

## OECD International Conference “Sustainable School Buildings: From Concept to Reality”

1-2 October 2009, Ljubljana, Slovenia

Co-organised by the OECD Centre for Effective Learning Environments and the Ministry of Education and Sport in Slovenia

### CONFERENCE SUMMARY

#### Background

1. On 1-2 October 2009, 130 delegates from Austria, Croatia, Finland, Greece, Hungary, Italy, Japan, Korea, Latvia, Mexico, the Netherlands, New Zealand, Norway, Portugal, Slovenia, United Kingdom gathered in Ljubljana to explore the challenges in realising sustainable school buildings from planning to actual use, as well as to evaluate how legislative provisions, finance and other policy factors enable sustainable school buildings.
2. The conference was set in the context of pre-primary, primary and secondary schools. The interdisciplinary approach was intended to address the issues from the perspectives of a wide-range of stakeholders, including policy makers, educationalists, school planners and architects.
3. This brief report summarises the two-day conference that included presentations, discussion and school visits, and future action. It focuses on the proceedings of the conference by defining sustainability in schools, highlighting green growth, outlining the importance of school as a public place, specifying the role of architecture in supporting basic values, presenting country specific examples, identifying the need for multiple stakeholder involvement and delineating the challenges that still remain.

#### Introduction

4. The conference set out to promote and strengthen co-operation between those stakeholders responsible for the planning, construction and maintenance of school buildings and facilities. A key objective of this conference was to discuss the priorities and obstacles encountered in creating sustainable schools, and to subsequently guide those involved in creating sustainable schools toward good practices and enhance practices toward a better learning environment.
5. Day one was organised around three themes: conceptualising the role of spaces and places in schools and sustainable development; meeting the challenges of creating sustainable learning environments and exhibiting exemplary school facilities in Slovenia and around the world.
6. Day two opened with a tour of three schools in and around Ljubljana. It expanded on the themes from the previous day with a panel discussion to address the organisational and governmental challenges in creating sustainable school buildings, and proposed potential solutions.

#### Defining Sustainability

7. Sustainability as a concept has yet to be universally defined, and thus has taken on a range of meanings. The most basic definition of sustainability includes harmonising the values of economic viability, social justice and ecological preservation. Within the context of education and learning systems, the United Nations Decade of Education for Sustainable Development has emphasised pedagogy, teacher quality and curriculum. While these objectives attempt to be broad

and all-encompassing in altering the role of sustainable development in education, they fail to include how school buildings and facilities need transformation as well.

8. Sustainability for schools and architecture, for the purposes of this conference, means more than energy efficiency and ecological buildings. It incorporates values such as quality architectural design, economic efficiency, social equity and preservation of the environment in all phases of planning, design, construction and maintenance.
9. True sustainability, then, is only realised when school buildings integrate social, environmental and economic practices into learning, teaching and building management. Socially, this means ensuring clean and healthy classrooms, hallways and laboratories with few pollutants. Environmentally, this means a school that manages carbon emissions, respects the natural site and reduces waste. Economically, this means a school that maintains its budget and takes advantage of natural sunlight and other natural conditions. Additionally, the school infrastructure itself can provide a valuable platform and model for teaching students about the three aspects of sustainability and enhancing their knowledge of existing issues. Actions taken toward sustainability need to also be long-term and enable inclusion of intergenerational concerns.
10. Education also plays a vital role in the long term development of “green” economies, and that the physical environment provides an important reference point, particularly in synchronising economic, environmental and social concerns.
11. The challenge in guaranteeing sustainability in schools rests in co-ordinating governmental policies, design philosophies, dynamic pedagogies, cultural adaptation and ensuring long-term economic maintenance and environmental preservation. The conference focused on overcoming these challenges to create school buildings in the long term and to make learning environments adaptable.

