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Evaluating Quality in Educational Facilities

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FEATURE

EVALUATING QUALITY IN EDUCATIONAL FACILITIES

All students have the right to a quality learning environment. However in many countries, the educational process is compromised by poorly constructed facilities that are vulnerable to both natural and man-made hazards, by inflexible and inaccessible learning spaces, and by badly lit, poorly constructed and inadequately ventilated classrooms. While governments agree that quality educational facilities are an important policy concern, no consensus has been reached on how to define quality. Some case studies show that involving multiple stakeholders from both public and private sectors in the design, planning and management of educational spaces can have a positive impact on student motivation and educational outcomes; however there is little consensus about how to effectively measure quality.

In 2005, the OECD Programme on Educational Building (PEB) organised two international experts' group meetings to discuss how countries define and evaluate quality in educational facilities. The meetings' objectives were to define a set of international criteria for assessing quality, to discuss quantitative and qualitative methodologies that have been used to measure quality, and to examine the positive and negative aspects of implementing these methodologies in local, provincial and national settings. More than 40 international experts – architects, social scientists, academics, facility evaluation specialists, and representatives from state and national administrations – from a total of 14 countries, the Organisation of American States and UNESCO participated in the meetings, held in Lisbon, Portugal, and Telchac-Puerto, Mexico.

The research and experiences of six experts are presented in this article, in addition to the lessons learned from the experts' group meetings. The director of a state construction programme describes the standards used to assess the educational adequacy of all public school facilities in the State of Maryland in the United States. A researcher presents a post-occupancy evaluation methodology used in schools in São Paulo, Brazil. Another researcher presents a data collection tool used to develop indicators on educational infrastructure in a number of municipalities in Greece. Two administrators discuss the development of norms to ensure minimum standards of quality and security in educational facilities in Mexico. Two architects present the results of a recent post-occupancy evaluation conducted in a new school in Pendão, Portugal. And an urban planner presents an international project to construct new schools in El Salvador using quality criteria.

The outcomes of the two experts' meetings include ideas for further international co-operation.

TASK FORCE TO STUDY SCHOOL FACILITIES IN MARYLAND, UNITED STATES

In 2002, a State Task Force to Study Public School Facilities was created in response to the findings of a national report, which charged the state with failing to address the issue of facility equity in school systems. The role of the task force was to review, evaluate and make recommendations regarding the adequacy of public school facilities in the State of Maryland in the United States to support educational programmes. With a total population of about 5.6 million, Maryland has 24 public school systems serving approximately 870 000 students aged between four and 18 years.

The task force's review was completed in two phases. In the first phase, 31 standards identified as having the most potential for impact on educational programmes and learning were defined and grouped into four categories:

- Health and safety (*e.g.* indoor air quality, fire safety and toilets).
- Educational programme support (*e.g.* human comfort, acoustics and student capacity).
- Instructional areas (*e.g.* pre-kindergarten, elementary, secondary, technology and special needs education).
- Instructional support areas (*e.g.* adequate space for health services, food services and teacher planning areas).

Using the 31 standards, the task force designed a survey instrument and completed a state-wide facilities survey on the present condition of Maryland's 1 342 public schools.

The second phase of the project identified the cost of bringing schools up to the standards identified in the first phase: an estimated USD 3.85 billion.

Using survey results, the task force was able to communicate to decision-makers the deficiencies in public school standards and the cost of bringing school facilities up to these standards in a tangible manner. As a result of the task force report, USD 250 million in state funding was approved for school construction for fiscal year 2006, a near 100% increase compared with the previous year.

Survey data were also used to establish local and state priorities. Local school systems found, for example, that survey results and existing local information were useful for prioritising major renovation projects. Likewise, survey data helped determine the relative priority of systemic renovation projects that address electrical, structural and mechanical building systems.

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USING POST-OCCUPANCY EVALUATION IN BRAZIL

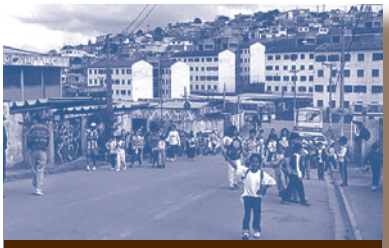
In Brazil, post-occupancy evaluation (POE) has been used over the last two decades by researchers at the University of São Paulo to evaluate the performance of the built environment from the perspective of the building's users. The resulting diagnosis provides important feedback for managing the quality of the planning, programming, design and construction process, and the use, management and maintenance of the built environment. The evaluation considers users' needs and satisfaction as they relate to a building's functional aspects, construction system, comfort, cost-benefit and maintenance.

