

PEB *EXCHANGE*

THE JOURNAL OF THE OECD PROGRAMME ON EDUCATIONAL BUILDING

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OECD



The OECD Programme on Educational Building (PEB)

The Programme on Educational Building (PEB) operates within the Organisation for Economic Co-operation and Development (OECD). PEB promotes the international exchange of ideas, information, research and experience in all aspects of educational building. The overriding concerns of the programme are to ensure that the maximum educational benefit is obtained from past and future investment in educational buildings and equipment, and that the building stock is planned and managed in the most efficient way.

Seventeen OECD Member countries and 13 Associate members currently participate in the Programme on Educational Building. PEB's mandate from the OECD Council to advise and report on educational facilities for students of all ages runs until the end of 2006. A steering committee of representatives from each participating country establishes the annual programme of work and budget.

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PEB AND OECD ACTIVITIES

BRICKS, CLICKS AND SPONDULICKS

“Bricks, Clicks and Spondulicks: Investing Educational Capital in Information Technology and Physical Infrastructure” was the title of the latest PEB seminar, held at the Queensland University of Technology (QUT) in Brisbane, Australia, 24-26 March 2003. The meeting addressed the relationship and interactions between capital investment in information technology (hardware and software) and that in physical infrastructure (bricks and mortar). While they have often been reviewed as separate entities in competition for the same funds, the seminar looked at how these two areas of investment can together lead to more efficient and effective ways of educational delivery, particularly for vocational and tertiary education. Susan Stuebing, co-ordinator of the influential PEB study *Redefining the Place to Learn*, gave the keynote address.

This international seminar presented current research in this area and gave an idea of what has been achieved and what developments can be expected in the near future. It concentrated on examining examples of innovations in various countries and attempted to define some of the parameters that will affect the future of educational information technology and physical infrastructure delivery.

Site visits were organised to four local learning facilities, and the PEB exhibition “Designs for Learning: 55 Exemplary Educational Facilities” was available for viewing throughout the meeting.

PEB extends its sincere thanks to the Commonwealth Department of Education, Science and Training (Australia) and to the Department of Employment and Training (Queensland) for their help in successfully organising this seminar; and to Queensland University of Technology, Brisbane, for hosting it.

PEB will publish a report on the outcomes.

EDUCATION WORK PROGRAMME

Priority areas for attention in the work programme of the OECD's newly created Directorate for Education will be generated by a recent meeting of senior education officials and upcoming committee meetings. Education chief executives from OECD countries met on 6-8 February 2003, in Dublin, Ireland, where they discussed five themes nominated from policy issues with which they expect to be engaged in the next three to five years. The themes were: achieving the strategic goals, improving the quality of education, tertiary education, education and social cohesion, and teachers. The Directorate's governing bodies, such as the PEB Steering Committee, will have the opportunity to discuss these themes and to adopt relevant elements of them into their individual programmes of work.

NEWS FROM THE PEB SECRETARIAT

PEB is happy to announce the recruitment of its new team member Hannah Cocks. Hannah, who transferred from the Directorate for Education's Indicators and Analysis Division, holds the position of analyst. Among her responsibilities will be to evaluate facilities policy and the impact of facilities on educational outcomes and to carry forward work relating to school safety and security. She is of Australian nationality.



© OECD Photo/Silvia Thompson

As part of the internal restructuring that followed removing the education sector from the OECD's former Directorate for Education, Employment, Labour and Social Affairs, a new division was formed. PEB and the Programme on Institutional Management in Higher Education now form the Education Management and Infrastructure Division (EMI), headed by Richard Yelland.

OECD SITE CHANGE

Plans are advancing for moving OECD staff during renovation of the headquarters in Paris's *La Muette* neighbourhood to a temporary location in the suburb of *La Défense*. The winning design team of the architectural competition to redevelop the site is composed of SCAU, Macary, Menu & Delemain, and Pei, Cobb, Freed & Partners. PEB is scheduled to move to *La Défense* in November 2003.

The winning model for redeveloping the OECD's headquarters



© OECD PHOTO/J BRINON

ATTRACTING AND RETAINING EFFECTIVE TEACHERS

The OECD Education Committee launched a major collaborative activity on attracting, developing and retaining effective teachers in March 2002. It responds to the call issued by OECD Education Ministers in the report *Investing in Competencies for All* (OECD, 2001). Ministers set out a challenging agenda for schools, and concluded that “we need to explore together strategies to attract and retain high-quality teachers and school principals”.

The activity is designed to provide a state-of-the-art review of teacher policy, to help countries share innovative and successful policy initiatives, and to identify policy options for attracting, developing and retaining effective teachers. Policies being examined include incentives to attract able young people and mid-career adults from other professions into teaching, building greater variety into the teaching career and improving leadership in schools. It is the most comprehensive cross-national review of teacher policy ever conducted by OECD member countries.

Of particular interest to PEB readers, among the factors that affect attracting and retaining teachers, the project is examining the role of schools’ facilities and infrastructure, including the availability of learning resources such as equipment for information and communication technologies.

Methodology

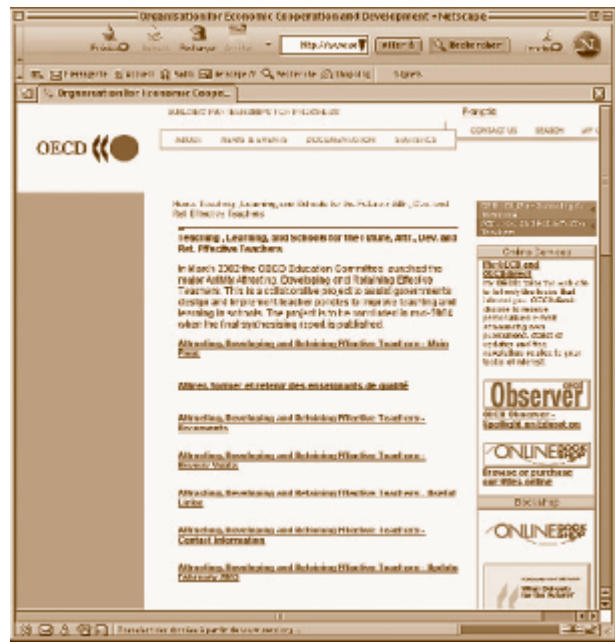
The activity involves two complementary approaches: an analytical review strand and a thematic country review strand. The analytical review strand is using several means – country background reports, literature reviews, data analyses and commissioned papers – to analyse the factors that shape attracting, developing and retaining effective teachers, and possible policy responses. All 24 participating countries are involved in this strand.¹ Nine countries² have also chosen to participate in a thematic country review, which involves external review teams undertaking an intensive case study visit whose conclusions are then reflected in a

1. Australia; Austria; Belgium (Flemish and French communities); Canada (Ontario and Quebec); Chile; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Israel; Italy; Japan; Korea; Mexico; the Netherlands; Norway; the Slovak Republic; Spain; Sweden; Switzerland; the United Kingdom.

2. Austria; Belgium (Flemish and French communities); Germany; Hungary; Italy; Korea; Spain; Sweden; Switzerland.

reviewers’ report. The first thematic country visit was to Belgium (Flemish Community) in November 2002 and all visits will be completed by July 2003.

All participating countries are preparing a country background report within a common framework to facilitate comparative analysis. These reports are due by April 2003, and those for Belgium’s Flemish Community and Switzerland are already published on the activity Web site at www.oecd.org/els/education/teacherpolicy.



The overall project will conclude with a final synthesising report and dissemination activities in mid-2004.

PEB DOCUMENTS TO DONATE

PEB is offering to donate a collection of books, reports, guidelines and architectural reviews related to educational infrastructure to a library or research institute that would be interested in caring for them. The documents, which take up approximately ten metres of shelf space, come from a number of countries and include material on school design and use, space management in higher education, safety, furniture, libraries and more during the past few decades. For further information, please contact the PEB Secretariat (see page 28).

NETHERLAND'S SCHOOL BUILDING PRIZE

The Netherlands's Ministry of Education, Culture and Science has published the winners of its School Building Prize 2002. In the primary education sector, first prize was awarded to the Dalton school *De Vijver* in The Hague. The jury praised the building's integration into its urban environment and the way in which the pedagogical concept is extended to the quality of its outdoor areas. *De Vijver* provides a safe and innovative learning and work environment for pupils and staff.

