67% of the students attend schools with science labs, respectively). In the other countries, the percentage of students who attend schools with science labs is minimal. Also, music / arts rooms are scarce in the region (with the exception of Chile, where 41% of third grade students attend schools that have them).

In Graph 3, we have grouped students according to the number of sufficient categories their schools have. For example, the dark blue section of the pie shows the percentage of students in the region who attend schools that have no sufficiency in any infrastructure category. The light blue section shows the percentage of children who attend to schools with sufficient levels in all categories of infrastructure. As shown in Graph 3, only 26% of third grade students of the TERCE countries attend schools with sufficiency levels in the six categories of infrastructure mentioned above. In contrast, 26.5% of the students attend schools with two or less categories of sufficient school infrastructure and 2.5% of the students attend schools that do not achieve any level of sufficiency in terms of infrastructure.

Graph 3

Only a few students in the region attend schools with adequate infrastructure

Percentage of students who attend schools according to the number of infrastructure categories with a sufficient level TERCE 2013, Third grade



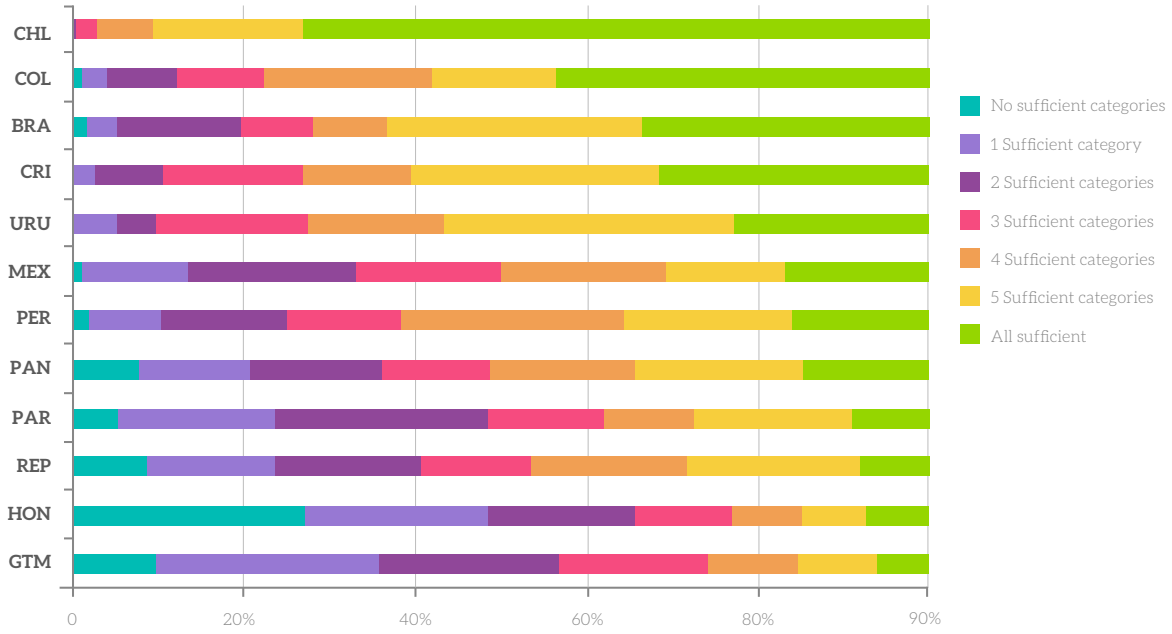
Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the analysis.

When we look at the information by country that is shown in Graph 4, the sufficiency levels are quite varied. In Chile, 91% of the third grade students attend schools with 5 or 6 categories of sufficiency in school infrastructure (73% have all the categories). In Brazil, Costa Rica, Colombia, and Uruguay the number of students who attend schools with 5 or 6 categories are 63%, 60%, 58% and 57%, respectively. That is, while there are deficiencies, a large proportion of the student body has adequate learning spaces.

Graph 4

Only in one country most children attend schools with sufficiency in all infrastructure categories

Percentage of students who attend schools according to number of sufficient infrastructure categories for countries TERCE 2013, Third grade



Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the analysis.

The situation is, in turn, dramatically different in Central American countries (except for Costa Rica) and in Paraguay where the percentage of students who attend schools with very few infrastructure categories at a sufficient level are unacceptably high. In Honduras, almost half of the students attend schools with only one or no category of sufficiency in terms of infrastructure, in Guatemala the proportion is 36% and in Panama, Dominican Republic, and Paraguay, it is between 21% and 24%. Similarly, in the countries mentioned above, the proportion of students who attend schools with 5 or 6 sufficiency categories is low (in Honduras, 14%, and in Guatemala, 15%)[10].

10 *The calculations of sufficiency in infrastructure for the schools attended by sixth grade students how tendencies similar to those described for the third grade (see Annexes C2 and C3).*

When analyzing the data by country, the high degree of variability within the sufficiency levels of the infrastructure categories (or dimensions), highlights the differences in idiosyncratic educational systems of the TERCE countries. An obvious comparison is to look more closely at the relationship of the sufficiency of infrastructure with the economic development of the countries (see Annex C4). While there is a positive relationship between the income level of the countries, measured through the GDP per capita in PPP (Purchasing Power Parity) and the degree of adequacy of school infrastructure, the variations between countries of similar income suggest that the physical features of schools do not necessarily depend on the economic status of the countries, but are the result of different degrees of prioritization, planning and efficiency in the management of educational public policies resulting from the different historical paths of the countries.

For example, countries with nearly identical income per capita such as Panama and Uruguay, show large differences in the degree of sufficiency they have achieved in the water and sanitation indexes (44% vs. 66%), connection to services (64% vs. 98%), and academic spaces (37% vs. 73%). These differences are exacerbated when compared with Chile, which has a higher income per capita, although not very different from Uruguay and Panama, but has 93%, 97%, and 95% of sufficiency in each of the indexes mentioned above. Similarly, it is also important to mention the case of Colombia, Ecuador, and Peru, with per capita income hovering around the $12,000, but with very diverse sufficiency levels in academic areas: Colombia with 82%, Peru with 60% and Ecuador with just 43%. Similarly, Colombia and the Dominican Republic have a similar GDP per capita, but differ in the level of sufficiency in school infrastructure: Colombia has higher levels of sufficiency in all infrastructure categories (between 10 and 31 percentage points higher that Dominican Republic)[11].

11 *Explaining the factors that determine these variations is beyond the scope of this study, but we believe it is important to mention it to emphasize the need to examine the actual source of these differences in the future.*

Equity in the distribution of physical spaces according to socioeconomic and cultural level and region (urban-rural)

From a normative point of view, educational systems must guarantee not only a minimum of resources to facilitate learning, but they must also try to ensure that all students, regardless of the socioeconomic origin of their parents, their geographic area or their belonging to certain ethnic groups, have access to similar levels of resources. This would ensure equality of educational opportunities. Unfortunately, according to our analysis, when it comes to infrastructure, student access to different school infrastructure resources varies significantly by groups or sub-groups of the population.

In the following analysis, the sufficiency estimates of the previous section are combined with an equity analysis (equality of access to resources); data is disaggregated by the socioeconomic levels of the students' families and their attendance to rural schools, urban public and urban private schools.

Equity according to socioeconomic and cultural level of the students' families[12]

According to the TERCE data, when we look at all the countries that participated in the assessment, the socioeconomic differences (or gaps) are broad in each of the analyzed infrastructure categories (Graph 5). While 91% of the third grade students in the wealthiest quartile of the population have access to schools with sufficient connection to electricity and telephone, the figure for children in the poorest quartile is just 40%. While 82% of the students of the wealthiest quartile of the population attend schools with adequate water and sanitation connection, only one in three of the poorest quartile of the population has this access. While 78.5% of the students of the wealthiest quartile

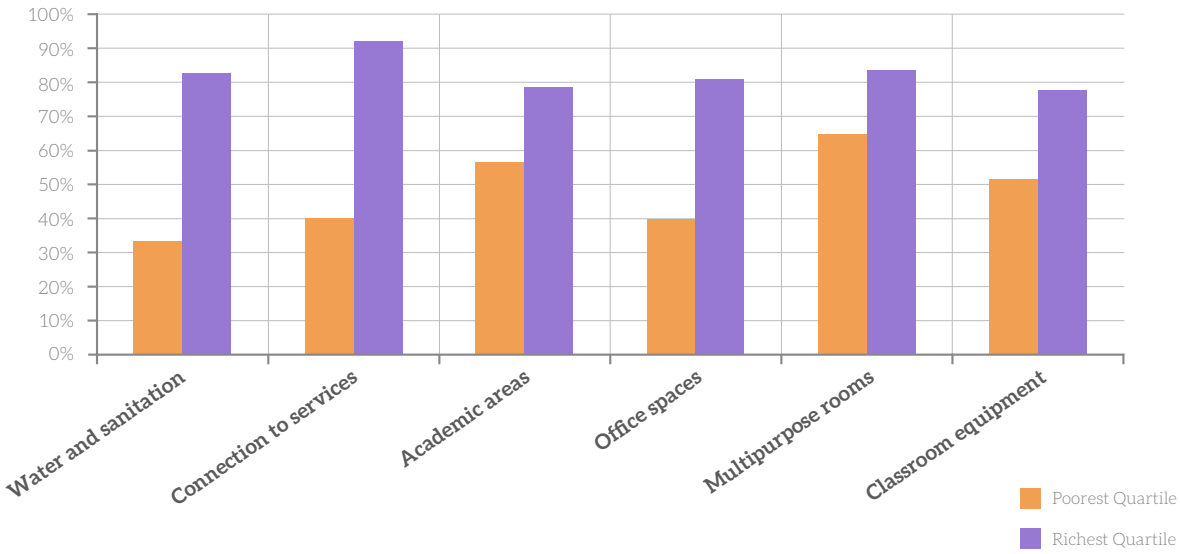
12 *The Social-Economic and Cultural Index (ISEC) created by TERCE from variables of education of the students' parents, housing characteristics, access to public services, and family access to cultural goods (especially books at home) was used for the social-economic levels of the students.*

attend schools with sufficient academic spaces, in the poorest quartile this figure is 56%. Only 51% of the students of the poorest quartile have access to sufficiently equipped classrooms compared to 78% in the wealthiest quartile.

Graph 5

Large gaps in school infrastructure by socioeconomic level

Percentage of students who attend schools with sufficient levels of school infrastructure according to category TERCE 2013, Third grade



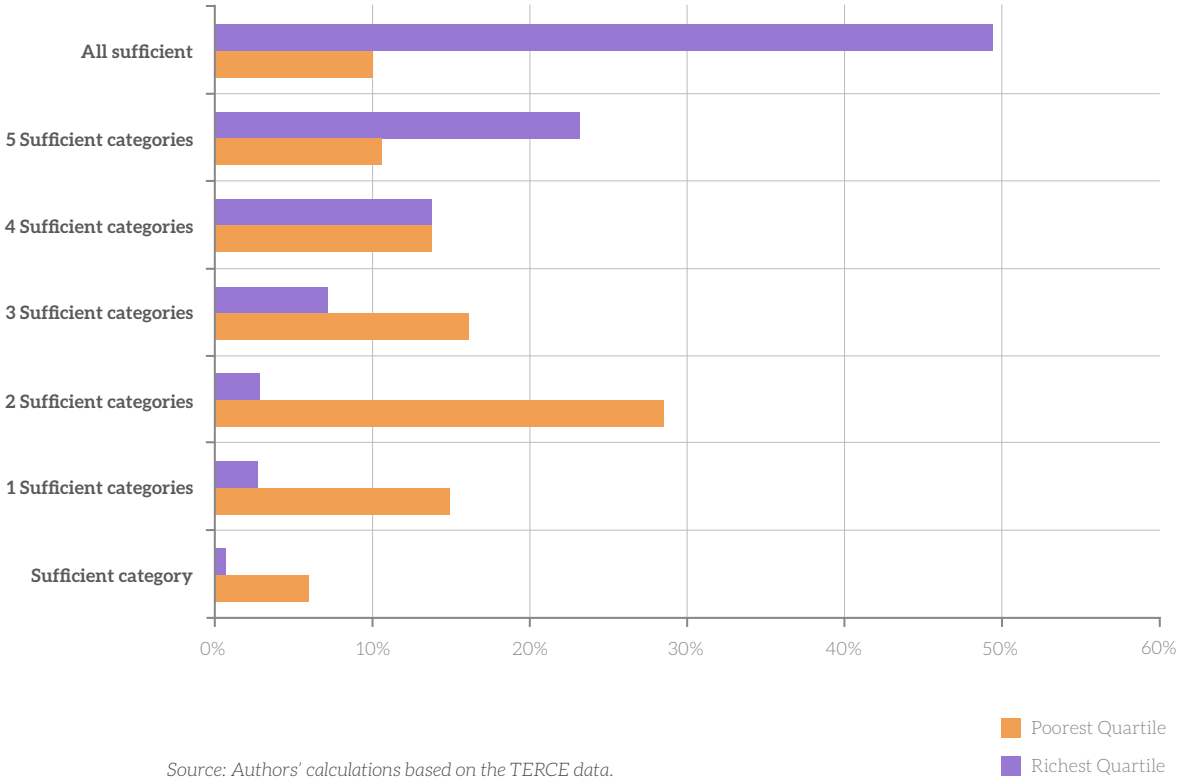
Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the classroom equipment index

Inequity in infrastructure distribution can also be observed when comparing the percentage of students from extreme quartiles (the poorest and the wealthiest) who attend schools according to the number of categories in the sufficient level. As shown in Graph 6, while 72% of the students of the wealthiest quartile attend schools with at least 5 categories with sufficient level (49% with all sufficient), in the poorest quartile only 10% attend schools with all the sufficient categories and 11% attend schools with 5 sufficient categories. On the other hand, half of the students of the poorest quartile attend schools with two or fewer infrastructure categories in the sufficient level. Among the group of countries that participated in TERCE, poor students tend to attend schools that are poor in school infrastructure.

