

Learning in Twenty-First Century Schools

*Note 1.
Series Introduction*

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Series Introduction

This series of notes summarizes work performed by the countries of Latin America and the Caribbean under the project on Learning in Twenty-First Century Schools, a Technical Cooperation on Regional Public Goods funded by the Inter-American Development Bank (IDB). The project's main aim was to study, jointly with the countries of the region, the state and challenges of school infrastructure, to suggest solutions, and to encourage the adoption of subregional building standards. The Caribbean countries were particularly interested in possibilities for public-private partnerships for financing school infrastructure, and the countries of Central America and the Andean region were keen on the prevention of natural disasters. In general, all recognized the need to have a workable system for school maintenance and a flexible, real-time way of keeping track of the state of the stock of educational infrastructure.

This series of notes represents the major results of that project around the key themes of planning, designing, building, operating, and maintaining school infrastructure. The notes consider cases in Latin America and the Caribbean but draw on best practices from around the world.

Planning school infrastructure

Many educational facilities in the region are outdated in their design, particularly classrooms whose size, proportions, and level of comfort are not conducive to the dynamics and interaction required for effective learning. In addition, owing to a lack of modernization, prevention, and maintenance, the existing infrastructure represents a heavy financial burden for these countries rather than a valuable asset with which to enhance education. In many cases, places of learning are unsafe or in poor condition, which has a negative impact on their operations. However, the most alarming finding was that some of the buildings characterized by poor design and construction were built in the last 20 years.

The process of building a school begins with planning and goes through the stages of design, construction, operation, and maintenance. Planning seeks to allocate school infrastructure efficiently. To this end, it uses tools such as demographic information and an inventory of existing school infrastructure, while also considering the financial dimension.

The last few decades in Latin America and the Caribbean have seen advances in the design of projects for educational institutions as well as in many aspects of school design, including the provision of dedicated open spaces for pre-school classrooms, extensive provision of multiple-use rooms, attention to classroom layout and furniture suitable for group work, and smaller rooms for support classes (among others).¹ However, achievements have been limited, as not all of the existing capacity is suitable for either teaching or school community needs.

Despite these efforts, progress in design has not kept pace with pedagogic advances, particularly in terms of interactions between teachers and students, technology use, and opening schools up to the community.

One of the major challenges for the planning process in the region is accurately calculating the deficit in school infrastructure. The lack of up-to-date data on the stock of school facilities and their state of repair means that many decisions have to be based on guesswork. While some countries in the region have conducted surveys of school infrastructure, collecting data is a slow process, and the surveys are usually out-of-date by the time they are needed. This reduces their value as decision-making tools, as they provide insufficient information on which to base appropriate decisions on siting new schools, replacing or enlarging existing schools, or conducting maintenance or repair programs. Apart from the lack of up-to-date data for each country, architectural programs, construction standards, and costs per square meter differ

from country to country, making it difficult to make comparisons across the region.

To deal with this challenge, the project on Learning in Twenty-First Century Schools developed an instrument for use in a Regional School Infrastructure Survey (Censo de Infraestructura Escolar Regional, or CIER). The purpose of the survey is to compile an inventory of existing infrastructure and its current condition.

The traditional source of funding for school buildings has been the public sector. However, experience shows that in this region, the state has not been able to meet increasing needs, forcing it to seek other models of financing to enable it to make up the deficit. Links between the private sector and government can offer substantial benefits to the community and foster confidence in the government's ability to provide quality education.²

The project addressed the issue of public-private partnerships (PPP) as an alternative mechanism for financing school construction. The results of this work were as follows: (i) alerting countries in the region to the advantages of joining together with the private sector to build and update schools without privatizing education; (ii) discussing how to ensure that spending on school infrastructure does not appear in government budgets as investment, particularly for those countries with fiscal deficits; and (iii) providing a diagnosis of the institutional situation, specifying what is required to enable both the public and the private sector to become involved in a mutually beneficial relationship.

Design of educational institutions

A key aspect to take into consideration in designing school buildings is their environmental impact. The energy and materials used in building, heating, cooling, and lighting conventional buildings accounts for

1. "Programa Nacional 700 Escuelas" [National 700 Schools Program], Federal Ministry of Planning, Public Investment, and Services, Buenos Aires, Argentina, June 2011; "Memoria 2009–2012" [2009–12 Report], INIFED (National Institute on Physical Infrastructure for Education, Mexico (November); "Espacios Educativos 1990–2010" [Education Spaces, 1990–2010], Bicentennial Edition, Ministry of Education of Chile. OREALC/UNESCO; "Más y Mejores Colegios para Bogotá" [More and Better Schools for Bogotá], Educational projects in the framework of the agreement between the Secretariat of Education of Bogotá, DC, and the National University of Colombia, October 2009.