## **Green Growth**

12. The OECD Green Growth Declaration commits countries to shift economic, environmental and international policy toward sustainable economic growth and recovery. This implies that countries will take concrete steps toward using cleaner, low-carbon technologies and improved natural resource management. “Green Growth” strategies are intended to not only address climate change and other environmental challenges, but also to sustain fair and clean economic growth. The current crisis is an opportunity to rethink many of the prevailing concepts, and to help undertake a shift toward a cleaner, low-carbon society.
13. This recent emphasis on “Green Growth” as a component to economic stimulus has also recognised school buildings as an appropriate area for investment. In the context of school facilities, this implies developing approaches that encourage natural resource conservation, reduced carbon emissions and students with a heightened awareness of their engagement with the natural environment. Many stimulus packages include strategies for developing or renovating school buildings and using them to address the challenges of climate change through better energy performance, as well as the use of energy and materials from renewable sources.
14. Rather than permitting the economic and financial crises to postpone crucial decisions for the future well-being of the planet and its inhabitants, focusing on school buildings as a source for green investment implies long-term, inter-generational considerations and lasting decisions. The stimulus packages offered as remedies to the current global economic and financial crises present an opportunity to make fundamental changes to school buildings and the environment.

## **School as a public space**

15. Reiterated throughout the conference was the role that schools have in representing community ideals and the subsequent need for schools to be integrated into the public sphere –designed more inclusively with the city and town planning.
16. Illustrating the importance of this concept, French architect Françoise-Hélène Jourda was quoted in a poster display, “in the process of transforming urban planning and socio-cultural values, public buildings plays a decisive role. It is a matter of developing and acquiring experience with places for the community, for communal living. Schools are places of urban cohesion, since they are places where everybody can develop and grow accustomed to a sense of belonging to local society.”
17. Schools are more than classrooms and hallways for exclusive use by students and teachers. Schools, according to presenter Jane Briginshaw, Head of Design, Department for Children, Schools and Families, serve as the hub of a community. They are places where community members can come after traditional school-hours, where the school can function to provide social services, additional learning activities for both students and community members, or for lectures or group gatherings to engage the public.
18. School space, as a public entity, should “evoke a sense of community and public access” according to Dutch architect Herman Hertzberger, which can be achieved by designating space in functional and flexible ways. The “green” school can also be conceived of as a part of the whole, which is comprised of “green” homes and “green” cities.
19. Using the school as the foundation, it can serve as a model and have broader implications for society, impressing upon the community concepts of sustainability. This connection to the community fulfils the broader social aspect of sustainability by permitting community members to access and use the facilities for enrichment and civil society development and serves as a model for behaviour.

## **Role of architecture**

### *To support basic educational values*

20. Schools should be designed primarily to encourage specific behaviours and reinforce actions of students and teachers. They are protected space designated for learning and thinking, to enable creativity and discover, and to help individuals create identity. It is also a time for students to form relations with one another and their teachers, as well as with learning. Sustainable architecture provides the means to influence the learning environment and interactions.
21. Finnish architect, Juhani Pallasmaa explained in his presentation, that “the role of architecture extends far beyond the material, physical and measurable conditions, and even aesthetic pleasure, into the mental and existential sphere of life...architectural constructions organise and structure our experiences.”
22. In this way, school space has to be organised in such a way to support learning, and be structured, yet flexible. To facilitate student knowledge and skills, sustainable school design must also be flexible in order to accommodate changes in learning and teaching methods. Thus allowing learners at one moment to work individually and later in groups, while also allowing educators to lecture or observe.

### *Integrating nature into the school structure*

23. The design of the school should smoothly and organically create a transition from the inside to the outside and from the outside to the inside, so that students do not lose connection to the natural environment.
24. Building upon the notion that the school should be connected to the community, integrating the school with its natural surroundings, also limits physical and perceived barriers to invite the community beyond the teachers, staff and students.
25. In Slovenia, this is achieved through *open-plan schools*, which are designed on ground-level, and to include outdoor passages throughout the school and allow every classroom direct access to the outside.