Graph 6

High inequality in the infrastructure characteristics of schools

Percentage of students attending schools according to the number of sufficiency of infrastructure categories for the wealthier and poorer quartiles TERCE 2013, Third grade



Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the analysis.

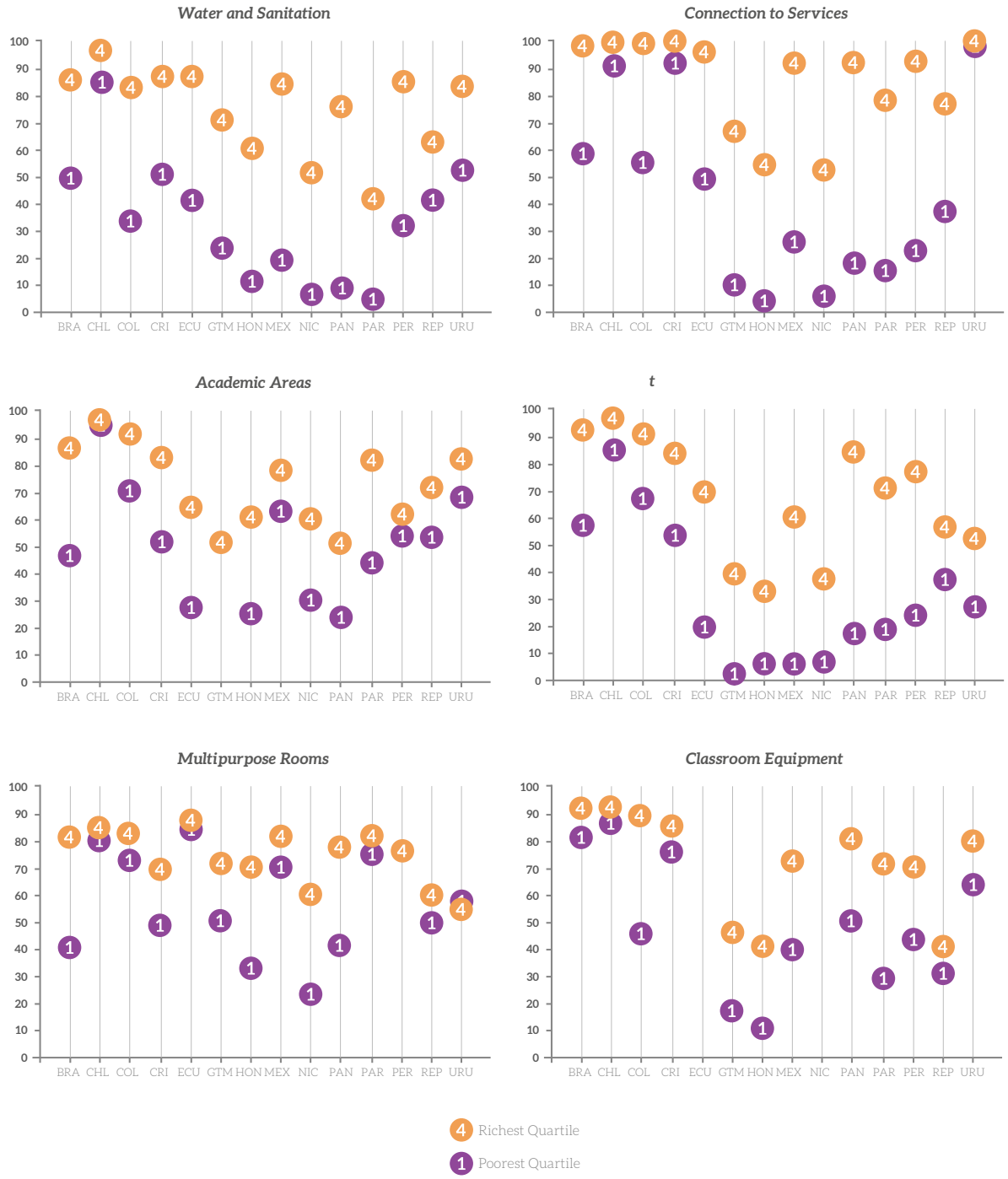
By countries (Graph 7) the situation is varied, but in most countries, high inequalities persist in the distribution of physical resources of schools attended by the population when analyzing the socioeconomic level, to the detriment of the poorest population groups. Chile stands out for having the least equity gaps of the region: these gaps range from 11 percentage points in water and sanitation

connection to 0.5 points in the existence of academic spaces other than classrooms in schools. In Uruguay, the differences are also less pronounced, being virtually non-existent in connection to electricity and telephone.

In Guatemala, Honduras, and Panama, the equity gaps in the allocation of physical resources of the schools tend to be larger, and access of the poorest quartile of the population to the majority of infrastructure categories is very restricted. In the case of drinking water and sanitation, the gaps are 47, 49 and 67 percentage points, respectively, while access of the poorest is 23%, 11% and 9%, respectively. In electricity and phone, in Guatemala, the gaps are of 57 points percentage points (with access of the poorest at less than 4%); in Honduras, the gaps are 49 percentage points (when less than the 10% of the poorest has access to schools with such services); in Panama, the gaps are 75 percentage points (with only 18% of the poorest attending schools with electricity and telephone). In such countries, the poorest students also have low access to pedagogical spaces other than classrooms (libraries, labs, computer labs or music rooms): in Honduras only 25% of them has access compared to 61% in the wealthiest quartile; in Nicaragua only 30% compared with 60% of the wealthiest quartile. Also, the poorest students do not have adequate equipment in the classroom: only 17% in Guatemala or 10% in Honduras (see Graph 7 and Annex C5 with data of the wealthiest and poorest quartiles in the TERCE countries).

Graph 7

Percentage of students attending schools with sufficiency of infrastructure categories by countries and socioeconomic level, TERCE 2013, third grade



Even in countries like Colombia, Mexico and Peru there are wide gaps between the wealthiest and the poorest quartiles (always in favor of the wealthiest). In Colombia, there are differences of over 44 percentage points with respect to access to water and sanitation, electricity and telephone, and adequate classrooms. In Mexico, there are differences of over 65 percentage points relating to access to water and sanitation and electricity and telephone and 54 percentage points in access to adequate administrative offices. In Peru, there is a difference of 70 percentage points in access to electricity and telephone and more than 52 points on access to adequate water and sanitation and sufficient administrative spaces[13].

Equity by geographical area

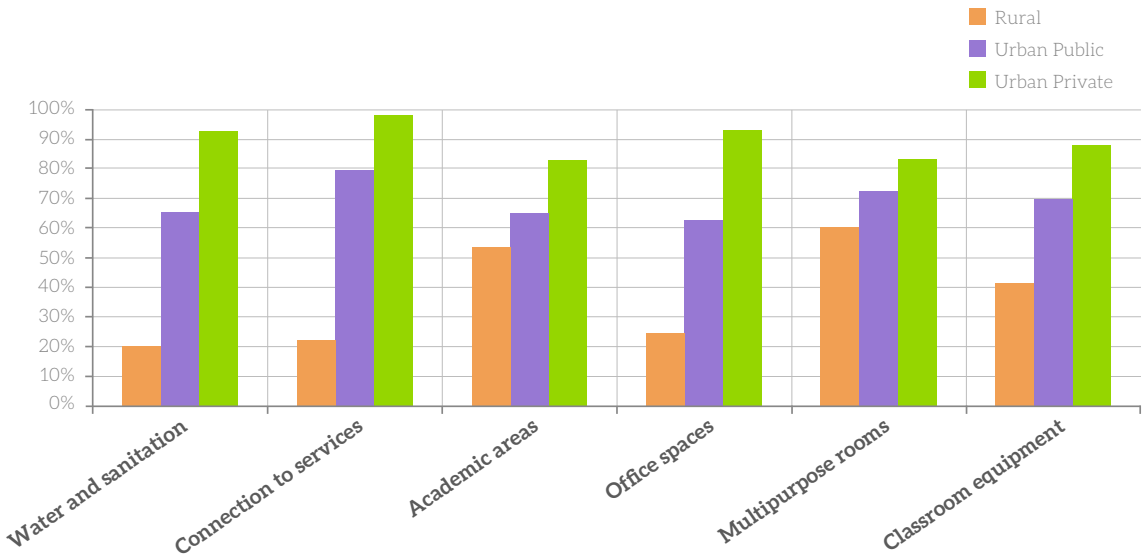
Access to school infrastructure according to the area where schools are located also shows large inequities. As can be seen in Graph 8, students who attend rural schools are at a clear disadvantage: just 20% of them attend schools with sufficient access to drinking water or sanitation; only 22% attend schools with a sufficient connection to electricity or telephone; only half are in schools with appropriate academic spaces; 24% have schools with insufficient administrative spaces; and less than half (41%) attend schools with sufficiently equipped classrooms.

13 Social-economic gaps for sixth grade students are similar to those reported for third graders. See Annexes C6, C7, C8 and C9

Graph 8

Large gaps in school infrastructure according to geographical area and school type

Percentage of students who attend schools with sufficient levels of school infrastructure according to category and geographical area and school type
TERCE 2013, Third grade



Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the classroom equipment index

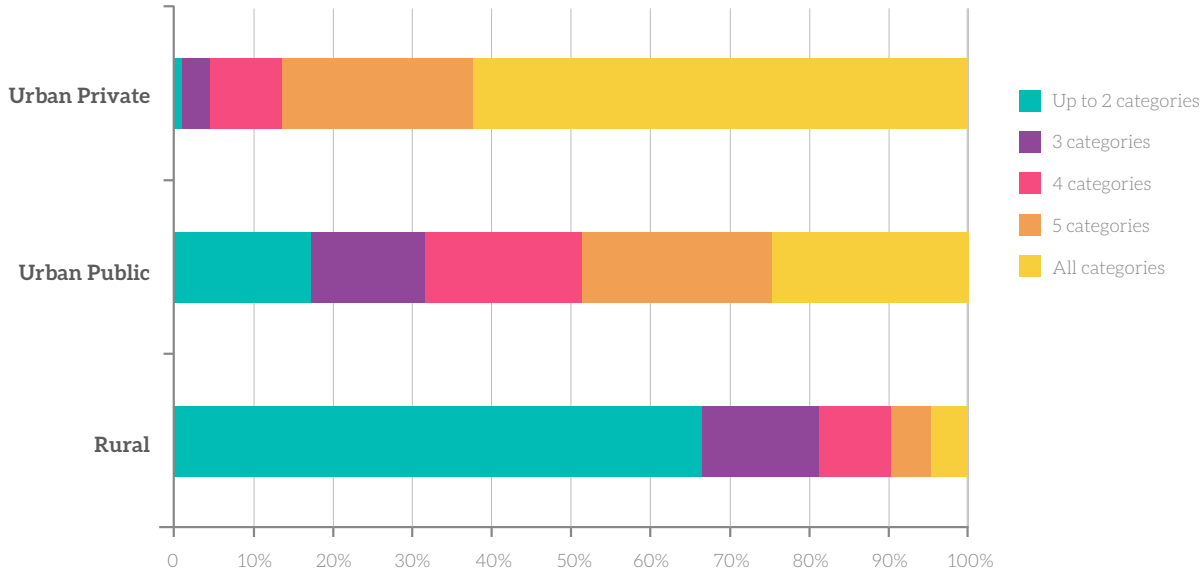
In urban areas, the situation is also clearly insufficient for public schools when compared to private schools. While 65% of the students who attend public schools have adequate access to drinking water and 79% have schools with electricity and telephone, the indicators for students who attend private schools are higher: 93% and 98% respectively. Only 65% of the students in urban public schools have sufficient administrative areas compared with 83% in the case of students of the private sector. Similarly, while just 70% of the students in the public sector receive classes in properly equipped classrooms, the figure for those in the private sector is 88%.

The uneven distribution of infrastructure categories according to geographical location of the schools or their belonging to the public or private sector can also be seen when comparing the percentage of students who attend schools according to the number of categories in the sufficient level. As seen in Graph 9, 67% of the students in rural areas attend schools with 2 or fewer categories of infrastructure in the sufficient level, compared with 1% of those who attend urban private schools. Only 5% of rural students have schools with all categories in the sufficient level compared with 62% of the urban private sector schools. Students who attend public urban establishments are in a better situation than those of the rural sector, but are at a disadvantage when compared with those of the private urban sector: 17% attend schools with two or less categories of sufficiency while only 25% attend schools with all the infrastructure categories in the sufficient level.