In the secondary education sector, first prize went to *De Lingeborgh* in Geldermalsen. The jury appreciated how the building facilitates today's educational developments and will allow for innovation in the future.

Amsterdam's Bredero College received the innovation prize, for creatively expanding their existing building and making it literally visible. Its glass front allows passers-by to see the students working inside.

The *De Eilanden* Montessori school in Amsterdam received an honourable mention.

These institutions along with five additional projects nominated by the jury are presented with colour photographs and plans in the ministry's publication "School Building Prize 2002". The Dutch text is accompanied by a two-page English summary. This sixth biennial competition was open to projects realised between January 2000 and September 2002.

For a copy of the publication, contact:

ICS Adviseurs

Postbus 39

2130 AA Hoofddorp

The Netherlands

Tel.: 31 235563600

Fax: 31 235563601

Publication price:

EUR 10



De Lingeborgh secondary school in Geldermalsen



*De Vijver
primary school
in The Hague*



Bredero College in Amsterdam



SCOTLAND TO IMPROVE SCHOOL ESTATE

Scotland has unveiled a new school estate strategy and will triple its annual level of funding over the next three years to make building improvements. The school estate strategy was published by the Scottish Executive and the Convention of Scottish Local Authorities in February 2003. The document, *Building Our Future – Scotland's School Estate*, sets out a long-term strategy for replacing and revamping worn out schools. Emphasis will be placed on schools which provide facilities for the wider community as well as for pupils and teachers.

An extra GBP 110 million by 2006 in grant funding will go to local authorities to invest in school buildings. The current year's level of funding, GBP 26.7 million, will rise to GBP 36.7 million in 2003/04 and to GBP 76.7 million for each of the two following years.

Launching the strategy, Minister for Education Cathy Jamieson said, "The right physical environment is a vital part of inspiring children to realise their full potential during their school years. They deserve better classrooms, better sports and arts facilities, better dining rooms – in short, they deserve 21st century schools not the crumbling bricks and mortar that many have to endure due to a legacy of under-investment in school buildings. Good quality design will be key to a successful transformation."

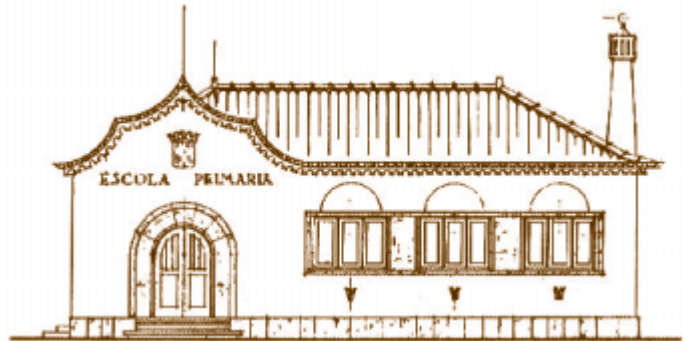
Deputy Minister for Education Nicol Stephen added, "Partnership is critical at the local level and we fully expect councils to work with schools, teachers and parents in the preparation of estate management plans and give headteachers a direct say in how an element of the new funds are spent on improving the quality of life in their schools."

REORGANISING PRIMARY SCHOOLS IN PORTUGAL

Portugal is reorganising its network of primary schools and has recently focused its efforts on the Algarve region. The Special Programme of the Network of First Cycle Basic Education Schools Reorganisation (PER.EB1), after starting in Alentejo, arrived in Algarve. The protocol, signed in February 2003, provides for the Algarve local authorities to apply to rehabilitate and extend schools delivering the first four years of education, by creating new classrooms, libraries and gymnasiums, or



Alporchinhos School, Lagoa
© 1972. DGAE Archives



A traditional one-classroom Algarve building
© *Many Years of Schools*, ME, DGAE, English Ed., Lisbon 1999

to construct new schools to accommodate pupils previously served by antiquated schools without adequate facilities and in less populated areas.

Financing will be granted in exchange for the closure of primary schools operating with few pupils, with the aim to improve the quality of education provided at this level. Of the region's 231 primary schools, 41 are operating with less than 11 pupils. EUR 14 million was allocated for the reorganisation of the Algarve network. The investment in the schools will be provided by the Algarve Operational Programme (65%) and the local authorities (35%). The Education Ministry will be responsible for support in terms of furniture and computer equipment in the schools involved in the programme.

Since the management and preservation of primary schools usually falls under the competence of local authorities, PER.EB1 required close co-operation between the Education Ministry and the Ministry for Towns, Town Planning and Environment.

Signing the protocol, Education Minister David Justino stressed that, despite the closing of some schools in recent years due to a decrease in the population, "the rate at which this has happened did not match the demographic rate", and it is therefore necessary for the government to support the local authorities.

PROJECTS

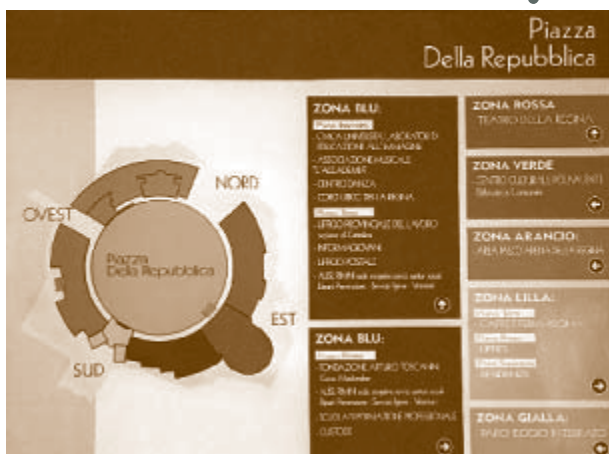
THE URBAN COMPLEX IN CATTOLICA, ITALY

The Italian city of Cattolica has developed an urban complex, the *Piazza della Repubblica*, providing a wide range of services to the public. In renovated facilities, the complex provides a modern and rational architectural setting based on the idea of the traditional town square or “piazza”, an area of interaction and exchange characteristic of Italian cities.

A primary school, a community cultural centre housing the municipal library, and a theatre are but a few of the various facilities located around the vast circular piazza originally used as a market and an open-air theatre. A newly built outdoor theatre made of masonry is now used for various events in summer. The architectural complex surrounding the piazza also includes a centre for music studies, a vocational training school, a dance school, visual arts workshops, the Civic University, a fitness gym, a post office, the Public Health Office, a café, a pub and an underground supermarket with ample parking. The piazza is an exclusively pedestrian area.

Developing the complex, the municipal government of Cattolica, which is one of the main tourist centres of the Emilia-Romagna Region, ensured that the city’s tourist infrastructure includes a cultural dimension. During the summer season, in addition to its resident population of 16 000, some 250 000 visitors come to stay in this sea-side resort.

The original maps of the piazza clearly show in different colours where the various services are located.



The *Repubblica* primary school to the left of the outdoor theatre



The *Repubblica* primary school

The *Repubblica* school was constructed in 1966 for students aged 6-10. As part of the plan for reorganising and rationalising the city’s school system in 1993, the school was renovated, following a design by Daniele Fabbri, into a combined day-care centre (ages 3-5) and elementary school (ages 6-10). It is now equipped with laboratories, workshops and other facilities for integrated activities and remedial instruction. There are a total of 400 pupils in 16 classes.

The overall surface area of the building is 1 600 m² on three levels: one underground, one raised above ground level and a first floor. Children have access to a large garden area with pine trees.

The entire building was renovated at a cost of EUR 1 500 000.

The community cultural centre

Built between 1979 and 1983, the community cultural centre’s design is still highly functional and user-friendly. It now provides a broad range of services – which in recent years have become strongly focused on multimedia – that include a municipal library, a large newspaper and periodical collection, an exhibition area (the Santa Croce Gallery) and the *Museo della Regina*, a museum with a section on archaeology and another on the history of seamanship, which was the city’s primary activity until the advent of the tourist industry.

The centre was designed by Pier Luigi Cervellati, an architect who is well-known for renovating historic city centres (in particular Bologna). It is a large, semicircular hall-like building made of reinforced-concrete that faces onto the piazza and is fronted by a portico, with an overall surface area of approximately 2 000 m² on two levels. The centre is air-conditioned, has a closed-circuit audio-television

link for recording and retransmitting events and performances, and is equipped with electronic burglar-alarm and anti-theft systems. Inside, it has an open-space design and is divided into separate areas that interact and communicate with each other in an arrangement that effectively expresses the multifunctional nature of the centre. Since the 1970s, this multifunctionality has been a key concept that has inspired policies for promoting numerous cultural activities and events and for establishing institutions equipped with technological systems able to provide modern cultural services.