Post-occupancy evaluation is characterised by its multi- and inter-disciplinary nature, which espouses a systemic and integrated vision of the built environment. Many school buildings in São Paulo are of similar construction, which facilitates such an approach.

A number of qualitative methods are used to evaluate users' needs and satisfaction with the built environment:

- Observation and mapping of activities and behaviours using graphs, photographs or videotapes.
- Open, free or semi-structured interviews with students, teaching and non-teaching staff, and maintenance personnel.
- Face-to-face questionnaires.
- Small, one-hour focus groups with all stakeholders.
- Students' drawings or essays.

Results from POEs in Brazil have indicated a need to improve the performance and quality of public pre-school, primary school and secondary school facilities. Many students, teachers and staff have been dissatisfied with the level of environmental comfort, in particular room temperature and noise from adjacent classrooms. In addition, furniture and equipment were reportedly ergonomically unsuitable for the age groups using them, and the school building entrance, parking, toilets and educational spaces were inaccessible to students with physical disabilities. Users have also criticised the lack of security against intruders and reported problems of thefts, vandalism and graffiti.



Outside a school in São Paulo's suburbs © Marcelo de Andrade Roméro



Standard public school building in the suburbs of São Paulo © Sheila Walbe Ornstein



Ongoing participatory design as part of a post-occupancy evaluation © Sheila Walbe Ornstein

Specific recommendations from the POEs have included improvement of space management; greater consideration of room size as it relates to educational function and to the number and age of students; increased provision of information and communications technology; improvement of fire and accident safety and of security against intruders; and improved accessibility, comfort conditions and maintenance management.

In Brazil, many problems related to school facilities could be addressed through more "humanised" architecture, which is responsive to users' needs and incorporates construction systems that are compatible with low-cost preventive maintenance programmes. In this context, the use of an intensive participatory design such as POE can inform school facility planning and maintenance.

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EVALUATION SCHOOL BUILDINGS INDICES QUALITY SYSTEM IN GREECE

The "Evaluation School Building Indices Quality System" (ESBI-Qsystem) aims to develop principles, methodologies and reliable, effective criteria for the evaluation of educational infrastructure. The core ideas of the project are: a) to propose and approve reliable and measurable indices, or indicators, and b) to allow comparisons of the size and features of school buildings either within the same area or from different areas or countries. The project is based on a survey of 64 schools in the Greek municipality of Egaleo in Attica from November 2004 to February 2005, and of 713 schools in 16 municipalities surrounding Attica from June 2005 to October 2005. The survey, which comprises 22 questionnaires and 200 questions, was completed by the director of each school unit, with technical assistance from the Municipality Technical Services. The survey requested data on:

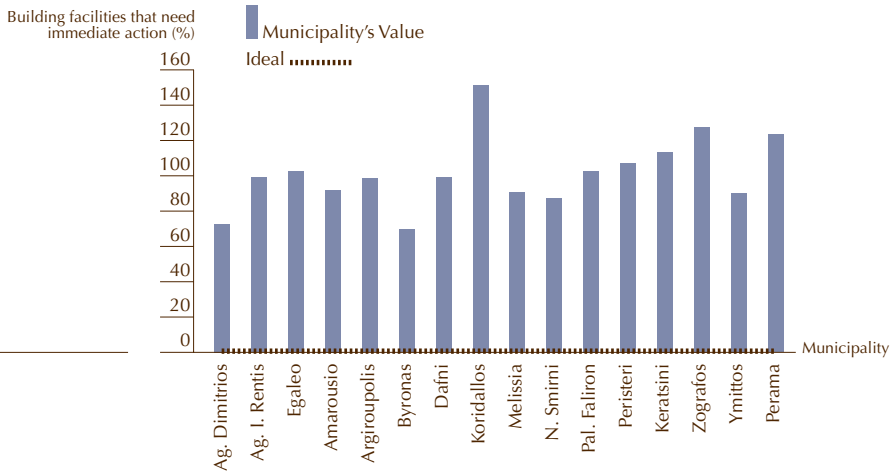
- The number of students enrolled, classes, teachers, foreign students and students with special educational needs, by level of education.
- The number, ownership and age of school buildings, school operating hours, and the number and size of teaching and non-teaching spaces (indoor and outdoor), by level of education.
- The number of schools with certain security features and structural faults (*e.g.* parapet faults or cracks in building).
- The number of schools with maintenance requirements, by level of need (five levels, from immediate action to no action) and by type of structure or amenity (16 structures including staircases, insulation, garden and boiler room).
- Availability, condition (new, old or very old) and immediate- and short-term requirements for school equipment and furniture, such as computers and libraries.
- The number of training spaces, society offices, and spaces for social and community activities.