Graph 9

The majority of students of urban-private schools have a high degree of sufficiency in all categories well above their peers in public or rural schools

Percentage of students who attend schools with sufficient infrastructure according to number of categories and geographical area TERCE 2013, Third grade



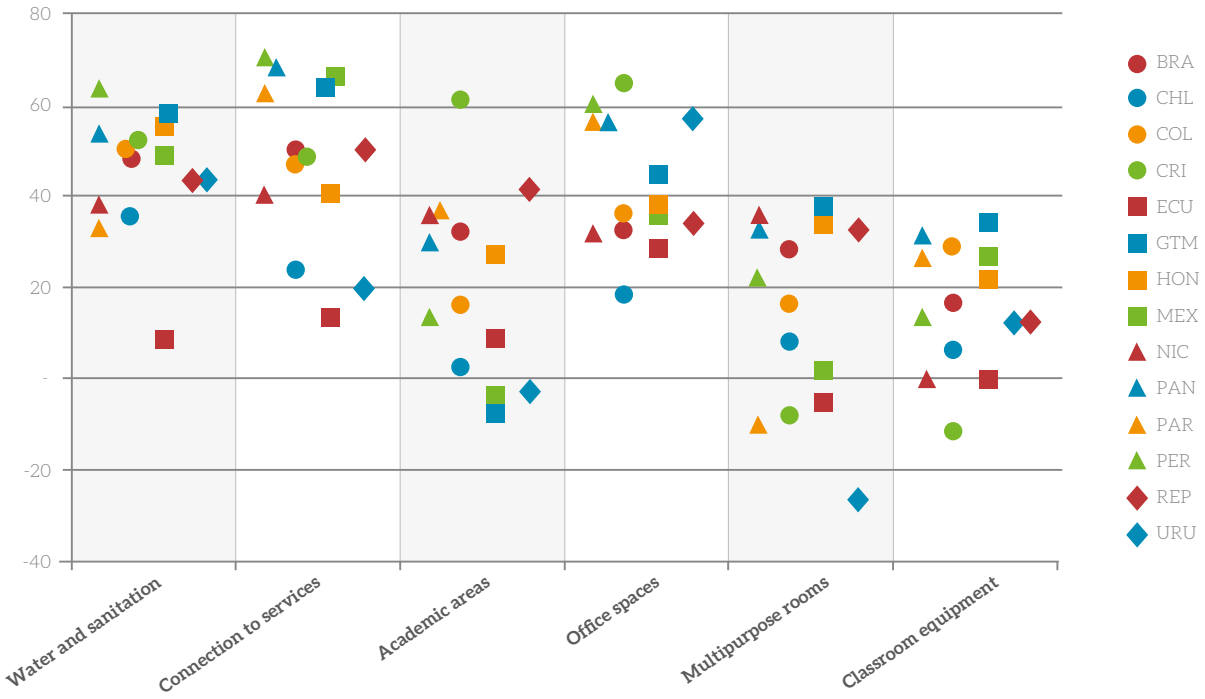
Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the analysis.

Graph 10 shows the high inequalities previously mentioned disaggregated by TERCE countries and according to geographical areas (rural and urban). Generally, large gaps are observed between the infrastructure conditions of schools attended by students of the rural area compared to those who attend urban schools, always in detriment of the former, in all countries of the region and in the aspects under study. Again, Chile has gaps smaller than 10 percentage points in three of the six categories (and less than 20 percentage points in multipurpose rooms). Ecuador has gaps of less than 15 percentage points in 4 categories. Uruguay has gaps of less than 20 percentage points in four categories and Colombia in two. But for the rest of the countries, the high gaps indicate a very poor infrastructure situation of the schools attended by students from the rural sector.

Gráfico 10

The gaps in infrastructure between urban and rural areas differ according to countries

Percentage points of difference in the infrastructure sufficiency level according to category and country TERCE 2013, Third grade



Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the classroom equipment index. Negative values mean that the sufficiency is in favor of schools in rural areas.

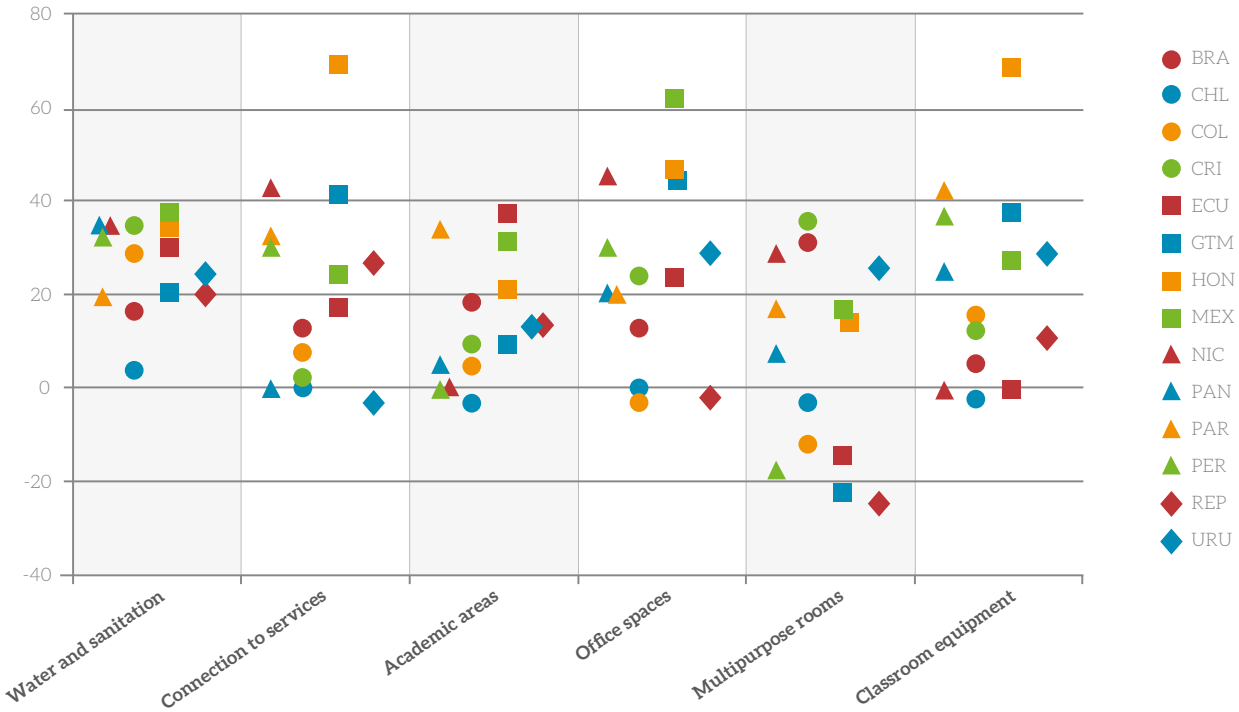
The gaps in infrastructure sufficiency by countries between schools attended by students of the private urban sector and the students of the public urban sector are also broad and in favor of the former, although generally narrower than those existing between rural and urban areas, as evidenced in Graph 11. For example, Chile stands out in the region because its gaps are almost non-existent, even with gaps in favor of students who attend public schools. Colombia has small gaps (less than 10 percentage points) in connection to water, electricity and telephone services, and academic spaces, but broader in multipurpose rooms and classroom equipment. In Costa Rica, the gaps are almost non-existent in connection to electricity and phone and academic spaces, but broader in the remaining categories. In Brazil, the gaps are small (less than 10 percentage points) in academic spaces and offices areas, but broader in the other categories under study. In Panama, there are small differences (in favor of private schools) in connection to electricity and telephone and academic spaces. In the case of sufficiency in multipurpose rooms, a group of countries (Colombia, Ecuador, Guatemala, Peru, and Dominican Republic) show differences in the gaps in favor of students from urban public schools. But in general, in the remaining categories and in most of the countries of the region, urban students of the public sector attend schools with less adequate infrastructure conditions when compared with students attending private schools[14].

14 *The gaps by geographical area and by type of urban school (public or private) for sixth grade students are similar to those described for third grade (see Annexes C10, C11, C12 and C13).*

Graph 11

Gaps in infrastructure between urban public and private schools are also broad in most countries

Percentage points of difference in the infrastructure sufficiency level according to category and country, TERCE 2013, Third grade



Source: Authors' calculations based on the TERCE data.
Note: Ecuador and Nicaragua are excluded from the classroom equipment index. Negative values mean that sufficiency works in favor of public schools.

Effectiveness of school infrastructure: the association between school infrastructure and learning

The effectiveness of school infrastructure according to the OECD refers to the articulation that may exist between the available physical resources of schools with the educational outcomes, be it learning, graduation rates, years of schooling, etc., or other long term results such as social mobility, citizen values, productivity or competitiveness, among others (see OECD 2014). In our case, we examine the relationship between the physical conditions of the schools and the academic achievement of students. Specifically, we seek to answer two questions: is there a relationship between the students' achievements in TERCE and the school infrastructure? And if so, which infrastructure categories or dimensions bear more weight in this relationship? It is necessary to emphasize that this analysis does not intend to establish relations of causality between infrastructure categories and school learning, but is oriented to estimate the statistical associations between them.

International literature points out that the quality of student learning is determined by multiple variables that may be categorized into three groups: factors related to the student's family, characteristics of the school, and the educational system[15]. With respect to the student, the fundamental factors are the educational and socioeconomic status of the family, health, and nutrition during the first stages of childhood and access to quality early childhood development programs. With respect to the school, teachers are the most important factor for student learning and for the acquisition of necessary skills. The academic literature also gives a prominent role to school leadership (especially

15 See Vegas and Petrow, 2008 and BID, 2016.

of the school principals) and to investment in physical resources (school infrastructure and furniture) and resources that support learning, such as books, teaching materials, and technology. Moreover, the quality of educational services is also determined by the institutional architecture and by systemic regulations for educational establishments, particularly those related to accountability and explicit or implicit incentive systems to different actors in the sector.

With respect to infrastructure, as mentioned in the introductory section of this document, there is a broad consensus that indicates that the characteristics of the physical spaces within a school are a necessary condition for favorable learning environments and skill development, although in and of themselves they cannot achieve better quality, and must be coupled with educational policies that boost the scope of the investments in school infrastructure.

To develop the analysis of the connections between infrastructure and student learning with the information collected by TERCE, we work with six infrastructure indexes[16], one for each of the categories shown in Table 1: water and sanitation; connection to services; pedagogical and academic spaces; offices areas; multipurpose spaces and classroom equipment. In all of the estimated indexes the average is zero and has a unit standard deviation.

In the analysis, we seek to model the existing relationship between school infrastructure characteristics (the six infrastructure indexes mentioned above) and student scores in the TERCE Language and Mathematics tests. The TERCE test scores have an average of 700 points with a standard deviation of 100 points. The socioeconomic and cultural level of the students' families was approximated using the Socioeconomic and Cultural Index – ISEC - calculated by TERCE, which also has an average of zero and a standard deviation of a unit.

The estimates were calculated using multilevel models (also known as hierarchical linear models) because they are most appropriate to analyze phenomena such as those occurring in education, in which there is a nested structure of relations, where the students, while having particular characteristics, are grouped in schools (they share physical spaces, resources, principals, teachers, etc.) and the schools are grouped in countries (they share the same standards, history, level of economic and cultural development, etc.)[17]. The model that was used has three levels (students, schools and countries). The estimated equation of student achievement is given by[18]:

16 *Those indexes were built with a principal component analysis on the basis of the polychoric matrix See Kolenikov, S. and Angeles, G. (2004) and StataCorpo (2015) for more information. Argentina, Ecuador, and Nicaragua were excluded from the analysis due to lack of data on some variables from the principals' questionnaire.*

17 *We adopted an approach similar to that used by the OECD for the PISA analysis. See specially, OECD, 2007 and Duarte et al, 2013.*

18 *For a thorough treatment of the estimate with multilevel models, see Raudenbush and Bryk, 2002. See also the TERCE Technical Report (UNESCO-OREALC, 2016), especially section 7.7, on the application of multilevel models in the TERCE.*

$$Y_{ijk} = \beta_{00} + \beta\ INDICES_{jk} + \mu_{0j} + \varepsilon_{jk} + r_{ikj}$$

Where,

Y_{ikj} is the test score of student i in j school in k

β_{00} is the intercept

β a vector of parameters associated with the school

$INDICES_{jk}$ a vector of infrastructure indexes and socioeconomic level of the students

μ_{0k} random deviation of the j country with respect to the average of all countries

ε_{jk} random deviation of each school

r_{ikj} random deviation of each student

$$\mu_{0k},\ \varepsilon_{jk,}\ r_{ikj} \sim \left(0,\ \sigma^2\right),\ Cov\left(\mu_{0k},\ \varepsilon_{jk,}\ r_{ikj}\right) = 0$$

The models were estimated for the totality of students in the region as a whole (disaggregated by geographical area and for public and private sector) and models by country were also estimated.