The municipal library

The municipal library has been a key institution ever since it was established, serving both schools, the population of Cattolica and tourists. The library was founded by the local school association in 1914 at a different location in the city and in 1982 was transferred to the new community cultural centre. It is also appreciated by tourists who can borrow books by paying a membership fee.

The library currently has some 55 000 volumes in all fields, of which 17 500 are shelved in areas open to the public, while the remaining books are kept in closed stacks. Some 6 500 multimedia documents are available in the media centre. The library already had some 5 000 volumes of books by the 1940s, but two thirds of the collection was destroyed during the Second World War. The 1 500 volumes saved during the war cover approximately a century and a half of Italian publishing, and are still part of the municipal library's holdings.

It is easy to consult and borrow items, which are made available immediately. There are seven computer consoles for consulting the on-line catalogue. Trained staff are present continuously during opening hours to help users to consult catalogues and locate materials.

There is a reference service intended for students of all levels, from primary school pupils to undergraduates and researchers, but also for anyone wishing to request infor-

The municipal library



mation of any kind. The library also provides photocopying services and services for reproducing photographs in the cultural centre's archive and for duplicating the audio-visual materials produced by the cultural centre.

The *Teatro della Regina*

Adjoining the community cultural centre is the *Teatro della Regina*, another project by Pier Luigi Cervellati. Inaugurated in 1996, it was the first completely new theatre designed and built in Italy since World War II. It is equipped with state-of-the-art technology and has a total of 700 seats and a spacious foyer that can be used for meetings and conferences. Cattolica's new theatre is a symbol of its commitment to culture as a means of civic development.

Cervellati created an elegant and modern design that combines the basic plan of the traditional Italian theatre with the functionality and versatility required for modern stage productions. The theatre's design reproduces the classic horseshoe shape characteristic of traditional Italian theatres. Two tiers of boxes, topped by a spacious balcony forming a third tier, enclose the orchestra area panelled with blond wood, giving the theatre outstanding acoustics.

The *Teatro della Regina*
with the municipal library to its left



To contact the City of Cattolica:
Piazza Roosevelt 5
47841 Cattolica RN
Tel.: 39 0541 966511
Web site: www.cattolica.net

The Repubblica school can be contacted at:
Piazza Repubblica 8
47841 Cattolica RN
Tel.: 39 0541 954209
E-mail: ddcattolica@rimini.com

See a 360° moving view of the Piazza at:
www.cattolica.net/retecivica/italiano/ente/visita/index.php3?RESEARCH_PAGE=piazza_repubblica.htm

CURRENT CONCERNS FOR AUSTRIAN SCHOOL FACILITIES

The Austrian Institute for School and Sport Facilities (ÖISS) is responsible for current issues and problems related to the country's educational buildings. Four recent concerns of ÖISS's work are summarised here: schools as low energy buildings, electromagnetic fields and school buildings, chairs and tables for educational buildings, and school grounds – "learnsapes". Further items of ÖISS deal with lighting and acoustics and with buildings without barriers.

Schools as low energy buildings

Concepts for low energy buildings play an important role in recent Austrian architecture, and school buildings are no exception. A few low energy schools have been built in Austria, however the local conditions are different for each and their success depends largely on the ability and willingness of teachers and staff to handle and maintain the technical systems.

The concepts for low energy buildings entail compactness, high insulation, three-pane windows and glass panels, and ventilation systems. Once a certain degree of compactness and insulation are ensured, energy loss is mostly caused by window ventilation, so alternatives have to be considered. Poor air conditions due to CO₂ pollution in highly occupied classrooms contribute to the problem.

ÖISS invited an experienced Austrian engineering office to research how school buildings can serve as low energy structures, taking into account the specific characteristics of and demands for educational facilities. The resulting study provides information on energy, comfort, heating, natural and artificial lighting, overheating in summertime and humidity.

An entire chapter is dedicated to the question of ventilation. Different systems such as partly automated window ventilation and centralised and decentralised controlled mechanical ventilation are compared with regard to CO₂ pollution, heating and electricity requirements, and production and maintenance costs. As the success of technical systems depends on local handling and maintenance, ÖISS does not recommend a specific ventilation system but offers advice and examples of successful and unsuccessful test cases.

The study in German is available through ÖISS.

Electromagnetic fields and school buildings

Due to the use of multiple electronic devices in daily life, exposure to electromagnetic fields has increased significantly in the recent past. Moreover mobile phone transmitter poles are frequently situated on school buildings.

ÖISS invited the Austrian Research Centre (Seibersdorf Research) to study the exposure of electromagnetic fields on educational buildings and possible precautionary actions. The study, completed in 2002, gives information about safety levels of electromagnetic fields related to frequency, precautionary strategies, and possible steps to take in planning, constructing and maintaining educational buildings. This study is principally addressed to experts, but a summary for non-experts has also been written by an ÖISS working group. The summary explains, for example, that exposure to electromagnetic fields is much higher from direct contact with a mobile phone than from close proximity to a transmitter pole. Due to characteristics of transmission, the exposure in neighbouring buildings is often higher than in the very houses beneath poles. Still this item requires care in dealing with concerned parents. Measurements of exposure in comparison with safety levels can be helpful in dissipating worries.

The study and the summary (both in German) are available through ÖISS.

Chairs and tables for educational buildings

Presently a new European standard on "Furniture – Chairs and Tables for Educational Buildings" is being developed by CEN/CENELEC.¹ However the current draft and the pre-standards, published in 2001, do not meet Austrian ergonomic standards for such furniture. The Austrian working group therefore decided to establish a complementary Austrian standard. ÖISS is involved in this process while at the same time writing its own guidelines, directed mainly toward users (principles, teachers, students and staff). While the European and the Austrian standards are addressed to furniture manufacturers, ergonomic conditions in schools are hindered by the lack of information for users. The ÖISS guidelines will inform users of ways to improve students' posture, movement, behaviour and development, such as:

- using ergonomic furniture;
- adapting the furniture to each individual based on periodical measurements of the students;

1. CEN is the European Committee for Standardization, and CENELEC, the European Committee for Electrotechnical Standardization.

- using tabletops that adjust to different types of work and that incline for writing and reading positions;
- encouraging “dynamic seating positions” (sitting in different positions, standing, walking around) during class;
- offering physical activities before, between and after classes.

The ÖISS guidelines also present advantages and disadvantages of specific furniture such as adjustable and multi-size furniture.

The Austrian standard (ÖNORM A 1650) and the ÖISS guidelines will be completed in summer 2003.

School grounds – “learnsapes”

In the 2000, aware of the importance of outdoor activities in everyday school life, ÖISS founded a working group for initiatives in school grounds. Its members include planners (landscape architects and architects), psychologists, educationalists and civil servants. They offer information related to school grounds, organise events and support school projects through consultation and workshops. The working group has defined the following principles for the design and use of school grounds:

- The school grounds should provide areas for movement, sports, recreation and communication during leisure time.
- The grounds should be an integral part of school life and function as a setting for learning and other activities. This requirement refers to the principle of “learnsapes”, which combines the idea of “learning by experience” with “landscape” as a practical hands-on teaching and learning area.
- Sustainability, gender and diversity mainstreaming, flexibility, ecology and multifunctionality should be guaranteed in all school ground settings.
- Participation of students, teachers, parents and staff should play an important part in the planning, realisation and maintenance process.

The working group has been offered the opportunity to test its methods and principles with a Viennese project, to evaluate the process and to work out general guidelines for school grounds. This pilot experiment is presently in progress and should provide valuable experience.

ÖISS would be interested to learn how other countries handle these or other subjects and invites similar organisations to share their ideas and experiences. Please contact:



ÖKO-Hauptschule Strasswalchen, a lower secondary school in Salzburg, the second low energy school built in Austria, still needing a few modifications to work well for the users

Volksschule Pirka, a primary school in Steiermark, whose combination of prefabricated and wooden structures creates a warm environment

AHS Heustadelgasse, a secondary school opened in 2002 in Vienna, with outstanding, transparent architecture

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EVALUATING SCHOOL FACILITIES IN PORTUGAL

Portugal has created a questionnaire on educational facilities as part of a larger auditing programme by the General Inspection for Education to evaluate the country's schools.