Three categories of indices were generated from data in the questionnaires:

- Basic pedagogical indices: students per classroom; building plot area per student; closed space area per student; students per computer; and facilities with computer laboratory spaces.
- Safety and security indices: facilities with inadequate resistance to earthquakes (structural and non-structural); facilities with an evacuation plan; facilities with safety lighting; school buildings located in potentially hazardous areas (*i.e.* petrol station, industrial area, etc.); facilities requiring immediate action for insulation, plumbing installations, central heating, boiler rooms, fire safety equipment, etc.
- Educational improvement and social participation indices: schools with whole-day classes, special cooking and dining rooms, safe access, toilets for pupils with special educational needs, and sports facilities.

The ESBI-Qsystem could also be a reliable tool for those responsible for the planning and management of educational programmes funded by international institutes, for example the European Investment Bank (EIB), the Council of Europe Development Bank or the World Bank. For the EIB, which performs a three-way analysis (technical, economic and financial),

Comparative assessment – Safety and Security Level Indices



performance indicators are a reliable way to appraise educational infrastructure projects submitted for financing.[1] In this framework, the ESBI-Qsystem could be used to evaluate real needs, to implement the appropriate actions (physical and financial), and to audit the effects throughout all stages of the programme and project cycle.

In the future, the questionnaire will be implemented in other Greek municipalities and there are proposals to administer it in other countries.

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1. At the European Council meeting in Amsterdam on June 1997, the European Commission urged the EIB "to examine its scope of intervention in the areas of education".

DEVELOPING SCHOOL QUALITY NORMS IN MEXICO

Mexico has developed norms to improve the quality of its new and existing school facilities. This is part of the country's new strategic, participatory approach to school building policy.

Between 1944 and 1992, Mexico constructed 150 000 school buildings, approximately 80% of its current educational infrastructure. In 1992, the Agreement for the Modernisation of Basic Education resulted in the decentralisation of the design, co-ordination and construction of educational facilities. As a result, the Secretariat of Education (SEP) administered funds directly to each state, and no longer through the Administrative Board of the Federal School Construction Programme (CAPFCE). The role of CAPFCE was transformed to that of a regulatory agency responsible for promoting and co-ordinating technical standards with respect to the construction, outfitting and furnishing of school property and facilities. In the last 30 years, the condition of Mexico's educational facilities has been deteriorating. Today, issues such as maintenance, refurbishing and new projects require urgent attention.

To address the need for updated facilities, in 2000, SEP instructed CAPFCE to create a multi-level sub-committee to develop and promote quality norms for Mexico's new and existing educational facilities. The sub-committee is comprised of representatives from the federal and state public sectors, the industrial, commercial and service sectors, research institutions and associations of professionals working in the construction fields. The norms would serve as reference points for the multiple state and municipal bodies responsible for executing educational physical infrastructure programmes, with the purpose of ensuring minimum standards of quality and security.

The sub-committee established two norms:

- *Norm 1. Site selection for educational property (2004).* This norm defines the minimum requirements for site selection of a new school. Its objective is to inform local authorities about geological features, land use and other issues that make a site suitable or unsuitable for selection.
- *Norm 2. Quality of educational spaces (2005).* This norm describes the "value chain", or process required to ensure that the physical environment is functional, suitable, comfortable, hygienic and durable with respect to:
  - General planning, which includes the identification of needs, a feasibility study, permits and licences.
  - Bidding and awarding of contracts.
  - Planning, design and budgeting of the executive project.
  - Supervision, technical and administrative control, procurement and sub-contracting of construction.
  - Delivery and acceptance in accordance with the provisions of contractual clauses for all contracted parties.
  - Provision of furniture and equipment in classrooms, laboratories and workshops, according to the level of education.
  - Maintenance.