Table 2, presents the results of the regressions that analyze the association between school infrastructure index and student achievement in third grade Mathematics, for all the TERCE participating countries. The coefficients of the indexes show how scores vary in the test for each variation in a standard deviation in the specific index, when all other indexes remain constant.

Table 2

Associations between school infrastructure and learning in Mathematics TERCE, third grade

	Total		Urbano		Rural	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and sanitation	4,15***	2,2	6,88**	2,15	2,08	0,69
Connection to services	15,97***	12,12***	14,12***	8,96***	13,76***	10,94***
Pedagogical/academic areas	13,07***	9,63***	13,34***	5,61***	8,03**	6,62*
Office spaces	8,26***	5,39***	11,73***	5,95***	-0,27	-1,83
Multipurpose spaces	6,28***	5,32***	6,28***	4,52***	3,39	3,15
Classroom equipment	3,55**	2,35*	8,33***	2,43	2,94	2,51
Socio-economic and Cultural Index (ISEC)		19,09***		19,88***		16,25***
Public school				-34,68***		
Constant	710,98***	709,62***	709,60***	730,20***	697,10***	699,41***
# of observations	41.857	37.786	27.114	24.318	14.743	13.468

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.

For the models of total students and students who attend urban schools, the estimated values show us that there are important and significant associations between the infrastructure categories and the scores of student academic tests when they are not controlled by the ISEC. When the ISEC controls are introduced, the coefficients decrease but continue to be statistically significant, with the exception of water, sanitation and classroom equipment in the case of students in the urban area[19]. For example, in the "Total" "without ISEC" column, the coefficient of "connection to services (electricity and telephone), 15.97, indicates that an increase in a standard deviation in said indicator is associated with an increase in 0.16 standard deviations in the scores of the third grade Mathematics test. By including control of socioeconomic level in the model ("with ISEC" column), the resulting increase in test scores is 0,12 standard deviations. Three asterisks indicate that the association is statistically

19 *While the purpose of the estimates, as mentioned in the beginning of the section, is only to establish if there are associations between the learning of the students and the different categories of studied infrastructures, we also estimate models with controls additional to the ISEC (e.g., quality of the teachers and full day schools), but the results of most of the categories did not present important variations, neither at statistical significance level nor in the coefficient values.*

significant at 1%. The model in the data of the rural students indicates that the categories that are significant, even after controlling the ISEC of the students, are connection to services (electricity, telephone and internet) and pedagogical and academic spaces[20].

A summary of the results of the estimates for individual countries is shown in Table 3. The category that is positively associated with learning most frequently is the pedagogical spaces category: in 10 countries of 12. The connection to services and the presence of multipurpose spaces appears related to learning in 7 countries; the presence of offices in schools in 5 countries; and water and sanitation and classroom equipment in 3 countries[21].

Table 3

Associations between school infrastructure school and learning in Mathematics by countries, TERCE, Third grade

	BRA		CHL		COL		CRI		GTM		HON		MEX		PAN		PAR		PER		REP		URU	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and Sanitation			*	**											**				*	*				
Connection to Services	***	***		*	***	**			***	***			**		*	*			***	***				
Academic Areas	**	*	*		*		**		*				***	**	***	***	**				***	**	***	***
Office Spaces							***	**	***	***	*	*	***						***	***				
Multipurpose Rooms	*		***	***	***	***	*		**	*							**	**					**	
Classroom Equipment				*	**				*	*					**	**								

Note: (***) significant at 1%; (**)significant at 5%; (*)significant at 10%.

20 *Results for Language models for third graders and Math and Language for sixth graders show tendencies similar to those found in the case of third grade Math, both for regional data as well as for the models of individual countries (see Annexes D1, D2 and D3).*

21 *In Chile, the water and sanitation index has a negative sign, with and without controls. In Guatemala, the multipurpose spaces index also has a negative sign. See Annexes D4 to D7 with data of the coefficient of the regressions by countries for third and sixth grade Mathematics and Reading.*

Main findings

In this study, we have used the TERCE database to analyze comparatively the characteristics of school infrastructure in the region. In particular, we have focused on three subjects: Are school learning spaces attended by Latin American children and youth sufficient or adequate? Are they equitably distributed according to the socioeconomic and cultural level of the students or according to the geographical area of the students? Are they effective, that is, are they positively associated with student learning?

On the first subject, after having defined the minimum group of spaces and physical resources that a school must have in order to achieve a favorable learning environment, the analysis found that a high percentage of students are attending schools with insufficient school infrastructures:

- In the region as a whole, in third grade, less than 60% of the students attend schools with an adequate level of water and sanitation or with sufficient administrative offices; only two students of every three have sufficiently equipped classrooms, at least an academic space other than the classrooms, and attend schools with access to electricity and telephone; and only 70% attend schools with some sort of multipurpose spaces. In sixth grade, the conditions are similar to those of the third grade.

- Only one-quarter of third graders in the region attend schools that met sufficiency levels within the six infrastructure categories under study. Instead, almost one third of the students attend schools with two or less categories of sufficient school infrastructure and 2.5% of the students attend schools that do not meet any sufficiency standard.

- The situation among countries is quite diverse, but it tends to be better in the countries in the southern cone of the continent (except for Paraguay) and is much more negative in the Central American countries (except for Costa Rica).

Regarding the issue of equity, although educational systems should ensure equality of opportunities and equitably distribute basic resources in schools, in this area there are large inequalities in terms of the access to different components of school infrastructure, both with respect to the socioeconomic status of the students and to the geographical area of the schools.

- In third grade, 92% of the students of the wealthiest quartile of the population have access to schools with sufficient electricity and telephone connection compared to 40% in the poorest quartile; 78% of the students of the wealthiest quartile attend schools with sufficient academic spaces compared to 56% in the poorest quartile; and 78% in the wealthiest quartile have access to schools with sufficiently equipped classrooms compared to 51% in the poorest quartile.

- More than 70% of the students of the wealthiest quartile attend schools with at least 5 categories (of the 6 studied) with sufficient level compared with only 21% in the poorest quartile. One of every two students of the poorest quartile attends schools that only have two or fewer infrastructure categories at the sufficient level. This indicates that in the TERCE group of countries, poor students tend to attend schools that are poor in school infrastructure.

- Only one in five students in the rural area attend schools with sufficient access to drinking water or sanitation or enough electricity or telephone connection; only two out of five are in schools with sufficiently equipped classrooms; and just half are in schools with appropriate academic spaces. Only 5% of rural students have schools with all of the categories at the sufficient level compared with 62% of the urban private sector.

- Students who attend urban public establishments are in a better situation than those in the rural sector, but at a disadvantage when compared to those in the urban private sector: 17% attend schools with two or less sufficiency categories while only 25% attend schools with all the infrastructure categories at a sufficient level.

- In the comparison between countries, Chile stands out for having the smaller socioeconomic gaps and by geographical area within the region, followed by Uruguay. In the other countries the gaps in both aspects are broad.

The analysis to estimate the effectiveness of school infrastructure found positive associations between student learning and infrastructure categories.

- For the data of the entire region and that of the students in the urban area, the large majority of the studied categories of infrastructure are positively and significantly associated with student learning, even after controlling the socioeconomic level of the families. The two categories that are most clearly associated with learning outcomes are pedagogical and academic spaces and connection to services (electricity, telephone and internet).

- For students in the rural area, positive and significant associations were found between the connection to services (electricity, phone and internet) category and the pedagogical and academic spaces and the student scores (with and without socio-economic control).

- By countries, the situation is varied, but the factor that is most frequently positively associated with learning is the pedagogical spaces category, followed by connection to services and presence of multipurpose spaces.

The results of this analysis are consistent with the findings of studies regarding the subject outlined in the introduction: attending a school with sufficient physical learning spaces, that is, a school with drinking water, bathrooms, electricity, telephone, library, some space for sport or student meetings and classrooms equipped with the basic materials is generally associated with better school learning[22]. What looks like a common sense affirmation, surprisingly, has not become a reality in a good number of educational systems in the region, where many students, especially those from poor families or from rural areas, have not secured access to schools with these basic features.

The challenges of the countries of the region relate not only to providing sufficient physical spaces to school buildings, but also to ensuring that these become real "learning spaces" where the interactions necessary to achieve quality education can be developed. The latter requires information that is rather scarce in the region and has to do with the quality, use, organization of physical spaces within the schools, and connections to external spaces. Improving such information, with the purpose of guiding policy design, is an additional challenge that the region has to face if the goal of transforming today's schools into the schools required for the 21st century is taken seriously.

22 See Glewwe (Ed.) 2016, chapter 1.

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ANNEX A
Sample data

Table A1

Number of students that showed for the TERCE test by country-test-grade (effective sample)[23]

	third grade		sixth grade		
	Reading	Mathematics	Reading	Mathematics	Science
Brazil	3,254	3,343	2,900	2,983	2,986
Chile	4,751	4,709	5,056	5,044	5,029
Colombia	4,018	3,975	4,343	4,308	4,325
Costa Rica	3,427	3,428	3,490	3,520	3,520
Ecuador	4,631	4,642	4,842	4,818	4,820
Guatemala	4,060	4,282	3,891	4,056	4,070
Honduras	3,743	3,870	3,788	3,880	3,886
Mexico	3,465	3,543	3,554	3,618	3,622
Nicaragua	3,513	3,810	3,470	3,726	3,741
Panamá	3,283	3,414	3,486	3,413	3,548
Paraguay	3,123	3,271	3,175	3,222	3,231
Peru	4,946	5,038	4,739	4,789	4,801
Dominican Republic	3,504	3,757	3,588	3,661	3,669
Uruguay	2,663	2,728	2,799	2,799	2,803
Total	**56,036**	**57,561**	**56,779**	**57,476**	**57,714**

23 *This table presents the number of children who meet the criteria for the inclusion of TERCE, without oversampling.*

Table A2

Number of schools attended by the students that showed for the TERCE test by country-grade-condition urban-rural-public-private

	third grade				sixth grade			
	Schools	Public-Urban	Public-Rural	Private	Schools	Public-Urban	Public-Rural	Private
Brazil	176	68%	14%	18%	126	76%	10%	14%
Chile	196	39%	7%	54%	197	34%	8%	59%
Colombia	158	52%	25%	23%	149	67%	18%	14%
Costa Rica	196	91%	2%	7%	197	91%	2%	7%
Ecuador	198	57%	21%	22%	193	57%	23%	20%
Guatemala	183	22%	62%	15%	176	25%	58%	17%
Honduras	204	29%	61%	10%	203	30%	60%	11%
México	168	66%	25%	9%	168	68%	23%	9%
Nicaragua	200	29%	53%	18%	180	35%	45%	20%
Panamá	185	36%	50%	14%	187	40%	47%	13%
Paraguay	203	36%	45%	19%	195	39%	41%	21%
Peru	292	56%	21%	23%	285	60%	18%	23%
Dominican Republic	195	58%	27%	15%	170	64%	23%	13%
Uruguay	170	77%	5%	19%	168	81%	4%	15%
Total	**2,932**				**2,801**			

ANNEX B
Variables for areas and countries

Annex B1

Percentage of third-grade students who attend schools with water and sanitation services

	Drinking water	Drainage or sewerage	Bathrooms in good condition	Garbage collection
Brazil	97%	77%	85%	93%
Chile	99%	98%	97%	98%
Colombia	82%	83%	73%	86%
Costa Rica	99%	81%	86%	93%
Ecuador	91%	78%	78%	89%
Guatemala	77%	64%	73%	66%
Honduras	83%	51%	65%	52%
Mexico	88%	79%	73%	81%
Nicaragua	69%	36%	44%	56%
Panama	78%	55%	76%	72%
Paraguay	92%	27%	74%	49%
Peru	82%	78%	73%	75%
Dominican Republic	82%	64%	88%	87%
Uruguay	99%	93%	74%	96%

Annex B2

Percentage of third grade students who attend schools with connection to services

	Electricity	Telephone	Internet connection
Brazil	99%	83%	88%
Chile	100%	97%	97%
Colombia	95%	81%	81%
Costa Rica	100%	97%	96%
Ecuador	100%	72%	72%
Guatemala	92%	32%	26%
Honduras	81%	21%	25%
Mexico	98%	63%	69%
Nicaragua	70%	26%	28%
Panama	87%	64%	61%
Paraguay	99%	41%	23%
Peru	91%	59%	67%
Dominican Republic	94%	56%	49%
Uruguay	98%	98%	98%

Annex B3

Percentage of third-grade students who attend schools with pedagogical-academic spaces

	School library	Computer lab	Art and/or music rooms	Science lab
Brazil	65%	73%	14%	18%
Chile	95%	94%	41%	67%
Colombia	82%	93%	20%	66%
Costa Rica	68%	80%	21%	6%
Ecuador	43%	83%	17%	32%
Guatemala	50%	31%	6%	4%
Honduras	39%	57%	5%	10%
Mexico	66%	50%	6%	5%
Nicaragua	45%	29%	5%	3%
Panama	37%	78%	7%	31%
Paraguay	58%	26%	9%	7%
Peru	60%	77%	13%	33%
Dominican Republic	58%	29%	5%	11%
Uruguay	73%	35%	27%	14%