The main objective of the facilities evaluation is to determine how site, design and management contribute to the performance of curricular activities in each school. And the results of the evaluation process, called the Quality of Educational Facilities and School Network Adaptation Project, will be used to improve the quality of facilities. Many of today's buildings were erected during decades of mass construction to accommodate a growing school population; as new construction is no longer necessary, the country is now focusing on bettering its facilities.

Portugal's Directorate for Quality Educational Facilities (DSQEE) collaborated with the General Inspection in preparing the project guide book along with a questionnaire to determine the image that users have of their school buildings. The project aims to reveal the attitudes of students, teachers, staff and parents toward their school building, their perception of the school's urban integration and the quality of both internal and external spaces.

The questions address the facilities' functionality, comfort, environmental conditions and safety. They range from true/false to multiple choice, to open-ended questions. Examples include "Where do you like to meet your friends?" and "What would you change about your school building?"

In addition to preparing the questionnaire, it was necessary to decide the best way to disseminate it, how many and which users would participate, and who would analyse the responses to ensure coherent statistics. These decisions had to be taken according to the General Inspection for Education's country-wide organisation as well as in collaboration with the Inspection's personnel who would implement the general school evaluation. It was decided to submit the questionnaire to a limited sample of users in each school and to complement it with interviews of teachers and school staff responsible for facilities management. A central department was designated to group and analyse the results.

The DSQEE drafted the questionnaire in collaboration with sociologists specialised in education but uncovered little documentation about similar projects. However they found useful the experience described in "An Evaluation Methodology and Its Application to the Gordon Hall of Science, Cranbrook, Michigan" by Neville Clouten, Jerry Lawrence and Sara Terian, presented at the 9th UIA International Seminar in Portugal in 1990.

For further information, contact:

José Freire da Silva, Architect

Direcção Geral da Administração Educativa (DSQEE)

Ministry of Education

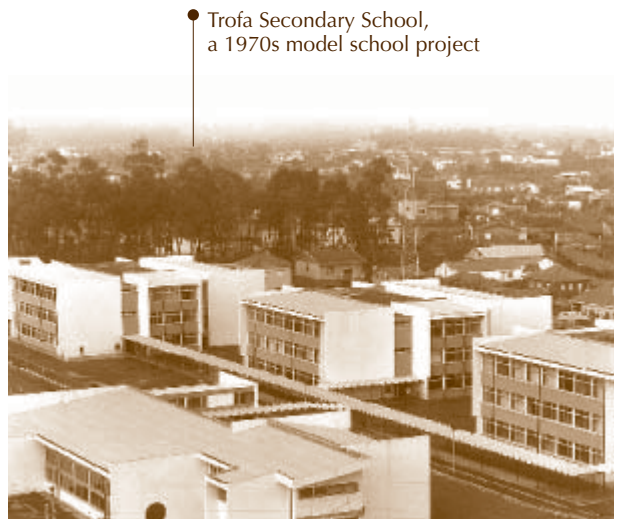
Portugal

Fax: 351 21 3970310

E-mail: JMSILVA@dgae.min-edu.pt



Alfragide Secondary School,
architect: João Mateus



Trofa Secondary School,
a 1970s model school project

DESIGNING TOMORROW'S SCHOOL

A seminar entitled "Designing Tomorrow's School" was organised by the OECD Decentralised Programme on Educational Building (PEB), the Irish Ministry of Education and Science and the National University of Ireland (NUI), Galway, and was held in Galway, Ireland, in September 2002. The seminar addressed new approaches to school design. As reforms seek to improve educational standards, the planning and design of schools for the future has become the focus of attention in many OECD countries. The meeting sought to identify current trends in school design at the international level, as well as the factors that are affecting the design of school buildings and how school building designs are responding to those challenges. It examined the extent to which information and communication technologies impact on the design of educational facilities and how school building design reflects the priorities of sustainable development.

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Education is being seen increasingly in many OECD countries as crucial for the development of economic growth and social being, a role largely corroborated by several recent OECD studies. Education is considered as one of the most important social and political priorities, to which much effort is dedicated in financial terms. As the size of the educational sector grows both within OECD countries and elsewhere, governments are mobilising resources to build educational facilities that respond to new demands.

Within that context, architects and educators in many countries have set out to design the "school of the future" and policy makers are trying to make the best choices in terms of school planning and management. All are facing major challenges as trends that set the environment in which schools will operate in the future are in constant evolution. If educational facilities do not simply reflect those changes, their design is undoubtedly strongly influenced by them. Equally, the quality of the delivery of education and training in today's knowledge society depends to some extent on the appropriate design of educational buildings. Facilities must be of good quality, be flexible and meet the needs of their users.

The need to identify and analyse trends in school design, with a view to producing policy recommendations about



the shape, size and general configuration of the school of the future, is therefore of concern to all OECD countries. On some aspects countries have known similar developments and face similar challenges. Of primary importance is the impact of new information and communication technologies on the design of facilities. Educational buildings must also respond to the challenges of sustainable development, another major priority set by OECD countries in the field of education. In recent years Ireland, the seminar host, has shown pilot developments in designing sustainable educational buildings as well as in integrating information and communication technologies to those facilities.

The discussion about school building construction and the criteria on which it should be based does not only lead to the identification and the definition of innovative approaches at the level of design. Indeed, the design stage is closely linked with other aspects of the provision of educational facilities, and most particularly with financing issues. In that context, OECD countries have developed different approaches involving combinations of central and local funding, increasingly with a private sector element.

The seminar looked at some recent attempts to conceive the school of tomorrow and to give an idea of what has been concretely achieved and what developments can be expected in the near future. The event concentrated on existing examples of innovative institutions in various countries and attempted to define some of the basic concepts that will affect the future of school buildings, while taking into account the points of view of planners, architects, teachers and students.

Certain presentations made at the seminar are summarised here. Nicolas Chung of France's Ministry for National Education spoke on "Developing digital work areas for education". Giorgio Ponti of Cisem (the Research Institute of the Province of Milan and Italian Provinces Union) presented "The school of the future: an Italian perspective". Naoto Fukabori from Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT) addressed "The trend in measures for school facilities in Japan". Jaime de la Garza of Mexico's Administrative Committee for the Federal Programme of School Construction (CAPFCE) spoke on "Multifunctional classroom facility: a challenge for tomorrow's education".

DEVELOPING DIGITAL WORK AREAS FOR EDUCATION IN FRANCE

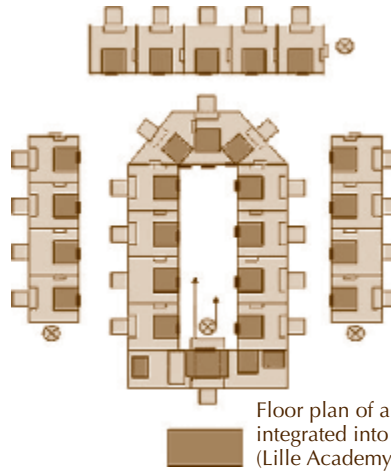
The development of information and communication technologies (ICT) is resulting in the emergence of new digital services for education: management and production of digital contents, communications and co-operative work tools, the organisation of school life, etc. The French Ministry of Education is pursuing an active policy of putting these services together as a genuinely coherent and personalised package for schools, aimed not only at students and teachers, but also at parents and administrative staff. Genuine personal “digital work areas” will in fact be made available on the Internet, both in school and from home or a municipal library.

The advent of new educational tools does, as a general rule, impact on the human organisation and infrastructure (computer or not) of the school and can ultimately promote change in the instruction provided. In the case of ICT, the impact is considerable and, as a corollary, means rethinking the above-mentioned factors. We shall deal mainly with infrastructure in this instance.

The first point to consider is the effect of the massive investment by schools in computer equipment and networks. This poses a problem in schools that were not designed for this purpose. Cabling the buildings and making the materials physically secure can be extremely expensive, while freeing classrooms for computing poses organisational problems.

