PEB EXCHANGE

THE JOURNAL OF THE OECD PROGRAMME ON EDUCATIONAL BUILDING

ISSUE 44 OCTOBER 2001

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.

Eighteen OECD Member countries and ten 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 2001. 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

HUNGARY JOINS PEB

The OECD Programme on Educational Building (PEB) gladly welcomes Hungary as it newest Member. The country joined the Programme in July 2001.

According to the OECD publication *Education at a Glance*, Hungary's educational expenditure has increased in recent years (1995-1998) despite a shrinking public budget. In 1998, the equivalent of 5.04% of the gross domestic product was spent on educational institutions from public and private sources, 4.46% from public alone. The country has a population of 10 million.

PEB TURNS 30

In September 1971 at the initiative of European ministers of education, the PEB Steering Committee met for the first time and the following year the Programme began its work. It was a time of economic expansion, and governments faced a need for new buildings to provide for a rapidly growing school population. In the late 1970's, the focus switched to the integration of school and community facilities. This was followed by a rationalisation phase, as governments prepared for a drop in student numbers. Since then the Programme's work has evolved towards its current concerns with the quality, management and renewal of facilities at all levels of education. The Programme celebrated its 30th anniversary with a forward-looking seminar on the future of educational building (see page 10).

MANFRED HINUM RETIRES

Manfred Hinum, who has represented Austria on the PEB Steering Committee since its inception in 1971, is taking his retirement. Mr. Hinum was an official of the Ministry of Education and Cultural Affairs in Vienna responsible mainly for school development planning and school building for secondary education. He acted as chair of the PEB Steering

Committee for five years and contributed to the Programme in countless other ways on both a professional and a personal level. On behalf of the Programme's Members, the Secretariat wishes to thank Mr. Hinum for the leadership and dedication he showed as well as for the friendship shared during his three decades of service.

RENEWAL OF MANDATES

The OECD Council has approved the renewal of the five-year mandates for the Organisation's education-related programmes:

- Programme on Educational Building (PEB);
- Education Committee, responsible for core work on education and training;
- Centre for Educational Research and Innovation (CERI);
- Programme on Institutional Management in Higher Education;
- Programme for International Student Achievement.

Earlier this year the ministers of education endorsed the broad scope of work on education under the current mandates to the end of 2001 and set an agenda for future work.

The PEB Steering Committee has since established a programme of work for its 2002-2006 mandate, taking into account the necessity expressed by the Secretariat for strengthened connections with the Education Committee and CERI and increased membership and funding.

E-LEARNING

The impacts of new information and communication technologies on education and training, broadly referred to as e-learning, is currently the subject of study by the OECD Centre for Educational Research and Innovation (CERI).[1] At the 7th OECD/Japan seminar on "E-Learning in Post-Secondary Education" held in June 2001, experts and representatives of 17 countries met in Tokyo to examine trends in this area as well as in trade in educational services. Five key questions were considered:

- How important a transformation has already taken place?
- What kind of electronic learning is likely to meet the demands of post-secondary education markets and offer value for money?
- In considering whether barriers to trade should be lifted, how can quality assurance and recognition of institutions and qualifications be fairly internationalised?
- What kind of post-secondary education systems are countries moving towards (and in what sense will or should national "systems" survive)?
- Can high-quality knowledge production survive a transformation from traditionally structured universities to the more diffuse environment suggested by the virtual economy?

According to the seminar report, 57% of Canadian universities offer on-line courses, with 3 000 offered in all. One in four of Dutch universities say they provide electronic learning environments, while all but 10% say they have some plans to do so. In Japan, 123 institutions have installed a communications satellite system for organising lectures, seminars and academic meetings.

The development of e-learning is also related to having a set of agreed international rules for trade in educational services. CERI presented an update on international negotiations and their impact on supply and demand of post-secondary education. The seminar also addressed the key emerging policy issues with regards to e-learning.

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1. See page 25 for a description of the 2001 CERI publication *E-Learning: The Partnership Challenge*.

News

THE CREATION OF A MISSION ON SCHOOL ARCHITECTURE IN FRANCE

Walkway in the 600-student *Collège l'Estaque*, Marseilles, France

Plants and natural light contribute to a pleasant environment in this recently renovated school for 11- to 16-year-olds.

Among the measures decided upon at the beginning of April 2001 for all lower secondary schools, the French Minister for National Education, Jack Lang, announced his decision to establish a Mission on School Architecture within his department, under the supervision of one of his advisers, Christian Dupavillon (architect).

This Mission is responsible for considering whether the premises of lower secondary schools are adapted to the educational reform measures adopted in early April. These measures are aimed at meeting the perceived need for small rooms for working in small groups, auditoriums that can hold a number of classes and areas in which pupils can interact, but also rooms in which teachers can meet with each other and with parents and suitable rooms equipped for the use of new educational technologies. Jack Lang emphasised that he wished schools to be more "human", that school premises must be better designed and better equipped and that lower secondary schools should be limited to no more than 600 pupils.