Annex B4

Percentage of third grade students who attend schools with office areast

	Principal's office	Additional offices	Teachers' meeting room	Health room
Brazil	80%	88%	60%	4%
Chile	99%	92%	89%	65%
Colombia	90%	81%	71%	33%
Costa Rica	89%	68%	47%	7%
Ecuador	80%	40%	46%	19%
Guatemala	74%	14%	19%	5%
Honduras	55%	17%	14%	6%
Mexico	86%	30%	22%	4%
Nicaragua	58%	22%	14%	3%
Panama	78%	54%	25%	17%
Paraguay	78%	43%	22%	6%
Peru	82%	51%	37%	13%
Dominican Republic	90%	49%	32%	14%
Uruguay	90%	38%	46%	3%

Annex B5

Percentage of third grade students who attend schools with multipurpose spaces

	Sports field	Gymnasium	Auditorium
Brazil	56%	15%	15%
Chile	77%	44%	27%
Colombia	80%	6%	45%
Costa Rica	55%	35%	17%
Ecuador	84%	3%	22%
Guatemala	60%	3%	9%
Honduras	53%	3%	16%
Mexico	74%	2%	8%
Nicaragua	40%	1%	18%
Panama	59%	25%	11%
Paraguay	78%	3%	14%
Peru	79%	5%	19%
Dominican Republic	56%	0%	17%
Uruguay	51%	14%	34%

Annex B6

Percentage of third grade students who attend schools with all the necessary classroom equipment

	Chalk	Teacher's table	Teacher's chair	Students' tables	Student's chairs
Brazil	94%	93%	94%	90%	97%
Chile	92%	98%	98%	99%	97%
Colombia	87%	75%	72%	75%	85%
Costa Rica	84%	93%	93%	96%	95%
Guatemala	74%	45%	49%	66%	61%
Honduras	48%	42%	36%	28%	37%
Mexico	83%	78%	79%	60%	78%
Panama	78%	85%	80%	86%	88%
Paraguay	80%	61%	60%	45%	66%
Peru	69%	69%	75%	75%	78%
Dominican Republic	81%	68%	69%	40%	48%
Uruguay	86%	85%	87%	78%	78%

Annex B7

Percentage of sixth grade students who attend schools with water and sanitation services

	Drinking water	Drainage or sewerage	Bathrooms in good condition	Garbage collection
Brazil	95%	84%	86%	95%
Chile	99%	97%	97%	98%
Colombia	82%	88%	82%	86%
Costa Rica	99%	82%	86%	95%
Ecuador	92%	77%	78%	91%
Guatemala	80%	65%	73%	69%
Honduras	83%	50%	67%	52%
Mexico	88%	80%	72%	82%
Nicaragua	75%	40%	47%	60%
Panama	81%	58%	77%	75%
Paraguay	93%	30%	75%	52%
Peru	85%	82%	74%	78%
Dominican Republic	81%	66%	91%	89%
Uruguay	99%	93%	76%	97%

Annex B8

Percentage of sixth grade students who attend schools with connection to service

	Electricity	Telephone	Internet connection
Brazil	100%	86%	96%
Chile	100%	97%	97%
Colombia	98%	79%	93%
Costa Rica	100%	97%	96%
Ecuador	99%	70%	71%
Guatemala	94%	36%	28%
Honduras	84%	25%	24%
Mexico	98%	62%	69%
Nicaragua	76%	30%	32%
Panama	90%	67%	62%
Paraguay	100%	45%	24%
Peru	93%	62%	71%
Dominican Republic	95%	62%	55%
Uruguay	100%	100%	99%

Annex B9

Percentage of sixth grade students who attend schools with pedagogical-academic spaces

	School library	Computer lab	Art and/or music room	Science lab
Brazil		88%	14%	38%
Chile	95%	96%	42%	68%
Colombia	83%	94%	34%	62%
Costa Rica	67%	81%	20%	6%
Ecuador	41%	83%	16%	31%
Guatemala	49%	36%	6%	4%
Honduras	45%	59%	6%	12%
Mexico	69%	48%	6%	6%
Nicaragua	50%	35%	5%	4%
Panama	38%	80%	8%	32%
Paraguay	62%	27%	9%	8%
Peru	62%	80%	15%	35%
Dominican Rep.	64%	38%	8%	17%
Uruguay	74%	33%	26%	12%

Annex B10

Percentage of sixth grade students who attend schools with office areas

	Principal's office	Additional offices	Teachers' meeting room	Health Room
Brazil	92%	97%	64%	4%
Chile	100%	93%	89%	64%
Colombia	90%	84%	76%	33%
Costa Rica	89%	68%	48%	7%
Ecuador	79%	38%	43%	19%
Guatemala	77%	16%	21%	6%
Honduras	55%	19%	16%	8%
Mexico	88%	29%	22%	4%
Nicaragua	64%	22%	16%	3%
Panama	79%	57%	24%	20%
Paraguay	81%	44%	25%	6%
Peru	84%	52%	37%	13%
Dominican Rep.	92%	56%	38%	17%
Uruguay	91%	40%	49%	3%

Annex B11

Percentage of sixth grade students who attend schools with multipurpose spaces

	Sports field	Gymnasium	Auditorium
Brazil	76%	20%	21%
Chile	77%	45%	28%
Colombia	73%	4%	45%
Costa Rica	56%	36%	17%
Ecuador	83%	2%	21%
Guatemala	62%	3%	11%
Honduras	52%	4%	17%
Mexico	75%	2%	8%
Nicaragua	47%	1%	22%
Panama	61%	25%	12%
Paraguay	78%	3%	14%
Peru	81%	7%	19%
Dominican Rep.	69%	0%	20%
Uruguay	53%	14%	35%

Annex B12

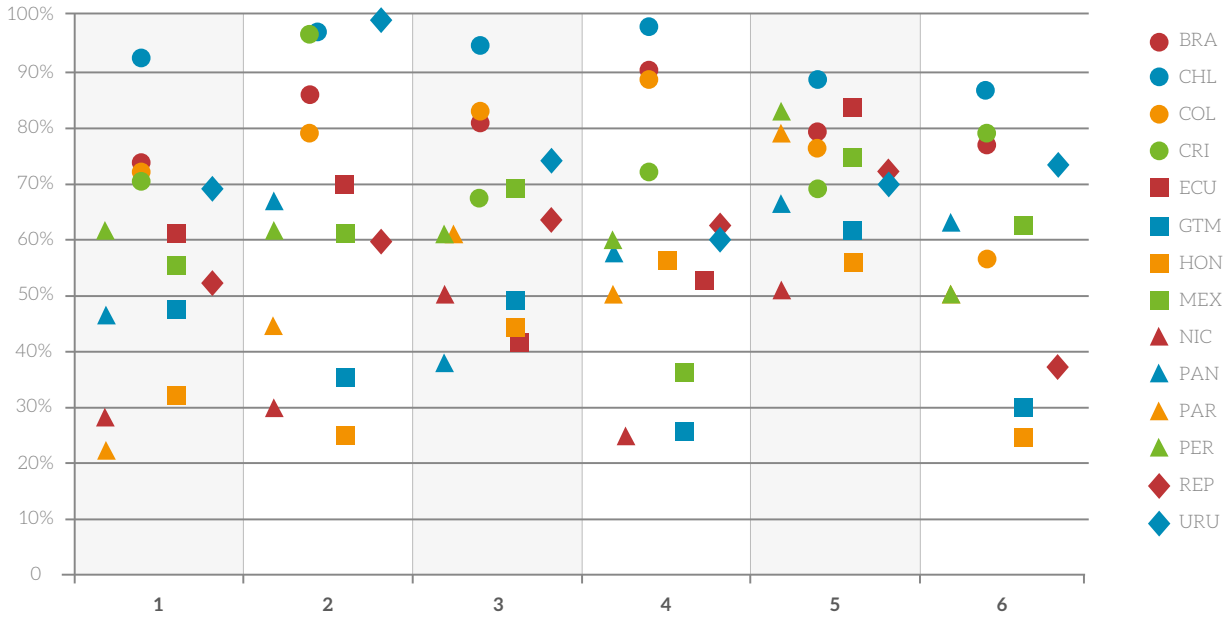
Percentage of sixth grade students who attend schools with all the equipment needed in the classroom

	Chalk	Teacher's table	Teacher's chair	Students' tables	Students' chairs
Brazil	90%	80%	83%	89%	95%
Chile	91%	98%	98%	99%	98%
Colombia	71%	55%	61%	62%	73%
Costa Rica	84%	93%	93%	96%	95%
Guatemala	75%	50%	52%	65%	59%
Honduras	46%	44%	37%	31%	41%
Mexico	83%	80%	82%	62%	80%
Panama	77%	85%	80%	85%	87%
Paraguay	81%	62%	63%	45%	67%
Peru	69%	68%	73%	77%	78%
Dominican Republic	82%	71%	69%	41%	50%
Uruguay	89%	89%	90%	80%	79%

ANNEX C
Sufficiency and equity in the 6th grade infrastructure

Annex C1

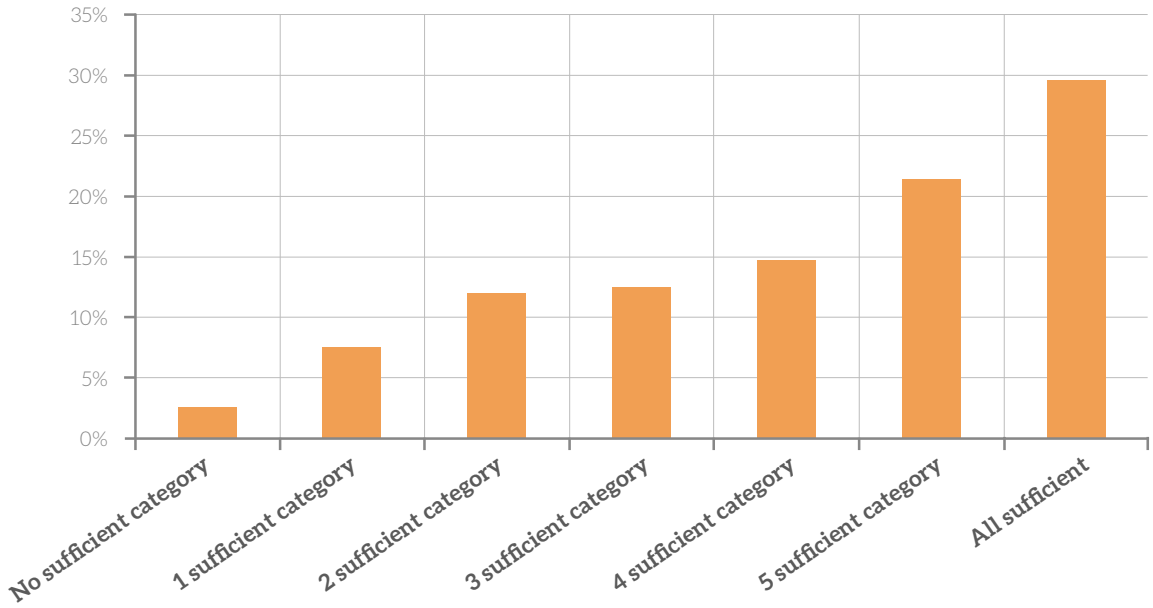
Sufficiency in school infrastructure by countries, according to TERCE 2013, sixth grade



Note: Ecuador and Nicaragua are excluded from the classroom equipment index.