Designers of new buildings have for their part to see the rapid change in technologies as an unavoidable and partly unpredictable factor. The “traditional” multimedia rooms equipped with networked office computers are showing their limitations. Teachers are asking for ICT installations and methods of use to be diversified, this being made possible by the greater mobility of the equipment (portable computers and inexpensive wireless networks, and soon, connected PDAs, tablet PCs, etc.) and the development of digital services online. Mobility also means that teachers and students can envisage having their own personal equipment, instead of using shared equipment.

As a result, it is possible to imagine ICT being used virtually anywhere. Architects are therefore faced with problems to do with workplace ergonomics, as well as more practical problems: the storage and securing of valuable mobile equipment, luminosity (for reading on-screen),



Floor plan of a classroom with computers integrated into each student's workstation (Lille Academy)

sound and heat (the machines generate a lot of noise and heat), recharging the equipment, the distribution of peripherals (such as printers and scanners which are not as mobile), etc.

More significantly, the introduction of ICT is gradually calling into question the traditional teaching relationship determined, as in classical theatre, by the unities of place (the classroom), time (the timetable) and action (the class) and clearly identified players (the teacher and class).

This is because digital work areas make it easier to work outside the classroom, and even outside the school, before and after class (thanks to asynchronous communications tools), and to bring in people from outside. This facilitates work in small groups of students and/or teachers and makes the classroom less of a central concept. With this being a developing trend, the nature and layout of teaching areas will have to be completely rethought with the object of making the real and the virtual more complementary, opening schools up to their environment and enhancing continuity between the closed realm of the school and the world represented by the global network. In this context, success depends to a large degree on work area flexibility and adaptability.

For further information on digital work areas, visit:

- the ICT site for education in France: www.educnet.education.fr
- the report by the general education inspectorate on schools and digital networks: <ftp://trf.education.gouv.fr/pub/edutel/syst/igen/rapports/rapportfinal.pdf>

Nicolas Chung

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THE SCHOOL OF THE FUTURE: AN ITALIAN PERSPECTIVE

The logo of the intelligent school building project



In the Italian scientific and educational community, the school of the future has already been given a name: the intelligent school. It is defined as an ideal grouping of physical spaces, technology and equipment able to rapidly respond to a large number of community and educational needs for today and the future in an open relationship with other social activities available to the public.

Cisem has tried to identify the important features of the school of the future by analysing buildings constructed by expert designers in a number of countries and by analysing needs specific to the Italian context. The key features of an intelligent school are described below.

Adaptability and flexibility

The building must be adaptable to various teaching methods, to diverse uses, to the introduction of new technologies and to size variations. An intelligent school should guarantee expansion or modification of spaces when needs change. The building should be organised in basic units, whether educational or service blocks, whose features allow them autonomy, insuring the maximum adaptability and flexibility over time. Each section of the school building should have independent access.

Flexibility is a prerequisite for electric installations, heating systems, waterworks and sanitary fittings, as well as multimedia and computer science laboratories.

Performance qualities

Introducing building automation systems and networks (see below) can contribute actively and passively to this feature.

Environmental and bio-architectural qualities

The school building can play a primary role in influencing students' behaviour towards the environment. It is therefore important to apply all the elements needed to ensure optimal conditions with attention to shapes, colours, lighting, materials, safety, health, comfort, energy savings and cost.

Automation systems and energy savings

An intelligent school should have a complete and all-encompassing systems network which is easy to integrate and to maintain, and the reduction of structural or size restrictions. Functions such as lighting, plumbing and heating should be controlled separately with dedicated sensors or interface. Once these various systems are integrated into the design, one interface tool – a computer that uses dedicated software – should manage all the building's functions. To avoid installing miles of dedicated wires, a single BUS line can connect and exchange information between the various components of the systems and the interface terminal.

A project called ZEP (zero energy pollution) is also being studied to run the building almost completely on alternative energy sources (*e.g.* photovoltaic cells, solar panels and geothermal energy), reducing air pollution.



A scholastic centre in a redevelopment area on the outskirts of Milan, built according to a design type for the Province of Milan and Cisem

Cost, savings and financing

An intelligent school is estimated to cost approximately 20% more than a new or restored traditional building; 5% more for better quality materials, 10% more for advanced energy systems and 5% more for building automation. However the future savings of an intelligent school, essentially linked to management costs and real estate operations, are estimated at 40% to be amortised over a ten- to 15-year period. Calculations show that an intelligent school would finance itself after ten or 15 years.

The first intelligent school, for primary education, has been designed and is being built in the city of Quattro Castella in Italy's Emilia-Romagna Region.

See the Web site www.n2d.it/isb

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Diversification and flexibility in subject matter and study methods

The multipurpose space has been introduced progressively so that various forms of study, such as simultaneous lessons or large or small group study can be chosen according to the subject matter.

With the growing popularity of studying in groups, which often requires a large, flat space, desks were improved to make their heights even so they can be grouped together to form the working surface needed.

School library services have diversified. The library has taken on the role of media centre, providing not only books but all media required for educational activities.

Adapting to changes in society

In response to the world's environmental problems, MEXT has developed "eco-schools" to reduce the burden on the environment. These schools serve as full-scale teaching materials for environmental education.

MEASURES FOR SCHOOL FACILITIES IN JAPAN

The measures relating to school facilities in Japan today respond to three needs: co-operation with the local community, diversification and flexibility in subject matter and study methods, and adapting to changes in society.

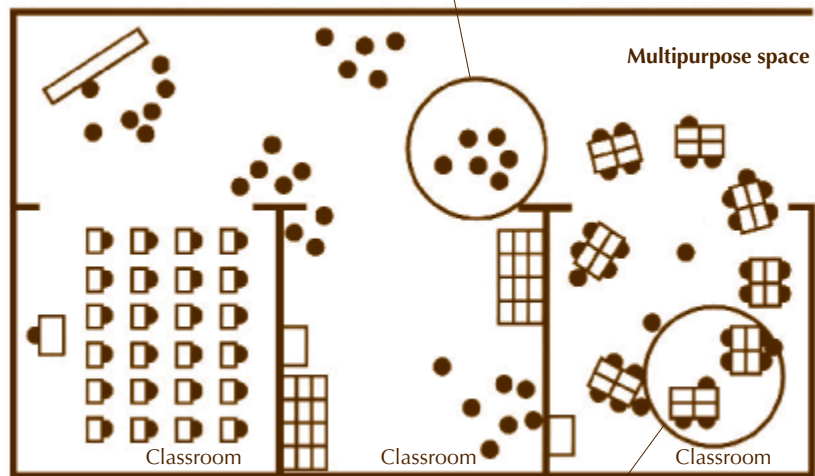
Co-operation with the local community

School facilities are now required to open their doors to the local community. They respond to community demand for life-long learning and serve as an emergency base for the community.

When disaster occurs, school facilities plan an important role as emergency shelters for local residents. In order to enhance and strengthen disaster prevention capabilities, MEXT has improved the earthquake resistance of school facilities and has built storehouses and swimming pools with water-purifying functions in schools.



Pupils using a multipurpose space



An example of group study

MEXT is promoting the development of the classroom equipped with terminals for an intra-school LAN and other information devices in order to use information technology to its maximum in teaching.

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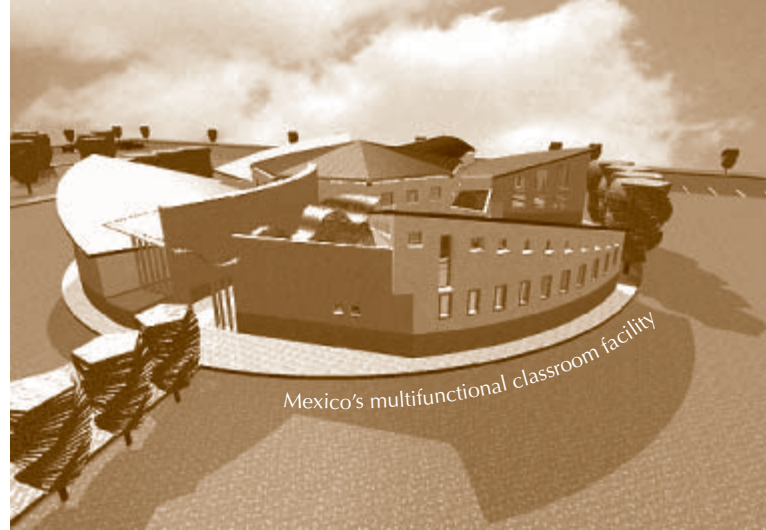
MEXICO'S MULTIFUNCTIONAL CLASSROOM FACILITY

The multifunctional classroom facility is a school complex project designed to facilitate computer-assisted teaching in the future, in any of the languages spoken throughout Mexico, in order to reach the large number of students in isolated rural areas. CAPFCE conceived this facility to meet the challenge of educational space, incorporating teaching and technological tools along with a proper architectural design. This project is part of the Ministry of Education's goal to provide a quality education to all of its citizens.