2. Blyth, Alastair, Rodolfo Almeida, et. al. 2012. *Upgrading School Buildings in Mexico with Social Participation: The Better Schools Programs*. Mexico City: OECD-CELE.

around 40% of global energy consumption and about a third of greenhouse gas emissions,³ the main cause of global warming and a key source of pollution. The energy crisis and the process of global climate change demand a focus on measures to ensure energy efficiency, reduce greenhouse gas emissions (GGE), and protect against social and natural disasters.⁴

The concrete expression of this theme in the project on Learning in Twenty-First Century Schools was the design of an Environmental and Energy Audit of classrooms. Audits were carried out in schools in six participating countries⁵ under the guidance of local universities in each country with a view to ascertaining the location of schools, staff numbers, student numbers, room sizes, equipment, and objective measurements of comfort levels in terms of acoustic, thermal, lighting, and air-quality conditions in classrooms in a sample of schools. The aim was to analyze 50 schools and to include two classrooms in each school with different orientations, conduct measurements during two different seasons of the year (winter and summer), and survey around 30 students per classroom, bringing the total sample size to some 6,000 observations.

These were analyzed by school, by country, and between schools in similar situations in different countries. The objective measurements were compared with the standards for each country, while international standards were used in comparisons between countries. This analysis generated a number of recommendations for the design of school infrastructure applicable to different climatic conditions. These recommendations can be applied immediately to new construction in the countries involved and will be available for study by countries that did not take

part in the project but that share similar environmental conditions.

Another important outcome of the project is the Infrastructure Standards and Guidance Matrix, which consists of a comparative listing of building standards, regulations, and costs. Drawn up largely by the Argentinian and Chilean representatives to the project, the matrix includes information from 10 countries of the region as well as comparisons between countries in terms of standards, space types, sizes, and costs. In future, it will be possible to create an online reference library containing all of these data, which will be updated periodically.

Maintenance and prevention of disasters

Once school buildings are in use, maintenance becomes an issue. School buildings are subject to heavy use, probably more so than other public buildings, and their occupants not infrequently cause damage, usually inadvertently. Taken together with building defects owing to insufficient supervision during construction and the use of residential fittings (such as taps and sanitary equipment) rather than institutional fittings, maintenance can be quite a challenge.

As a result of the project, seven countries in the region showed particular interest in taking part in a diagnostic study of school building maintenance.⁶ The analysis covered: (i) collecting and analyzing existing information systems and data on school building infrastructure, maintenance, and equipment, and (ii) defining methodological strategies for overcoming problems based on international experiences adapted to the socioeconomic conditions of the region. Members of the project's technical team obtained the information they needed for the analysis

3. United Nations Environmental Program, 2007.

4. "Manual de Diseño Pasivo y Eficiencia Energética en Edificios Públicos" [Manual of Passive Design and Energy Efficiency in Public Buildings]. Proyecto Innova Chile. May, 2012.

5. Argentina, Chile, Colombia, Costa Rica, Mexico, and the Dominican Republic participated.

6. The participating countries were Argentina, Barbados, Colombia, Guatemala, Honduras, Jamaica, and the Dominican Republic

and discussed possible improvements for each country with a consultant.

Although the Organization of American States (OAS) has made major advances in risk management,⁷ these have not been adequately implemented. Throughout the region, there is often cause to regret the loss of life caused by natural disasters, and this should inspire a thorough rethinking of current regulations and the development of practical proposals to ensure that adequate measures are in place to prevent – or at least mitigate – the effects of natural disasters.

Six countries from the Andean, Central American, and Caribbean regions were more than willing to discuss in both face-to-face and virtual workshops the measures they have taken in their own countries to protect schools from adverse natural events and thus

to minimize their effects.⁸ This joint work, facilitated by a specialist in this area, produced a diagnostic tool for Risk Management Systems for dealing with natural disasters. Standards and regulations, exposure to risk, and the institutional structures available for each country were discussed. To put these aspects into perspective, experiences in OECD countries that apply international standards were also discussed. On the basis of these studies, the regional countries participating in the discussion formulated alternative methods of protection and made suggestions for improving current methods.

The series of notes

This series of notes presents a detailed analysis of the distinct aspects of school infrastructure: planning, design, construction, operation, and maintenance. These aspects have been explored by academic experts and those responsible for school infrastructure policy in the region. It is hoped that the notes will prove useful to those involved in making decisions about investments in school infrastructure.

7. "Plan de Acción Hemisférico para la Reducción de la Vulnerabilidad en el Sector Educativo a los Desastres Socio-Naturales" [Action Plan for Reducing the Vulnerability of School Buildings to Natural Hazards]. Organization of American States, Washington, DC, 1998. <http://www.oas.org/nhp/planeduc.html>; González, Pablo, and Rosa Trejo. 2008. "La Gestión de Riesgos a Desastres Naturales en el Sector Educación" [Risk Management for Natural Disasters in the Education Sector], Department of Sustainable Development. Organization of American States, Washington, DC.

8. The countries were Chile, Colombia, Guatemala, Honduras, Mexico, and the Dominican Republic.



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