A number of programmes will inform, monitor and measure the implementation of each stage on the "value chain" in new and existing educational infrastructure. The programmes include an educational infrastructure diagnosis and needs analysis, a designer and planner co-ordination plan, and a regional design contest.

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EVALUATING NEW SCHOOL FACILITIES IN PENDÃO, PORTUGAL

A recently rebuilt school, the Galopim de Carvalho School in Pendão, Portugal, has undergone a useful post-occupancy evaluation.

The old school building, a temporary construction in use for 15 years, experienced constant problems with its installations and functioning. In addition, educational spaces were small, poorly resourced and generally discouraging for its students from diverse backgrounds and regions, including rural communities, ex-Portuguese colonies and socio-economically disadvantaged areas. The project to rebuild the school was presented in *PEB Exchange* no. 38 (October 1999).

The school was rebuilt in 2001 in collaboration with the school community to provide new learning opportunities to a disadvantaged student population. It was equipped with a multi-media resource centre – using audio and video projection areas and access to Internet – to support curricular activities, transversal projects and independent learning. A school-wide network was installed with information points in every classroom which allowed all students to access existing resources and data in different formats, including video. The introduction of the new equipment resulted in profound changes in the delivery of learning, producing innovative teaching and learning strategies.

In May 2005, problems of ICT maintenance, shortage of space (the new school was designed for 600 students but now enrols 800), insufficient teacher training in audio and video production, and difficulties with Internet access prompted the Ministry of Education to choose the school for a demonstration post-occupancy evaluation. The evaluation was to identify strengths and weaknesses of the new school facilities from the stakeholders' perspectives. Its fitness-for-purpose approach allows stakeholders to negotiate performance criteria that change during the service life of buildings and vary with region, budget, government policies, social trends, building type and use. By assessing buildings in terms of actual use, rather than predicted use or briefing issues, the fitness-for-purpose approach affords independence. It also allows stakeholders to negotiate use and design simultaneously, as well as to sort out specific issues and relationships between design parameters.







The demonstration interviews at Pendão involved students, teachers and other school staff, parents, municipal and project staff, along with a ministry officer and university observers. The principal evaluator, Chris Watson, has used this methodology successfully on some 40 educational settings and 80 non-educational settings in Australia, New Zealand and the United Kingdom since the 1980s. The method has the robustness to enable effective communication despite cultural and language differences. Recommendations from the evaluation entailed fine-tuning the existing facilities and the ways they are used, and lessons for future schools in Portugal. Issues included access to sports facilities, air quality, thermal comfort and safety.

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SCHOOL INFRASTRUCTURE PROJECT IN EL SALVADOR

The School Infrastructure Project (IMEF-UE), initiated in 2001, is a joint initiative involving the European Union and the Ministry of Education in El Salvador. One of the principal aims of the project is to repair, construct and equip schools in areas affected by Hurricane Mitch in 1998 and the 2001 earthquake. Specifically, the project seeks to improve design quality on the basis of three criteria: teaching/function, cost and maintenance. The project brought together 15 construction companies, four design companies, five furniture factories, architects, civil engineers, bricklayers, mechanics, carpenters, topographers and others to rehabilitate or construct and furnish 70 new primary schools in rural areas. In addition, the project oversaw 33 school maintenance projects and more than 100 educational programmes to improve literacy and vocational training in the country. Active participation, co-operation and co-ordination between the project team and the school community contributed to the project's success.

In El Salvador, the Ministry of Education plays a central role in the construction of educational facilities. School construction is co-ordinated by the Social Protection and Local Development Fund (FISDL) – a public body that provides technical assistance and training on infrastructure at the local level – and non-governmental organisations. Construction is supervised by the Infrastructure Department of the Ministry of Education. Although there are no formal national school construction norms or guidelines, the Ministry of Education contracts architects and engineers to develop norms and guidelines for school design, which are included in the tender documents for new school construction. In addition, several small engineering consulting firms have considerable expertise in developing appropriate norms and standards.

Although the technical expertise and human resources needed to address problems in educational facilities exist in El Salvador, the functional quality of schools is often compromised by lack of funds. In new facilities, building deficiencies

Usuluteca Primary School



School opening,
La Cribe Primary School, May 2005



School opening,
Villa España Primary School, May 2005



can also be attributed to poor performance in the construction phase and to poor supervision and building control. In existing schools, there is a general lack of preventive and corrective maintenance, resulting in health and hygiene problems.