The multifunctional classroom facility will be composed of three cells, totalling 10 800 m². Each multifunctional cell will accommodate 80 to 96 students and include these facilities:

- four classrooms (for 20 to 24 students);
- an administrative office;
- a technical support office;
- a sanitary services area (30 m²);
- a small storage room for teaching materials adjacent to each classroom (the classroom and storage room combined equal 87 m²);
- an open area connecting all the classrooms (632 m²);
- an electronic library space (32 m²);
- a concession area or small student lounge.

The facility is designed for community interaction, serving as a centre for social events in addition to education. It includes an outdoors amphitheatre, a playground and a basketball court. The buildings are on a single level, in consideration of people with mobility handicaps.



Mexico's multifunctional classroom facility

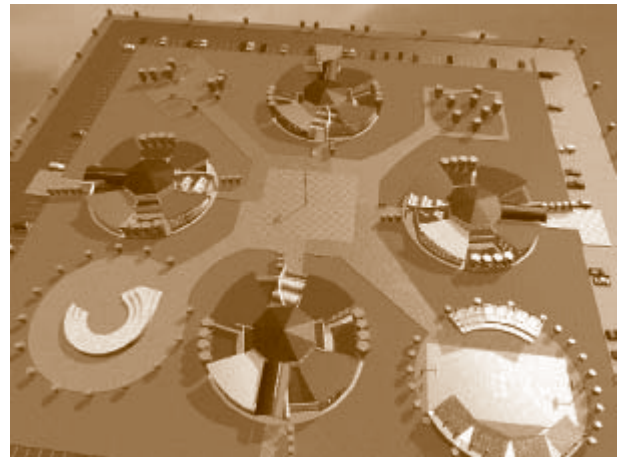
Materials used to build the facility will come from the local area. This lowers costs and customises the building in accordance with the city or region's local culture.

Teaching in these rural facilities will be overseen by a local tutor using lessons provided via video-conferencing and a multimedia system that allows for the use of Intranet, Internet (for consulting libraries abroad and exchanging ideas with students from elsewhere through discussion groups), DVDs, etc. Each classroom will be equipped with a video projector, camera and interactive whiteboard. The pupils will have specially-designed worktables that house a computer terminal.

The proposed classroom will be easy to install, maintain and use for various purposes.

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A bird's eye view



EDUCATIONAL FACILITIES IN SLOVENIA

Some statistics

- Country population: 1 967 million
- Area: 20 273 km²
- Elementary schools: 811
- Secondary schools: 136
- Post-secondary vocational schools: 37
- Institutions for higher education: 47 higher schools
- Universities: 3

Since gaining independence in 1991, one of Slovenia's priorities has been to invest in education. The Ministry of Education, Science and Sport has been widely reforming its education system and investing its limited resources in the construction of buildings and their equipment for all levels of education. The government is working to overcome the problems it has encountered.

Among Slovenia's aims are providing quality facilities that are functional and flexible; are safe for pupils and teachers; are not overly expensive; dispose of appropriate funding for building, operating and maintaining infrastructure; and reduce energy consumption.

When planning school facilities, the government is working to give more attention to functionality and flexibility of use. The strict territorial lines that divide secondary and post-secondary schools need to be erased (the majority of vocational schools are located on secondary-school premises). And the school should be perceived increasingly as a cultural, information and sports centre for the local community. Facilities such as libraries, equipment for information and communication technologies, and spaces for exhibitions, performances and recreation should be shared. School buildings should be used after school hours and at weekends.



Elementary school in Ptuj



In the last few years, the problem Slovenia encountered most frequently in educational building is ensuring the highest quality of air with a minimum investment and low operating costs: how to provide maintenance and monitoring of heating systems as well as compulsory ventilation and cooling at minimal costs. This is challenging because good air quality can be ensured only by the built-in installation equipment of the highest quality (and therefore the most expensive) and adequately financed operation and maintenance of the facilities. Without the proper investment, this technology can have damaging effects on the health of students and staff.

A second, though no less crucial problem, is a constantly undersized education budget. Much effort goes into searching for additional resources to invest in and maintain the country's educational infrastructure.



Faculty of Law in Ljubljana

In 2003 Slovenia is working on two projects:

- a public call for tender to grant a concession for building and operating a student residence hall, in an attempt to attract private capital;
- a public call for tender for investment in energy savings in educational facilities (performance contracting). With the help of resources from outside the budget, the aim is to lower energy consumption as well as reduce future operating expenses.

The last ten years have seen extensive investment in Slovenia's educational facilities. The central government has built or renovated 205 buildings for different levels of education ranging from elementary to university level, for a total spending of nearly EUR 300 million coming mainly from the ministry's budget. An additional 290 schools have been newly built or renovated through co-financing by local authorities and the ministry.

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LIBRARY ENVIRONMENTS AND ORGANISATIONS: OPPORTUNITIES OR CONSTRAINTS?

The following article is based on a presentation by Sarah E. Thomas, a librarian at Cornell University in the United States. She spoke at an international seminar on universities and libraries organised by the OECD Programme on Institutional Management in Higher Education (IMHE) in August, 2002. This abridged version begins by summarising how libraries thrive in an era of change. Next it explores storing print publications and how libraries are increasing space for services and activities. The paper then addresses new roles and partners for libraries and, finally, architectural solutions to spatial constraints.

Libraries thrive in an era of change

Library environments and organisations are in a heightened state of change. Far from becoming deserted or anachronistic in the digital age, libraries are enjoying a renaissance which manifests itself in the widespread renovation and reconceptualisation of library facilities. Modern libraries or historic buildings that are rejuvenated to reflect contemporary functionality are experiencing immense popularity as destination spots. The challenge of book storage of collections that seem to grow inexorably offers opportunities to rethink the very nature of a library. Is it necessary to own a title? Is it necessary to make it available for immediate consultation and browsing? Responding to the pressure placed on buildings has resulted in an array of creative solutions and services that alters the relationship of libraries to each other and of patrons to collections. A trend to return library space to users is occurring, with collections and staff being moved off site and new user space being created out of unused terrain. Successful facilities are likely to accommodate boundary spanning in organisations or to house multiple units that engage in collaborative support for teaching and learning. Because the institutions are so much in flux, library facilities are being designed to be flexible, capable of further reconfiguration as the structure of organisations shifts and new needs emerge. At the beginning of the 21st century, the public venerates the traditional role of libraries as custodians of knowledge and culture, and they celebrate

the iconographic character of grand reading rooms. They seek out libraries for the community space they provide at the social and intellectual crossroads of society. To integrate into the digital information age, they require that the library incorporate state-of-the-art information technology and services which bridge the analogue and digital worlds.

Storing printed publications

With publication of books and print journals continuing unabated and the appetite for acquisitions unsated, libraries reached saturation. Yet where these volumes had been the source of pride for universities, they were now a source of vexation. The growth of holdings and the space they required collided with other interests of the university, which have been constructing other facilities such as laboratories, classrooms and residences to accommodate expanding populations and research priorities. University administrators have been reluctant to commit to the expense of central campus expansions, and as campuses became congested, they tried to preserve the green spaces so highly prized in their micro metropolises. Out of these conflicts was born the high-density storage facility. In the United States the Harvard Depository, erected in 1986, has become a model for many other remote storage buildings.

The off-site storage library, with its highly efficient shelving of materials organised by size and depending on delivery mechanisms of daily van service or scanning of items, has recently entered a new phase. As more and more of these “big boxes” have been constructed, at a fraction of the cost of on-site storage, they have forced reconsideration of this approach. At the Massachusetts Institute of Technology (MIT), for example, campus space constraints have resulted in over 75% of MIT’s library collections being housed off site; the librarians are warning that this imbalance of access is putting its readers at a disadvantage. They are laying the groundwork for the construction of a USD 100 million science library and a USD 50 million renovation of an existing library, enabling them to support browsing and direct access to a much higher percentage of their collection. Librarians are beginning to assess the proportion of their collections that must be available to users for on-site consultation. On one hand, MIT asserts convincingly that 25% is an insufficient number. Elsewhere librarians are challenging the assumption that a significant proportion of their holdings must remain in central stacks. Harvard’s Widener Library, the great treasure house supporting the distinguished faculty and students of the College of Arts and Sciences, now sends

68% of its newly acquired publications directly to the Depository, and they estimate that within the decade more than 60% of Widener's holdings will be located off-site. At Ohio State University, where the library is conducting a campaign for a USD 100 million renovation of its main building, the planners propose reducing the amount of space devoted to shelving.