Annex C2

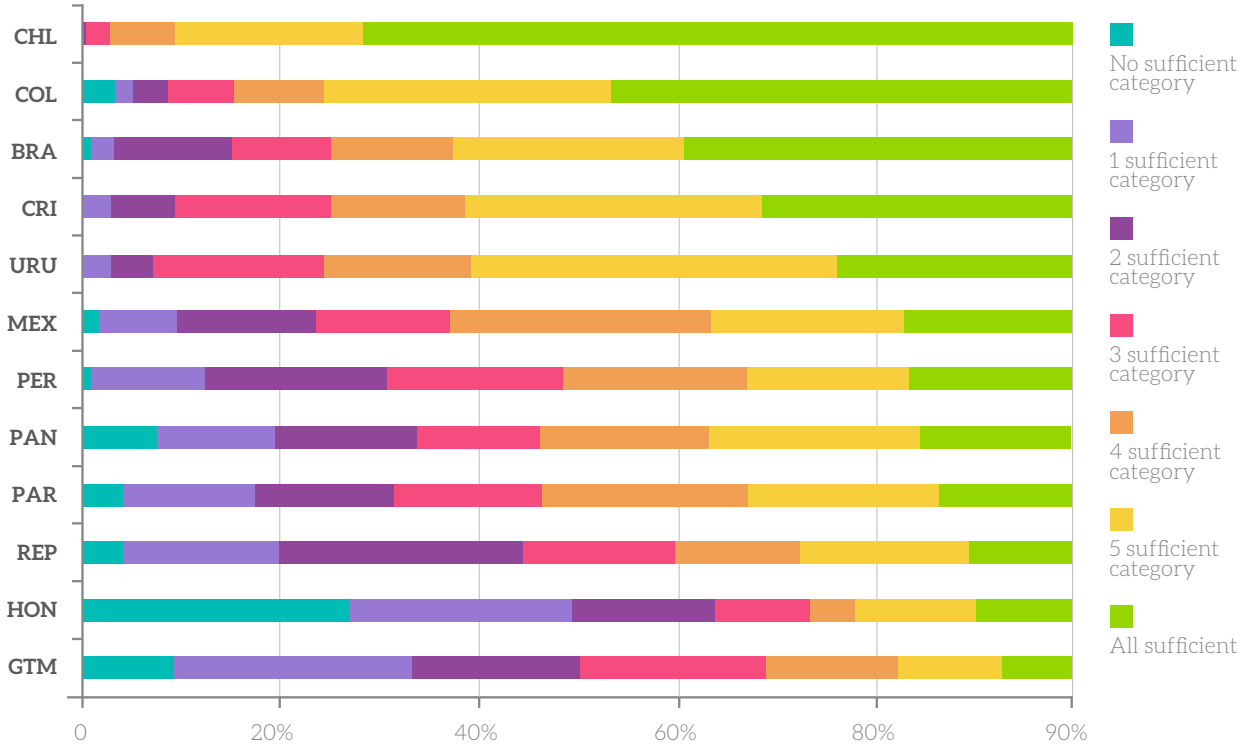
Percentage of sixth grade students who attend schools with sufficiency in the infrastructure categories, according to TERCE 2013



Note: Ecuador and Nicaragua are excluded from the analysis for lack of observations

Annex C3

Adequacy according to number of categories by countries, according to TERCE, sixth grade



Nota: Ecuador and Nicaragua are excluded from the analysis for lack of observations.

Annex C4

Sufficiency in the categories of school infrastructure and GDP per capita of the countries, TERCE 3rd grade

	GDP per capital in PPP*	Water and sanitation	Connection to services	Academic spaces	Office areas	Multipurpose rooms	Classroom equipment
Chile	21.968	93%	97%	95%	98%	89%	88%
Uruguay	19.956	66%	98%	73%	57%	67%	72%
Panama	19.714	44%	64%	37%	56%	65%	64%
Mexico	16.156	55%	62%	66%	36%	74%	60%
Brazil	15.726	67%	83%	65%	80%	58%	87%
Costa Rica	14.360	68%	97%	68%	71%	67%	80%
Colombia	12.711	61%	81%	82%	84%	86%	66%
Dominican Rep.	12.348	51%	55%	58%	57%	61%	35%
Peru	11.699	60%	59%	60%	59%	81%	52%
Ecuador	10.998	62%	72%	43%	55%	85%	
Paraguay	8.500	21%	41%	58%	46%	79%	50%
Guatemala	7.193	44%	32%	50%	22%	60%	26%
Honduras	4.761	34%	22%	39%	23%	57%	23%
Nicaragua	4.683	26%	25%	45%	23%	44%	

**PPP: Parity of Purchasing Power.*

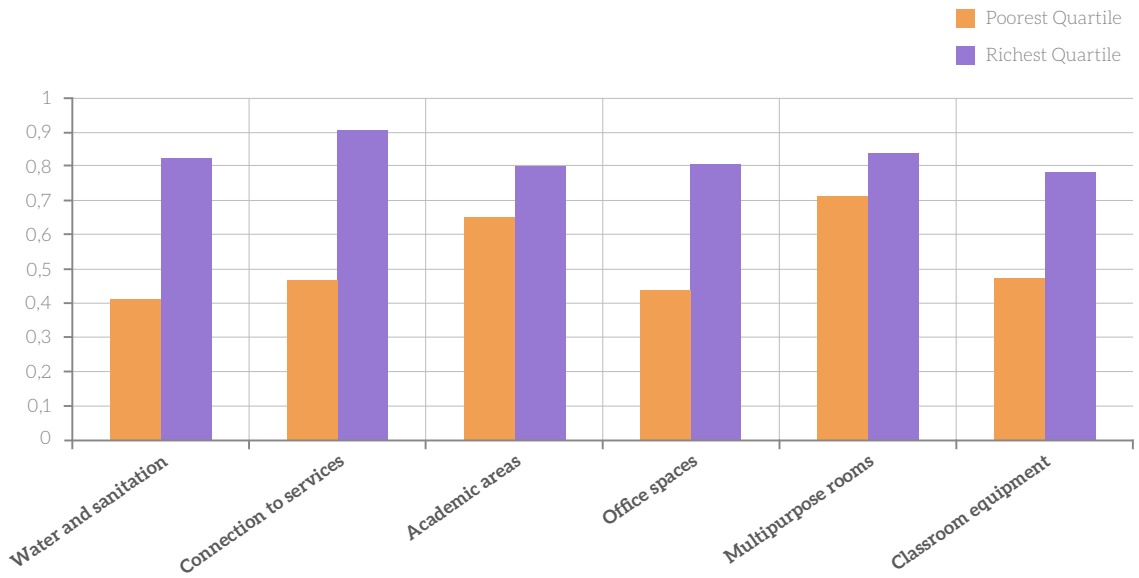
Annex C5

Percentage of students who attend schools with sufficient infrastructure by countries according to socioeconomic level TERCE 2013, Third grade

	Water and sanitation		Connection to services		Pedagogical spaces		Office areas		Multipurpose spaces		Classroom equipment	
	Quartile		Quartile		Quartile		Quartile		Quartile		Quartile	
	Wealthy	Poor	Wealthy	Poor	Wealthy	Poor	Wealthy	Poor	Wealthy	Poor	Wealthy	Poor
BRA	86.5	49.6	98.6	58.3	86.6	46.9	92.9	57.6	81.0	40.2	92.2	81.6
CHL	97.0	85.6	100.0	91.7	96.2	95.6	97.3	85.4	83.8	80.5	92.8	86.9
COL	83.9	33.8	99.4	55.1	92.4	70.3	91.0	67.2	82.5	73.4	89.4	45.7
CRI	87.5	50.8	99.9	92.7	82.8	51.7	84.2	53.8	69.7	48.2	85.6	75.9
ECU	86.7	41.4	96.1	48.7	64.7	27.5	69.5	20.0	86.8	84.6	NA	NA
GTM	71.2	23.7	66.7	9.9	51.4	52.3	39.5	2.4	72.3	50.3	46.0	17.1
HON	60.6	11.6	54.3	3.9	61.3	25.2	33.0	6.1	70.5	32.3	40.9	10.4
MEX	84.4	19.4	92.3	25.9	78.7	63.0	60.9	6.3	81.5	70.8	72.6	39.9
NIC	51.7	6.7	52.6	5.6	60.3	30.6	37.2	6.6	60.8	23.0	NA	NA
PAN	76.0	9.0	92.4	17.6	51.4	24.0	85.0	17.2	77.7	41.4	81.1	50.4
PAR	42.1	4.7	78.0	15.2	82.3	44.2	71.6	18.9	81.9	75.7	71.7	29.5
PER	85.2	32.1	92.8	22.6	61.9	54.2	77.2	24.0	76.7	76.3	70.1	43.4
REP	63.3	41.4	76.9	36.6	72.2	53.4	57.5	37.9	59.3	50.2	41.0	30.7
URU	83.9	52.4	99.5	98.4	82.6	68.4	52.5	27.1	55.3	57.9	80.0	64.0

Annex C6

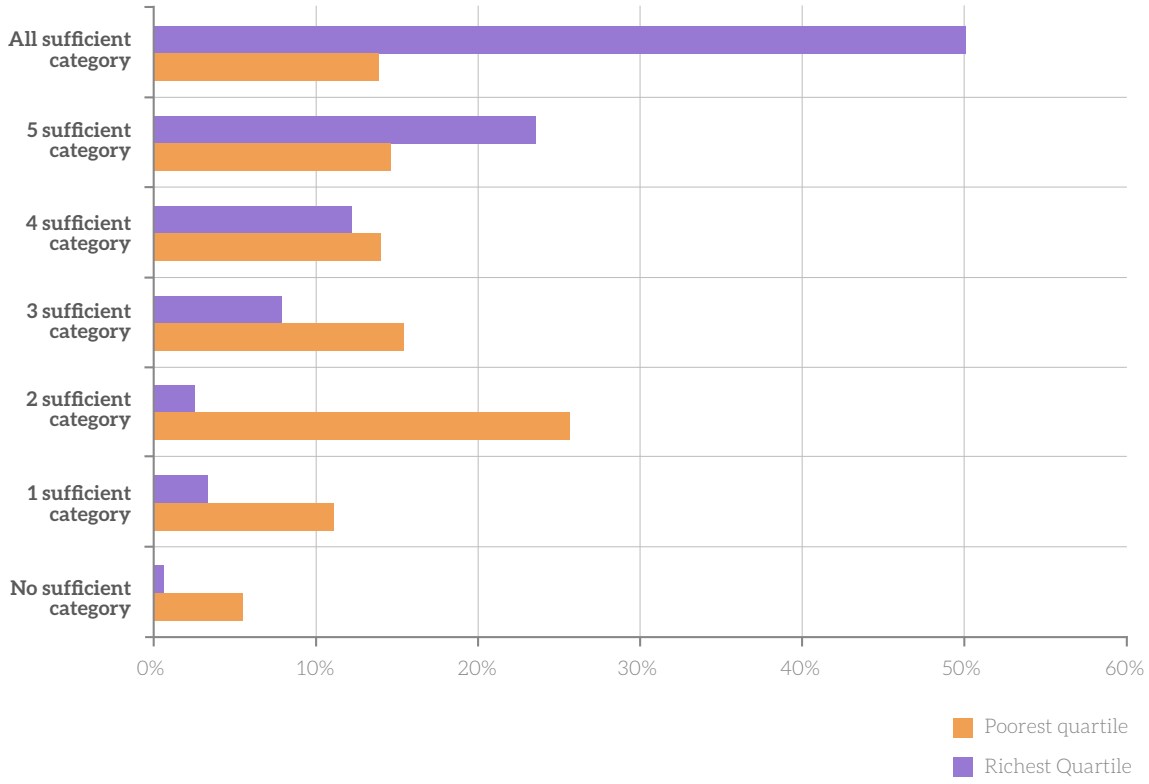
Percentage of third grade students who attend schools with sufficient levels of infrastructure resources according to socioeconomic level, sixth grade



Ecuador and Nicaragua are excluded from the classroom equipment indext.

Annex C7

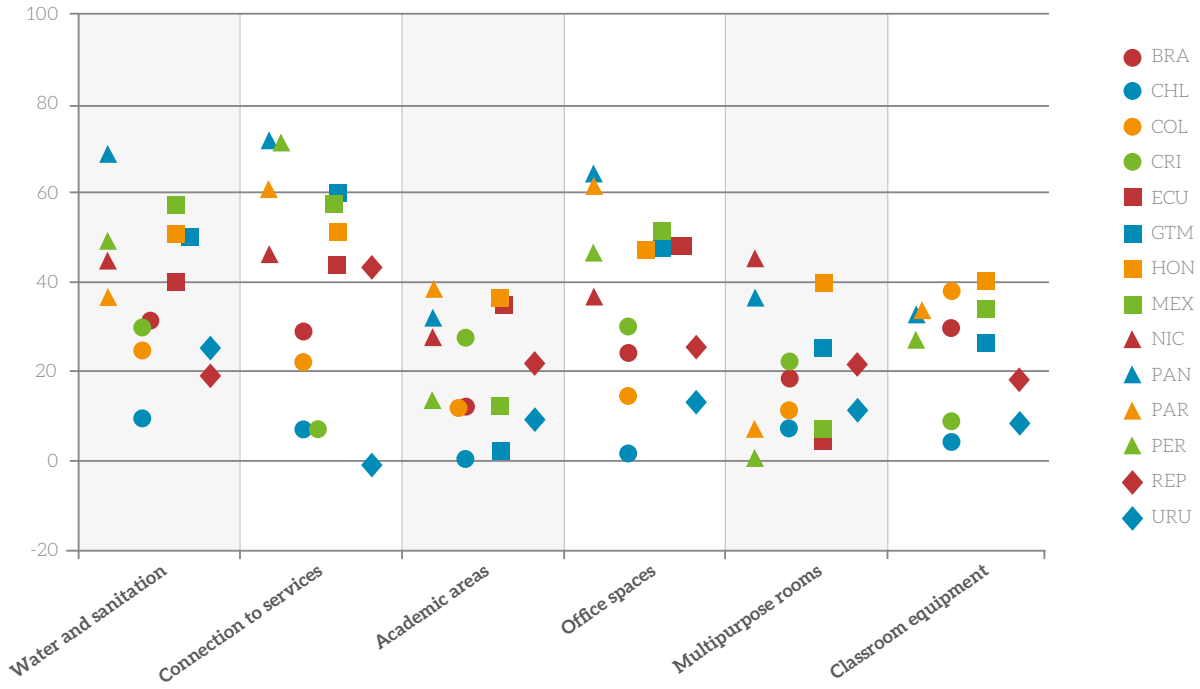
Socio-economic gaps in sufficiency according to number of categories with levels of sufficiency, TERCE 2013, sixth grade



Note: Ecuador and Nicaragua are excluded from the analysis for lack of observations.