In the course of the School Infrastructure Project, the functional design of existing school buildings, in particular kitchens, toilets and classrooms, was improved. Insulated sandwich-roof sheets were constructed to lower room temperature, window areas were increased to maximise daylight and the quality of concrete block masonry was improved. Seminars were organised with the building sector on problems related to construction finish and craftsmanship and on improvements needed. In the course of the IMEF project, school building maintenance guidelines were developed for renovated schools.

Potrerillo Primary School



Further work is required to improve the design and quality of the school building stock in El Salvador and its seismic resistance.

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BUILDING ON LESSONS LEARNED

Defining quality

So what does the wealth of existing knowledge and good practice tell us about providing quality educational facilities? Can experts agree on what constitutes "quality" in design?

Experts participating in the Portugal and Mexico meetings took the first steps towards establishing an international framework, comprising a definition, principles and criteria of quality facilities. The framework also considers a number of parameters within which quality can be defined.

"All individuals have a right to a quality educational facility, a physical space that facilitates the learning process and demonstrates cost-effectiveness over time; one that respects and is in harmony with the environment; and one that encourages social participation, providing a healthy, comfortable, safe, secure and inspirational setting for its occupants.

"Universal parameters – reflecting temporal, local and concrete quality dimensions – such as flexibility, sustainability, and preventive and corrective maintenance can be used to evaluate the physical space that defines a school."

Further to this definition, experts identified criteria for assessing school building quality along with six universal principals. Facilities should be: fit for purpose (*i.e.* meet the educational requirements of a school and the needs of its users); inspirational and symbolic; environmentally sustainable; healthy and comfortable; safe and secure; and cost-effective. However, caution must be exercised when applying these principles to other contexts, such as educational policy priorities; and the existence and architectural interpretation of building codes and regulations must be considered.

Experts agreed that the overall aim of the framework is to "bridge the gap" between architecture and education, addressing the fundamental question, "How do educational facilities contribute to educational goals, educational effectiveness, educational policy and educational quality?".

Evaluating quality

Experts identified a number of successful approaches, involving both qualitative and quantitative research methods, for evaluating the quality of the built environment. Post-occupancy evaluation, which has been implemented in Brazil, New Zealand, Portugal, the United Kingdom and United States, uses a variety of qualitative techniques such as interviews, observation, walkthroughs and focus groups by one or several evaluators, with a high degree of stakeholder involvement. In Greece and Portugal, inventories of school accommodation have been established and indicators generated to identify areas of greatest need. In El Salvador and Mexico, norms are being developed to ensure minimum standards of quality in new building construction, maintenance and equipment.

While there is no single best approach for evaluating quality, several broad guidelines must be followed when defining and implementing an evaluation methodology. The approach used must be:

- *Multi-disciplinary and inter-disciplinary*, bringing together people from the fields of education, architecture, engineering, child psychology, anthropology, environmental psychology, sociology and public policy.
- *Participatory*, ensuring early and continuous dialogue with policy-makers, students, teaching and non-teaching staff, parents, educationalists, financial bodies, architects, the media, facilities and asset managers, and researchers.
- *Holistic*, providing a systemic and integrated vision of a built environment throughout all phases of the facility's life cycle – from planning to project delivery to occupation and management – as well as of society's life cycle.
- *Multi-method*, incorporating aspects of appropriate qualitative and quantitative methods into the research design.
- *Purposeful and valid*, having a process, a timeframe and research questions that are clear and objectives that are tangible and ever-present. Evaluators must be neutral, trained and accredited by external authorities.
- *Policy-oriented*, responding to and influencing policy.

Further international co-operation

Experts expressed a common desire to continue PEB's work to promote international co-operation on quality criteria for educational infrastructure, with the goal of raising community and government awareness. This work could include establishing a working group on facilities methodology involving experts and administrators from countries interested in developing and implementing an international study to evaluate quality in educational facilities. The approach would address established quality principles and criteria at each phase of a building's life cycle. The methodology for this study could involve, for example, developing an online tool that different stakeholders could use to assess the needs and satisfaction of users; or conducting a number of school visits in different countries, with walkthroughs, interviews and focus groups involving multiple stakeholders.

Proceedings from the experts' group meetings will be published in 2006. For further information on this activity, see *www.oecd.org/edu/facilities/statistics* or contact Hannah von Ahlefeld, hannah.vonahlefeld@oecd.org.