Informing these decisions are several factors. Automated circulation systems have enabled libraries to determine that substantial parts of their collections never circulate. As publishers and entities such as JSTOR digitise retrospective holdings of journals, patrons rely more on electronic access, making it reasonable to transfer paper volumes to remote storage. Universities seeking the most

cost-effective means to store items often collaborate to reduce overhead. First gradually, and now with increasing rapidity and frequency, librarians are questioning the need to duplicate titles held in these repositories. There is a movement toward establishing a library of record for maintaining access to and preserving paper copies, freeing other institutions to deaccess their holdings. The consequences are lower capital and operational costs, institutional interdependence and a greater ability to hold central libraries to zero collections growth. Other benefits of remote storage are environmentally superior conditions and protection against thieves.

Increasing space for services and activities

Over the past 15 years libraries have shifted from an emphasis on ownership to access, and there is increased focus on services. Certain traditional staples of the library have altered their shape. The card catalogue, once the starting point for scholars seeking entry into the library's collections, receded in importance as libraries brought its contents online, and as users began to prefer the Web as the point of departure for discovery. Similarly, as libraries provided access to more electronic journals, the periodicals room declined in popularity. Reference transactions have also fallen steadily, perhaps a casualty of the greater independence of information seekers who conduct much of their information seeking online. As a consequence of these changes, libraries are reconceptualising their space in innovative ways. The vast amounts of floor space freed up by removal of the catalogue now are often occupied by computer workstations. Libraries have converted periodical rooms into cafés or group study rooms. Taking into account the trend toward one-stop shopping and the blurring of the boundary between reference and information, libraries are unifying service points. For example, they may combine access to materials formerly separated by format, creating a single service desk for inquiries for newspapers, microfilms and general reference. The complexity of information resources makes navigation for readers much more difficult than in the days of the book-dominated culture. Thus libraries have greatly increased the amount of instruction, adding wired classrooms to their domain. As general collections have grown more homogeneous, owing to online aggregations of serials or to restricted budgets which force libraries to cut back on acquisition of monographs, special collections have ascended in prominence. There is greater attention to primary source materials as students begin research earlier in their careers, and as samples mounted on the Internet whet the appetite for access to originals and entire collections.

© The Cornell University Library



Cornell's Periodicals Room was hardly used by 2001.

Transformed into a wired café, the space is now one of the campus' most popular study and meeting places.



© The Cornell University Library

One of the major challenges facing libraries and their users is the integration of print and digital and place and space. Not only do library patrons need access to dispersed manifestations of knowledge in a variety of locations and formats, but also they themselves are now creating new knowledge through the incorporation of diverse sources. Increasingly they seek modes of expression that are multidimensional and for which they employ computers, software and the raw material of library holdings.

No longer is the monastic study carrel with its narrow ledge and bookshelf sufficient for the thesis writer. Now she desires a small enclosed room with electrical outlets and Internet connections for her laptop. The comfort and convenience of home need to be reproduced in the library, with soft chairs, warm lighting and an inviting atmosphere encouraging learning and research. Users need quiet zones where they can concentrate, interactive areas where they can work with one another utilising the latest technology, connections to online services and live experts, and space for social intercourse and community building.

The demand for technology support has led to the development of areas called media commons, requiring a reorientation of space to accommodate the multiple spatial requirements of users who need computers, colour plotters and printers, GIS programs, scanners, projectors and a host of other technological devices not envisioned by the creators of the codex. Because the new order combines traditional and new technologies, libraries must allocate even more space for users.

Although headlines in newspapers often suggest that Internet traffic has supplanted the physical library, the fact is that at research libraries, visits remain steady or are even on the rise. The library, far from being a mere warehouse for books checked out by clerks, is a critical component of social and intellectual fabric of the university. The inspirational reading rooms of the 19th and 20th centuries still exert a powerful pull on readers. The University of Washington has just celebrated the restoration of its magnificent Gothic reading room, and Columbia, Yale and Harvard have all invested significantly in maintaining the tradition of the reading and reference room, albeit in an updated form with access to power and data.

Access to physical collections is one reason to use the library, but equally important is the need for discourse and discovery with others engaged in academic pursuits. Cyber cafés, imported from progressive bookstores, have taken off like wildfire in U.S. libraries, taking advantage of relaxed prohibitions on mixing books and food, and drawing on the pleasure of human interaction in an ever-more technological world. Libraries have expanded their role in curating exhibitions, sponsoring lectures and planning other activities that attract people celebrating the life of the mind. Correspondingly, libraries are expanding the amount of space dedicated to these activities, and they are extending their hours. Most university libraries offer 24-hour access to at least a portion of their reading rooms and services during the academic year.



© Photo by Peter Aaron/ESTO

Renovation of Butler Library Main Reference Hall,
Columbia University, New York,
New York



Alderman Café, University of Virginia Library



New roles and partners for libraries

In the past several years libraries have taken on new roles and partners in order to serve their public's needs and to meet their expectations. Both the library's physical environment and the library organisation have changed as a result. The need for ubiquitous technology and deep technological expertise and the rising number of electronic resources have led to the collocation of information technology and library staff in neighbouring service points, team teaching and, in some cases, the merger of units. At Dartmouth College, for example, architects planned a new library addition that places information technology specialists and librarians in adjacent offices and public service desks. At the University of Georgia, construction of that campus' largest and most expensive building, the Georgia Student Learning Centre, is underway, with the library director at the helm of the planning group that has recommended a spacious building combining group study rooms, electronic classrooms and a traditional reading room. The building will be 200 000 square feet (18 600 m²), housing an electronic teaching library with 500 network stations, 2 200 seats, many electronic classrooms, plus the ubiquitous coffee house and lounge chairs for students. At Northwestern University, in Chicago, Illinois, there is a library building called "2 East", which is a version of media commons. In it the university has located collection managers, digital

media services and academic technologies. Although organisationally separate, the university library and academic information technology support work together to offer their clients a library training facility, a reference classroom and digitisation services where they can assist faculty in creating courses that employ digital content.

Sharing staff expertise often leads to integration or adjacent placing of staff and services. Expertise gained by librarians in the management of digital resources has made them key resources in other cultural units that are just developing digital activities or products. Thus librarians assume responsibility for museums or university presses, with the consequence that both facilities and staff can overlap. Cornell University manages the operations of the arXiv, a physics pre-print server, and directs Project Euclid, an online service for publishers of mathematics journals, with a concomitant increase in staff and space needed to house their operations. Some libraries partner with other academic units in teaching and research. At New York University, the dean of libraries oversees not only the libraries, but also the television station, media services and the New York University Press. The preparation for classes, meetings with other professionals and students, and laboratory space all place new demands on library facilities for different configurations. In addition to more square footage, the fluid and dynamic organisational changes create a need for space that is very flexible and easily altered.

The University of Georgia Student Learning Centre



Architectural solutions to spatial constraints

In their quest to accommodate the variety of dimensions of the library and its users, universities and architects have presented many ingenious solutions that respond to the constraints of space. In 2001 Princeton University announced that it would build a USD 60 million building designed by Frank Gehry, consolidating several science libraries. Smoothing the way for this momentous decision were several factors: a willing donor, the desire by researchers to liberate space for laboratories and the increasing availability of scientific information online. Another popular solution to limited on-campus space, as we have seen, is displacement. Most frequently, libraries move books off site to high-density storage facilities. Of late institutions are also shifting staff from central libraries to office space located at some distance from the library. When Harvard moved its cataloguing operations out of Widener Library to an office located a mile away in 2001, it transformed the former cataloguing workroom into an inviting current periodicals reading room. Many other institutions are re-examining the necessity of locating all staff near public spaces. One solution to total separation is to establish an area in a central location for "hoteling", where staff can reserve temporary offices and business services to use for a few hours or days.