Annex C8

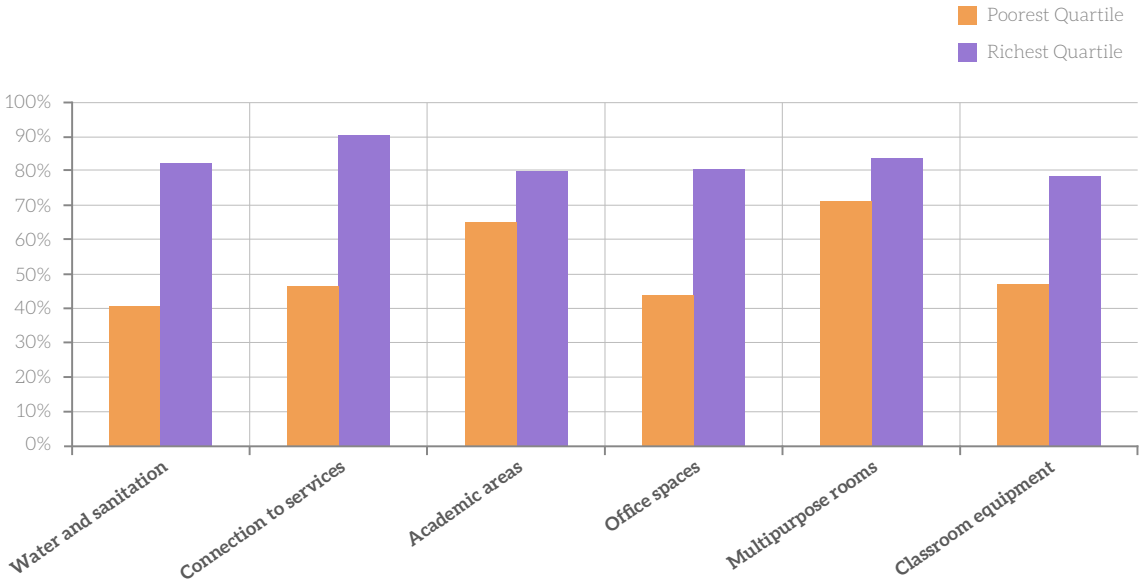
Socio-economic gaps in sufficiency between the wealthier quartile and the poorer quartile, TERCE, sixth grade



Note: Ecuador and Nicaragua are excluded from the classroom equipment index.

Annex C9

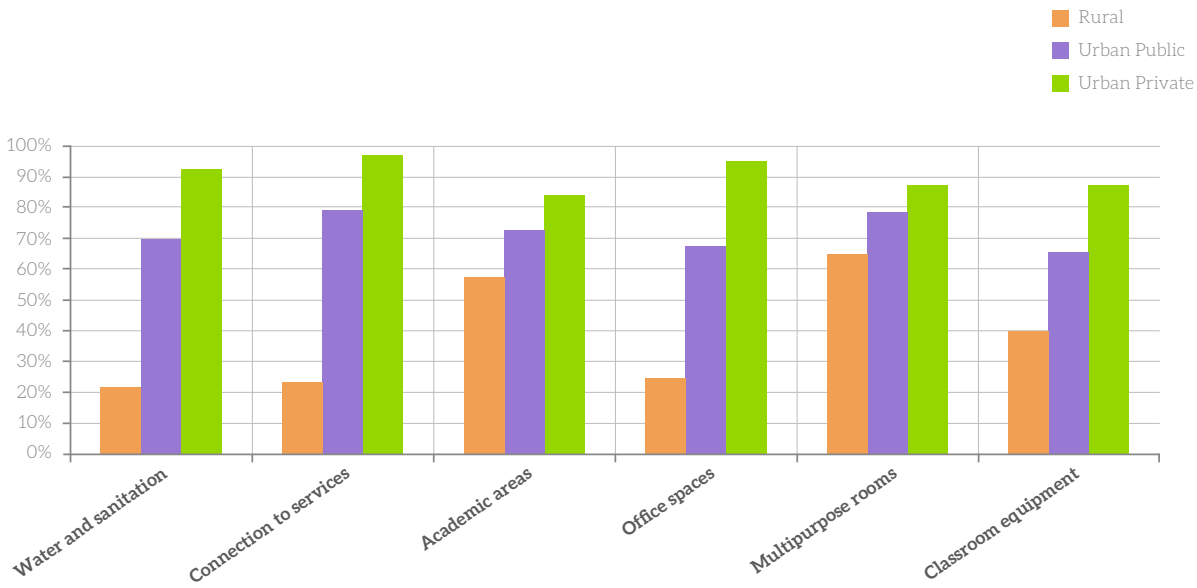
Sufficiency in categories of school infrastructure among the wealthier quartile and the poorer quartile by countries, TERCE, sixth grade



Note: Ecuador and Nicaragua are excluded from the classroom equipment index.

Annex C10

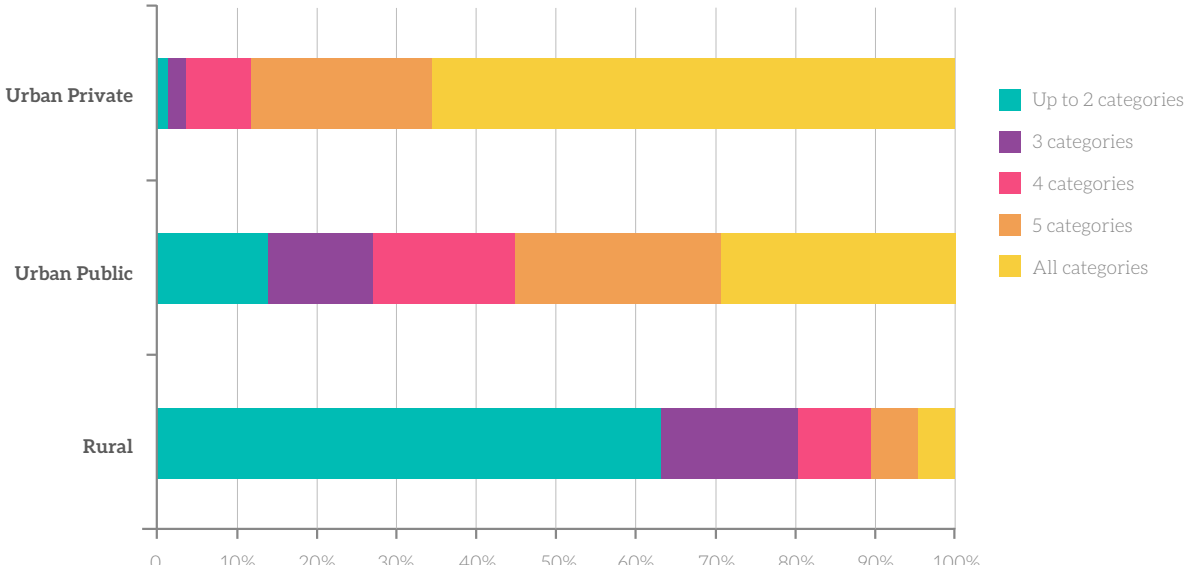
Percentage of sixth grade students who attend schools with sufficient levels of infrastructure resources according to geographical area and school type



Note: Ecuador and Nicaragua are excluded from the classroom equipment index.

Annex C11

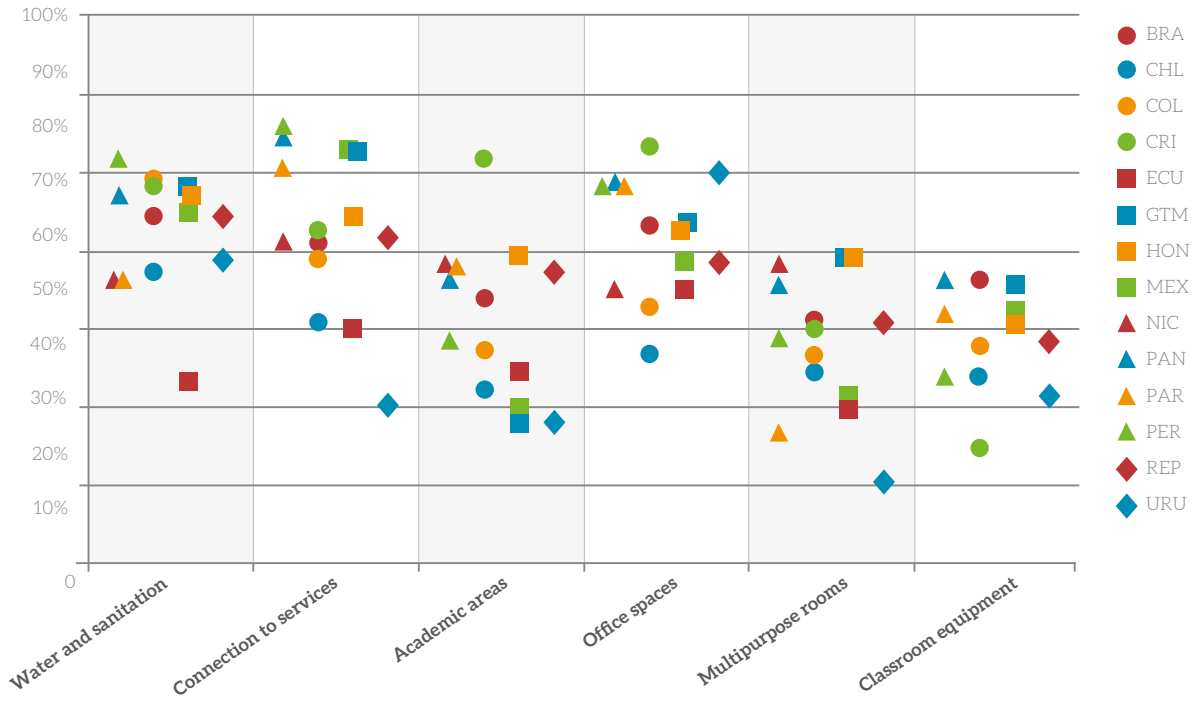
Geographical differences in sufficiency according to number of categories, TERCE 2013, sixth grade



Note: Ecuador and Nicaragua are excluded from the analysis for lack of observations .

Annex C12

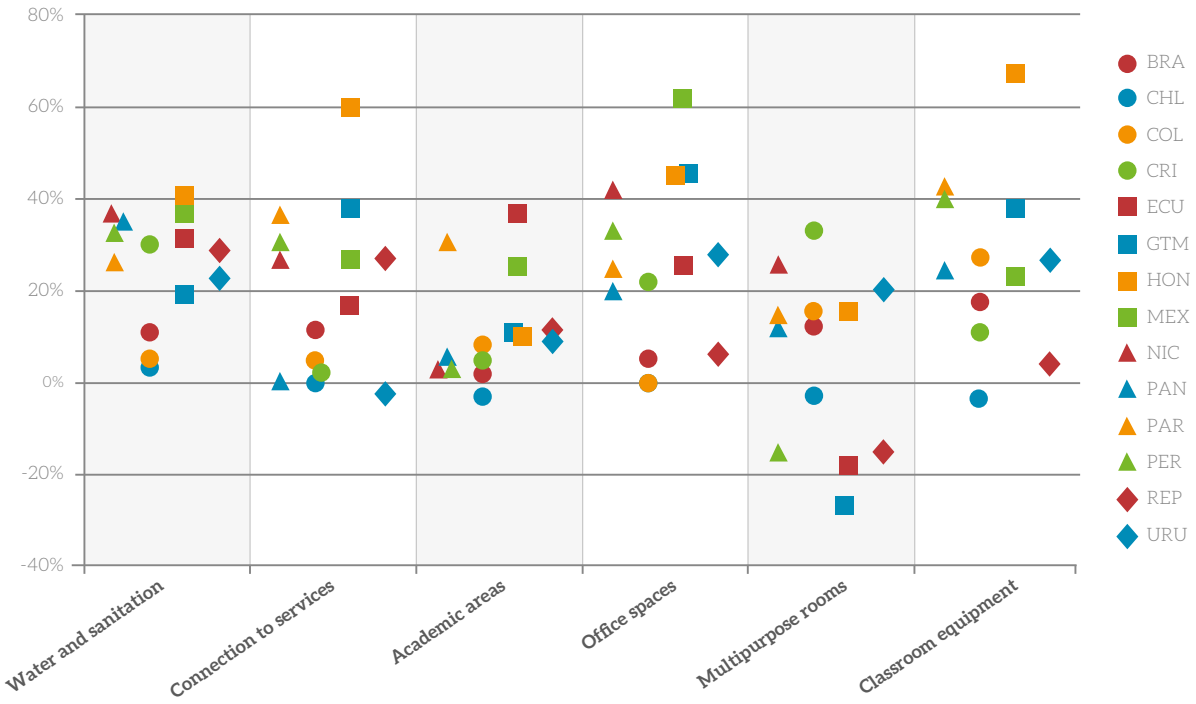
Socio-economic gaps in sufficiency between urban and rural areas, TERCE, sixth grade



Note: Ecuador and Nicaragua are excluded from the classroom equipment index.