### *The school building as a teacher*

26. Teaching students about the natural sciences and ecology tends to focus on a textbook approach, adapting the curriculum to teach students about current issues surrounding environmental sustainability. However, the school building can and should be used as a tool for instruction to enhance awareness, where students can learn from doing, seeing and experiencing. Learners can become engaged with the displays and technologies embedded in the school. Sustainable architecture and building features can augment students' education.
27. Director of Parque Escolar, Portugal, Teresa Heitor, who is responsible for delivering the country's secondary school building modernisation programme, finds that, "in order to encourage students and staff to healthier and participative environmental attitude and awareness, great visibility is given to energy and environmental performance indicators, by spreading monitoring devices throughout the school space and allowing users to easily see and monitor the results of the renewable systems performance."
28. Subsequently, when students learn they transmit this information to their parents, friends and neighbours, and influence the behaviours and capacities of others. The sustainable school has broader benefits beyond the immediate users and expands into the community.
29. In 2009, the OECD published, *Green at Fifteen? How 15-Year-Olds Perform in Environmental Science and Geoscience in PISA 2006*, which presents the results from the Programme for International Student Assessment (PISA) special section on students' environmental knowledge and attitudes toward greenhouse gases, waste disposal conservation and environmental concerns. Students designated school as the principle source of information on environmental issues. Given this assessment, there are relevant implications for the school building and the places and spaces where students acquire skills and knowledge.

### **Examples of schools**

30. Shown throughout the conference were physical examples demonstrating how school premises are created and conceptualised to encourage responsible and conscientious behaviours, engage students in and promote awareness of environmental, social and economic concerns, and sustainably designed to teach multiple generations of students. An overview of the following examples demonstrates how sustainability can be incorporated into broader plans for building and renovating school facilities, as well as the need for systematic support from the government.

### *Poster exhibition*

31. An international exhibition of selected examples of pre-primary, primary and secondary schools were displayed during the conference. Selected new or renovated schools demonstrated exemplary architectural design, integration of sustainability principles and spatial development. Schools were selected based on satisfying a set of criteria: integration into the urban or natural environment; adaptable and flexible arrangement; respect for natural and cultural heritage; understanding of traditional and indigenous architectural elements; didactic and sensory details; and engagement with the surrounding community.

### *Planning Schools in a low-carbon society, Japan*

32. Professor of System Design Engineering, Toshiharu Ikaga of Keio University, featured the approach by the Japanese government to incorporate eco-design as one of three components in the *School New Deal* to improve the learning environment and to achieve a low-carbon society.
33. This programme approaches sustainability by focusing on environmentally friendly design and construction; flexible operation and maintenance; instalment of renewable energy equipment and use of the school building for environmental learning. The success of the programme stems from the government commitment, as well as cross-ministerial co-operation (Ministry of Education, Culture, Sports, Science and Technology with Ministry of Agriculture, Forestry and Fisheries; Ministry of Economy, Trade and Industry; and Ministry of the Environment).

### *The Road to Zero Carbon Sustainable Schools, UK*

34. Jane Briginshaw, Head of Design, Department for Children, Schools and Families presented the main points about *Building Schools for the Future*, a school buildings investment programme to re-build or renovate nearly every secondary school in England.
35. Under the programme mandate, all schools must meet a minimum standard, adhering to the Building Research Establishment Environmental Assessment Method for School Buildings (BREEAM), while newly constructed schools must reduce carbon emissions by 60%.
36. In addition to implementing energy controls and reducing building costs, the programme also aims to enhance the curriculum and raise user awareness through smart meter displays.

### *Modernising Secondary Schools, Portugal*

37. Director of Parque Escolar, Teresa Heitor introduced the school buildings modernisation programme launched by the Portuguese government to raise school facilities standards and build school extensions, mainly teaching areas, science and technology labs, creative arts spaces and libraries.
38. This programme defines sustainability “to encourage education authorities to restore school suitability and efficiency comprehensive and cost-effective long-term decisions; suitable and stimulating environments, comfortable working conditions, school community participation.”
39. To enforce its definition of sustainability, the programme endorses five key features and design principles: flexibility of the school layout; robustness of the construction materials, fixed furniture and fittings; energy efficient measures; low cost solutions and simplified operational

mechanisms; and school community engagement. The combination of these features creates sustainable and exemplary school buildings.