Divestment is a more drastic form of dealing with overcrowding, but some libraries have chosen to contract out services such as cataloguing with the consequent savings in staff space. Cleverly, Yale, Harvard and the New York Public Library have created additional space within existing buildings by filling in light courts, fresh air intake courts and atria. These renovations have resulted in buildings within a building, and the transformation of previously wasted square footage into elegant public and staff space. At Cornell a prohibition on library buildings on central campus drove the library to expand underground. Emory filled in the space between the Woodruff and Candler libraries with a glass enclosure that houses its advanced technology and that creates a porous connection between the two.

Both physical facilities and the organisations which reside in them are still evolving. The transformation requires our imagination and flexibility. The evidence, as manifested in the construction and reconfiguration of the past few years, is that these qualities abound.

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The University of Georgia Student Learning Centre



DESIGNS FOR LEARNING IN THE KNOWLEDGE AGE

By Dr. Kenn Fisher

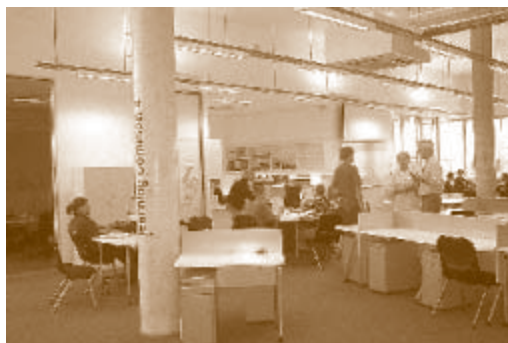
This overview of designs for learning in the Knowledge Age briefly explores the relationship between learning and the built environment, and the role of teachers in designing educational spaces; it calls for a collaborative campaign and suggests future action.

The relationship between learning and the built environment

It is in the formal environment of the classrooms and the informal environment of the campus grounds that architecture is lived, learnt and experienced by teachers and students. I believe that our architectural vocabularies and spatial literacies are shaped during these formative educational years and that school, college and university architecture sets the spatial benchmark for environmental quality later on in our adult lives. I also believe that if we have positive experiences in our learning environments then our expectations regarding high quality public spaces will be enhanced resulting in better architectural outcomes across the whole community. Further, educational architecture sends a powerful message to the community about how we value education as a fundamental part of our culture, society and economy.

The impact of the physical environment and the rapid changes in information and communication technologies on learning has spawned hundreds of studies by educational researchers worldwide.¹ Most of these, however, are quantitative studies which attempt to link test scores to building condition, with little attention paid to qualitative perceptions of students and teachers about their learning environments.

The “actuality”, or phenomenological experience, of the interaction between learning and the physical environment has only really been extensively explored using the natural environment and the school grounds through such agencies as Learning Through Landscapes in the United Kingdom and the Learnscapes Trust in Australia. In a similar vein educational architectural academies should also be exploring is the interactivity between the



Australian Science and Mathematics School

built environment and learning through action-learning projects which engage students and teachers in the architectural process. It is only through living, controlling and shaping learning spaces and places that they will become real and not simply experienced as passive containers for learning.

The role of teachers in designing educational spaces

There has been little change in the concept of a classroom over the last 200 years or so. This covers the agrarian, with the ecclesiastic classroom; the Industrial Revolution, with its Taylorist notions of control to produce compliant factory workers and, more recently, the Information Age with its flexible learning spaces. Yet the immutability of the classroom has continued despite the attempts of designers and educational authorities and their constant struggle for change. Teachers in all educational sectors will continue to revert to the time-tested concept which is the classroom unless it can be demonstrated that alternative physical learning environ-



Australian Science and Mathematics School



ments can positively influence learning outcomes. There has been no sustained attempt at a holistic change to approaches to educational reform that integrates all the forces acting on it, including the power of space.

Now, in the Knowledge Age, learning is becoming interdisciplinary, collaborative, problem- and project-based. It also involves learning in the community and in industry, with sustainable personal and social communication being the key to such transdisciplinary activities. Neither Internet chat rooms nor classrooms alone can achieve this objective. Pedagogical concepts such as

constructivism (negotiated individual curricula), multiple literacies (including spatial), multiple intelligences,² distributed learning (facilitated by mobile and wireless communications), integrated curricula and worked-based learning will all require a rethinking of the spatiality of learning. However, innovations such as the Australian Science and Mathematics School and Mawson Lakes in Adelaide, which attempt to embrace these ideas, are futile unless they become part of the mainstream of schooling. The ideas demonstrated in these prototypes must be integrated into all schools, colleges and universities for there to be any sustainable concept of school reform.

When closely involved, students and teachers offer passionate views on classrooms, corridors, playgrounds, cafeterias, performance theatres, laboratories, studios and school grounds and campuses. These are views and voices that should be heard, as they are the views of those who inhabit and use the spaces and places we design for them. I urge all those who are involved in educational architecture to engage, embrace and encourage students and teachers to collaborate with the greatest possible degree of inclusivity.

1. Fisher, K. (2000). "The Impact of School Design on Student Learning Outcomes and Behaviour", Schools Issues Digest No. 1, DETYA, Canberra.

2. Gardner, H. (1999). *Intelligence Reframing: Multiple Intelligences for the 21st Century*, New York, Basic Books.

A collaborative campaign

A campaign which relates space directly to changes in pedagogy, curriculum, and information and communication technologies, and which places place and space firmly on the agenda of teacher professional development, is critical to this collaborative project. Architects must engage directly with teachers and academic staff for any real and sustainable change to classroom design and campus planning. Such a campaign might include:

- Presenting innovative architectural concepts to professional teacher associations and inviting panels of teachers and academics, not just principals, educational administrators and vice chancellors, to meetings of educational architects to discuss issues around rethinking school, college and university spaces and places.
- Using art in architecture, art in public places and artist in residence programmes on educational campuses to increase interest and hands-on involvement in architecture.
- Developing a curriculum for a one-day teacher/academic professional development programme on place and space in education.
- Launching an initiative which focuses on the built as well as the natural environment and which links the two, such as the School Works project in the United Kingdom.
- Using educational architecture as an educational tool to demonstrate environmental sustainability.
- Sponsoring a demonstration project which shows how a “school of today” can economically, environmentally and socially (the triple bottom line) be converted to a “school of tomorrow”, rather than focusing only on new schools.

I think that the answer to why there has been little advance in educational architecture is the issue of ownership. Students and teachers need to “own” the architecture and the spaces and places they learn in. But, before they can do that, they must understand what it is, how it works, what impact it has on their lives and how they might be able to influence it.

Those of us that have the privilege to be commissioned to create these learning environments also have the responsibility to use these projects as a teaching and learning instrument for both teachers and students. These projects are rare in the life of a school student, indeed in the life of a teacher. Such opportunities must be capitalised upon to not only increase the spatial literacy of both teachers and students but also so that educational architecture becomes a powerful means of demonstrating that education and learning is indeed a critical, if not well understood, part of our social capital.³

Future action

It is clear that we still need creative designers to lead, to envision, to champion and to deal with the authorities, builders, financiers, project managers, the design process, the materiality and so on. But we also need to share the ownership of the process and the product. Schools, colleges and universities can be viewed as cultural interpretive centres. We should be pursuing the development, the production and the experience of interpreting our future built environment, for a knowledge society, actively with its current and future citizens, rather than simply for them.

Dr. Fisher's career has spanned campus and educational facility planning, teaching, researching and campus facility and project management for almost three decades. He was Head of the OECD Programme on Educational Building in Paris in 1997/8 and consults to UNESCO. Dr. Fisher has worked in Europe, Asia, the Middle East and Australia and is currently Managing Partner, Education, for Woods Bagot. His doctorate, at the Flinders Institute for the Study of Teaching, studied the design of educational buildings from the perspective of teachers and students.

This piece is an edited version of a longer article published in its entirety in SA Architecture Journal, in 2003.

3. Fisher, K. (1998). School buildings as social capital. *The Investment Appraisal of School Buildings*, Luxembourg, OECD/European Investment Bank.

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August

28-29 – "Management of Art Schools and other Specialised Institutions" is the theme of an international conference organised by the OECD Programme on Institutional Management in Higher Education (IMHE). It will take place in Paris. Contact: Jan Karlsson, tel.: 33 (0)1 45 24 92 01, e-mail: jan.karlsson@oecd.org

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