Annex C13

Socio-economic gaps in sufficiency between public and private urban schools, TERCE, sixth grade



Note: Ecuador and Nicaragua are excluded from the classroom equipment index.

ANNEX D
Efficiency in the use of school infrastructure

Annex D1

Associations between school infrastructure and learning in Language and Reading, TERCE, Third grade

	Total		Urban		Rural	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and sanitation	6,52***	4,47***	7,41***	3	5,41***	3,90**
Connection to services	16,96***	12,88***	16,37***	10,68***	13,07***	10,17***
Pedagogical/academic spaces	11,94***	8,49***	12,27***	4,71***	6,55**	5,71**
Office areas	11,66***	8,58***	14,31***	8,76***	3,48	1,45
Multipurpose spaces	6,41***	5,00***	6,56***	4,35***	4,06*	3,61
Classroom equipment	2,54**	1,5	6,82***	1,29	1,15	0,73
Socioeconomic and Cultural Index (ISEC)		20,42***		20,79***		17,43***
Public school				-32,55***		
Constant	711,91***	710,25***	712,12***	731,25***	697,38***	699,69***
# of observations	40.902	37.585	26.658	24.299	14.244	13.286

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.

Annex D2

Associations between school infrastructure and learning in Mathematics, TERCE, Sixth grade

	Total		Urban		Rural	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and sanitation	3,90***	1,96	3,44	2,05	1,68	0,14
Connection to services	13,43***	8,87***	8,84***	3,49	10,80***	8,26***
Pedagogical/academic spaces	13,94***	10,46***	15,19***	7,83***	5,81**	4,96*
Office areas	7,77***	4,72***	10,55***	3,93**	1,94	1,22
Multipurpose spaces	5,96***	4,43***	5,41***	2,85**	5,36***	4,98**
Classroom equipment	3,34***	2,30**	7,86***	3,06*	2,64*	2,38
Socioeconomic and Cultural Index (ISEC)		20,50***		22,49***		14,03***
Public school				-30.49***		
Constant	712,18***	709,02***	713,46***	727,25***	694,33***	695,89***
# of observations	41.904	38.488	27.719	25.289	14.185	13.199

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.

Annex D3

Associations between school infrastructure and learning in Language and Reading, TERCE, Sixth grade

	Total		Urban		Rural	
	Without ISEC	**With ISEC**	**Without ISEC**	**With ISEC**	**Without ISEC**	**With ISEC**
Water and sanitation	5,90***	3,43***	3,24	1,47	3,16**	1,04
Connection to services	17,74***	12,26***	11,46***	5,23***	14,30***	10,80***
Pedagogical/academic spaces	12,66***	8,41***	13,66***	5,72***	4,62*	3,95
Office areas	11,64***	7,45***	12,63***	5,40***	5,85**	3,79*
Multiporpuse spaces	5,20***	3,29***	5,33***	2,39**	4,68**	3,97**
Classroom equipment	3,49***	2,03*	7,80***	2,58*	2,43	1,8
Socioeconomic and Cultural Index (ISEC)		25,69***		26,44***		21,08***
Public school				-29,43***		
Constant	713,90***	710,09***	719,35***	732,08***	692,61***	695,11***
# of observations	41.506	38.675	27.491	25.387	14.015	13.288

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.

Annex D4

Associations between school infrastructure and learning in Mathematics by country, TERCE, Third grade

	Brasil		Chile		Colombia		Costa Rica		Guatemala		Honduras	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and Sanitation	6,23	1,51	-23,32 *	-27,61 ***	5,72	4,87	1,42	-3,10	3,24	2,15	-1,69	-1,85
Connection to Services	23,09 ***	18,92 ***	14,81	16,23 *	19,53 ***	12,85 **	-2,83	-3,36	25,60 ***	20,45 ***	8,81	5,23
Academic Areas	17,28 **	11,39 *	11,04 *	6,36	11,92 *	8,51	9,91 **	5,26	10,38 *	6,81	8,22	6,38
Office Spaces	0,75	0,19	9,39	8,17	2,04	0,80	12,80 ***	9,03 **	19,57 ***	15,94 ***	12,41 *	11,64 *
Multipurpose Rooms	9,18	7,41	13,32 ***	9,30 ***	13,82 ***	10,84 ***	5,16 *	2,64	-8,40 **	-6,32 *	1,96	2,23
Classroom Equipment	7,30	4,28	7,74	12,28 *	11,47 **	6,41	4,14	2,92	6,35 *	5,32 *	5,02	3,97

	México		Panama		Paraguay		Peru		Dominican Republic		Uruguay	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and Sanitation	7,64	4,03	11,23 **	7,11	-1,56	-3,38	7,51 *	6,92 *	1,25	-0,47	-7,34	-8,05
Connection to Services	10,64 **	6,40	8,90 *	7,79 *	14,04	9,65	30,09 ***	27,32 ***	2,41	-0,11	21,44	18,44
Academic Areas	15,29 ***	11,70 **	18,73 ***	15,04 ***	17,90 **	13,95	-4,20	-4,39	17,24 ***	14,81 **	25,87 ***	16,93 ***
Office Spaces	15,92 ***	8,91	3,13	-0,51	-0,73	-2,15	19,20 ***	16,21 ***	0,77	-0,91	3,29	1,05
Multipurpose Rooms	2,88	2,48	-0,00	0,79	16,24 **	16,82 **	4,36	4,39	-3,39	-1,48	12,06 **	6,68
Classroom Equipment	3,69	2,72	12,49 **	11,02 **	-2,95	-3,31	3,25	3,00	4,08	4,30	-0,83	1,84

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.

Annex D5

Associations between school infrastructure and learning in Language and Reading by country, TERCE, Third grade

	Brasil		Chile		Colombia		Costa Rica		Guatemala		Honduras	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and Sanitation	6,40	2,37	-7,68	-12,10	6,76	6,02	1,24	-2,82	6,09	4,89	6,12	6,32
Connection to Services	20,09 ***	15,26 ***	13,68	13,77	18,23 ***	12,40 **	11,40	10,26	26,13 ***	22,06 ***	6,69	3,34
Academic Areas	15,97 ***	10,41 ***	9,16 *	5,11	9,44	6,53	8,70 *	4,11	9,28 *	6,85	10,85 *	9,07
Office Spaces	6,03	3,80	7,91	6,56	6,62	5,20	16,87 ***	12,93 ***	17,68 ***	14,25 ***	17,86 ***	15,58 ***
Multipurpose Rooms	5,82	4,54	16,12 ***	11,38 ***	14,21 ***	10,99 ***	5,01	2,78	-3,09	-1,59	2,02	1,99
Classroom Equipment	1,74	-0,29	2,18	4,71	10,99 **	5,31	6,15	5,17	6,51 *	5,68 *	0,57	-1,03

	Mexico		Panama		Paraguay		Peru		Dominican Republic		Uruguay	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and Sanitation	10,64 **	8,38 **	6,83	1,57	11,16 **	8,30	6,92 *	5,94	4,32	3,08	-4,84	-5,95
Connection to Services	12,90 ***	6,59	11,70 **	10,38 **	22,34 ***	17,99 **	30,80 ***	27,31 ***	2,06	-1,72	14,91	10,37
Academic Areas	19,43 ***	15,87 ***	15,52 **	11,47 **	16,04 **	11,95	-1,52	-2,05	13,57 **	9,71 *	16,63 ***	9,78 **
Office Spaces	18,90 ***	10,93 **	9,69 *	6,29	-1,81	-1,86	17,59 ***	14,07 ***	7,71	6,82	9,29 *	7,30
Multipurpose Rooms	5,50	5,28	2,06	1,52	9,25	8,50	5,74	5,74	-2,07	-0,70	10,58 **	5,16
Classroom Equipment	-0,74	-2,10	10,44 *	9,16 *	0,70	0,64	0,95	0,77	4,79	5,06	-3,61	-1,49

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.

Annex D6

Associations between school infrastructure and learning in Mathematics by country, TERCE, Sixth grade

	Brazil		Chile		Colombia		Costa Rica		Guatemala		Honduras	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and Sanitation	-0,84	-3,68	-6,54	-2,78	0,63	-0,41	3,94	0,49	-0,05	-1,57	-0,97	-2,12
Connection to Services	22,04 **	18,38 **	6,05	3,16	-0,05	0,15	4,82	6,16	15,88 ***	11,60 ***	4,96	2,09
Academic Areas	14,45 **	9,73	13,56 **	8,83	13,02 *	10,95 *	7,57	2,62	10,47 **	8,24 **	14,61 ***	13,84 **
Office Spaces	7,84	3,35	1,42	2,25	14,61 **	11,52 **	16,75 ***	12,18 ***	16,63 ***	12,88 ***	8,18	7,01
Multipurpose Rooms	2,11	0,67	20,34 ***	15,81 ***	10,32 **	9,33 **	3,22	0,68	-5,03	-4,42	1,70	1,79
Classroom Equipment	11,73	9,69	3,68	4,28	-1,34	-3,00	13,51 **	12,57 **	4,21	3,81	5,45 *	4,51

	Mexico		Panama		Paraguay		Peru		Dominican Republic		Uruguay	
	Without ISEC	Con ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and Sanitation	8,62 *	3,53	1,59	-1,44	7,56	4,03	6,32 *	4,50	3,58	2,03	-8,36	-7,79
Connection to Services	11,80 **	4,36	11,04 **	8,86 **	12,62 **	7,26	30,85 ***	25,79 ***	3,21	0,43	44,91 **	32,78 **
Academic Areas	21,36 ***	14,95 **	14,77 **	11,33 **	14,43 **	10,97 *	4,64	3,98	8,28 ***	5,28 *	26,33 ***	15,75 ***
Office Spaces	5,50	-2,04	4,46	1,12	1,80	1,93	13,45 ***	9,39 **	7,15 **	5,59 **	2,38	0,03
Multipurpose Rooms	3,34	2,80	5,66	5,05	6,32	4,65	4,85	5,04	0,29	0,00	10,90 **	4,96
Classroom Equipment	6,18	3,43	5,72	6,44	2,82	2,57	7,41 **	6,79 **	0,63	0,59	-1,02	-0,90

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.

Annex D7

Associations between school infrastructure and learning in Language and Reading by country, TERCE, Sixth grade

	Brazil		Chile		Colombia		Costa Rica		Guatemala		Honduras	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and Sanitation	4,24	3,24	-26,34 ***	-20,29 **	1,39	0,61	7,59	2,95	0,09	-1,72	0,17	-2,06
Connection to Services	19,16 **	13,35 *	15,15	11,39	-0,23	-0,50	7,35	7,94	19,97 ***	13,87 ***	12,28 ***	7,26 **
Academic Areas	9,46	4,13	7,82	3,79	13,47*	10,89 *	8,55 **	2,92	9,67 **	6,27	16,25 ***	12,84 ***
Office Spaces	11,72	3,82	9,14	7,62	14,90 **	10,69 *	13,13 **	8,55 **	18,85 ***	14,57 ***	9,08 **	7,26 *
Multipurpose Rooms	3,58	0,90	14,48 ***	10,55 ***	9,03 *	7,92 *	4,75	1,37	-2,76	-2,18	3,64	3,71
Classroom Equipment	9,62	7,82	0,50	0,13	3,63	1,62	7,00	6,81	4,66	4,12 *	7,24 **	5,25 **

	Mexico		Panama		Paraguay		Peru		Dominican Republic		Uruguay	
	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC	Without ISEC	With ISEC
Water and Sanitation	7,31	2,70	6,80	-0,39	18,40 ***	12,95 ***	8,46 **	6,47 **	3,57	1,73	1,02	0,60
Connection to Services	17,71 ***	9,87 **	15,17 ***	14,01 ***	19,38 ***	11,37 **	31,85 ***	25,95 ***	9,50 **	5,99*	13,30	7,66
Academic Areas	18,73 ***	13,48 **	13,11 **	7,57	7,35	3,49	5,94	5,22	11,02 ***	6,44 *	22,21 ***	10,30 **
Office Spaces	8,82	1,62	6,80	1,29	18,31 ***	14,64 ***	15,88 ***	11,29 ***	6,33	4,60	11,90 **	8,36 *
Multipurpose Rooms	6,02	5,10	8,04 **	6,50 **	1,55	0,67	4,19	3,91	3,31	3,22	11,20 ***	4,61
Classroom Equipment	5,72	2,49	0,50	-1,00	1,77	1,20	4,24	3,33	1,16	0,83	-3,58	-2,46

Note: (***) significant at 1%; (**) significant at 5%; (*) significant at 10%.

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