#### *The Educational Quality Facilities Project, Italy*

40. Girogio Ponti from CISEM Milan, Italy, highlighted the environmentally sustainable principles of the Centre of Innovation and Educational Experimentation of Milan educational facilities project. The project aims to build intelligent schools by employing a quality assessment matrix and includes other principles of functionality, aesthetics, design quality and health and safety, in addition to environmental sustainability.
41. To achieve these objectives in educational facilities projects, schools are designed to include a range of technologies. Sustainable inputs within this Quality Index are: maximum respect for the environment and natural resources; zero carbon, pollution and waste; saving and new quality of the spaces by flexibility and by new pedagogical and educational inputs; emphasising of sustainability symbols as educative inputs; and maximum Leadership in Energy and Environmental Design (LEED) rating by the U.S. Green Building Council. Implementation of the five inputs gives specific consideration to the costs and savings.

#### **Multiple stakeholders**

42. Legislative policy is considered to be the principle driver for change in reorienting people's mindsets and practices. And government initiatives and policies to facilitate sustainability in schools are integral to the process. However, more than government decision making is needed in prompting real reform in education and school facilities.
43. A quality, sustainable architectural design is one that takes into account the varying needs of multiple stakeholders. Facilitating progress in the provision of sustainable schools necessitates a collective response and enacting more integrated and coherent reforms. However, the involvement of multiple stakeholders and perspectives is lacking from the current process to achieving sustainable schools. It is especially challenging for government actors to organise and co-operate across ministries.
44. "The lack of teachers, other school staff and students involvement in both the design and the daily management and maintenance of school facilities can reduce their sense of responsibility in keeping a healthy, safe and efficiently low-cost school environment as well as foster incivilities and neglecting attitudes that are disruptive to the educational process" (Teresa Heitor, *Modernising Secondary Schools in Portugal to Create Sustainable Environment*, citing Higgens, et al., 2005).
45. In order to create a sustainable learning environment that meets the demands of education as well as the demands of broader societal issues, the process of creating that environment must involve all parties from the community, teachers and students, in addition to ministers and designers. From a policy perspective and within the government sector, input and co-operation needs to come from across ministries.

#### **Usability**

46. Buildings can be carefully designed and constructed to include the latest green technologies; however, these measures do not ensure that features are efficiently applied. Energy ratings and building performance assessments imply that schools will perform sustainably. Yet, this is not

always the case in practice, especially if building users and managers do not understand how to properly control the features or technologies which are often complicated or not intuitive to use.

47. Overlooking interface design and user needs can turn highly efficient devices and technical features into non-functioning, expensive décor. To ensure correct use, requires building users and managers to be properly informed and instructed in order to optimise sustainability operations and ensure cost-efficient buildings performance, otherwise energy management techniques and ratings will be less than optimal.
48. Green technologies can only deliver their potential if they are manageable and easy to use. When energy saving features do not work, people become disillusioned with the technology and revert back to wasteful practices of the past.

### **Cost**

49. The perceived cost required to build or re-build a school with energy-saving strategies, such as building orientation for day-lighting and shading optimisation or photovoltaic panelling present a major challenge to creating sustainable school buildings. Price, especially the initial capital costs of renovation or new builds are the main considerations, rather than life-cycle costs, savings over the long-term and investment in sustainability.
50. This implies that new mechanisms for evaluating costs are needed to accurately inform school planners and decision makers.

### **Conclusion**

51. Sustainable development is a necessity in contemporary society, especially in 21<sup>st</sup> century schools and as a means to foster educational achievement. It has been widely recognised that the principles of sustainability must be embedded in life and work, via the curriculum and school facilities. Yet there remain extensive challenges to creating coherent policy and implementing new approaches to school design.
52. Jane Briginshaw observed that U.K. Prime Minister, Gordon Brown declared, “This isn’t about bricks and mortar. Building Schools for the Future is a catalyst for transformation.” Behind this statement is the idea that sustainable schools are comprehensive means to achieve multiple objectives, not the least that building will teach learners and the community about greater environmental, social and economic issues.
53. To create lasting places and spaces in schools demands that buildings and facilities support educational values, the school’s vision and the needs of the individual as they change and develop. Good school design should also be sustainable school design; the two concepts should be inter-changeable.
54. In order to successfully build and maintain sustainable school buildings, research still needs to be conducted and developed on data and measurements to ensure energy and resource efficiency and also for ways that national governments can prioritise environmental needs across ministries.