The Mission on School Architecture will discuss these issues with Departmental Councils, the elected bodies that oversee the *départements* (France is divided into 100 *départements*), since they have had prime responsibility for school construction since major decentralisation legislation was passed 15 years ago. The Mission will advise them on how to ensure that school premises and infrastructure are better adapted to educational needs and school life.

Jack Lang also announced at the end of May that some 27 000 "artistic and cultural activity" classes would be introduced in primary and lower secondary schools and upper secondary vocational schools when the academic year opened in September 2001. Some are devoted to the topic of "architecture and cities". In this regard, the Ministry of National Education is launching four programmes based on four themes: cities, with "classes on cities and architecture"; the visual arts with a programme called "Look Around You"; architecture, with a "Best House Contest"; and heritage, with a programme entitled "My School Adopts a Monument or Neighbourhood". These "artistic and cultural activity" classes are being established as part of a five-year plan launched in December 2000; priority has been given to primary education, with 20 000 classes; there will be 4 000 classes in lower secondary schools, mainly in the 6th grade (the first class of lower secondary school), and some 3 000 classes in upper secondary vocational schools.

THE RIGHT TO STUDY IN ITALY

In June 2001, the Tuscany Regional Council approved a Right to Study plan. The main areas covered are:

- the creation of a regional system of adult education that makes practical use of European indicators of lifelong learning;
- measures to implement compulsory training to the age of 18 for the first time at the regional level;
- increased levels of funding to maintain and strengthen more traditional measures relating to the right to study (scholarships and allowances, reimbursement of text-books, grants to municipal and approved private nursery schools), in order both to enhance children's chances of success at school and to increase the number of places in nursery schools.

The Councillor for Education, Training and Employment, Paolo Benesperi, who presented the measures, described the plan as "a new and decisive step towards integrating two systems which will increasingly be called upon to establish closer links and synergies, namely the educational system and the training system. And, for the first time, a third and innovative element, adult education, must be integrated." The cornerstone of this plan consists of the national rules that have "regionalised" educational

policy and raised the school leaving age to 15 and the compulsory training age to 18. The increased requirements have been matched by increased funding. Total funds exceed ITL 100 billion, which includes funding for school buildings (ITL 47 billion) from the European Social Fund and central government.

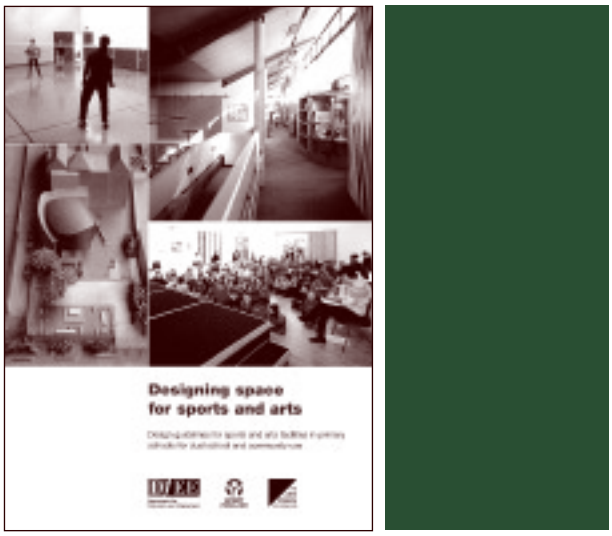
SPACE FOR SPORTS AND ARTS FOR SCHOOL AND COMMUNITY USE IN ENGLAND

Space for Sports and Arts is a new initiative in England aimed at improving facilities in primary schools in the areas of greatest need, for both school and community use. It will help tackle the situation, highlighted by schools inspectors, in which around 2 700 primary schools (14% of the total) have poor facilities for physical education, while 2 300 (12%) do not even have a space large enough for dance and movement. At the same time it will help communities which have little or no provision for sports and arts activities.

There are over 19 000 primary schools in England and most are conveniently located to serve the educational needs of local children. This makes them ideally placed to meet other community needs for sports, arts and social facilities and to provide learning opportunities, access to childcare and equipment for information and communication technologies. Moreover, in impoverished areas, ranging from run-down urban housing estates to areas of rural deprivation, schools are often seen as much more welcoming places than other types of public buildings.

This initiative creates many design challenges. Dual education and community use necessitates a substantial increase in the specification of standard school facilities. Sports and arts use will affect the size of individual spaces, such as halls, and the need for additional spaces such as changing rooms, meeting areas and adult toilets. The additional facilities may also have uses for other community activities: playgroups, clubs, societies, concerts, conferences, meetings, dances and discos, dance classes, films and receptions. However, the major challenge is how to design spaces which are attractive and stimulating places for children, while still being suitable for use by adults. Many spaces must be multi-functional for both sets of users. For example a hall may need to function as a dining room and gymnasium, but also as a space for ball games, or as a theatre, where elements such as wall bars would be obstructive. Such problems can be overcome if multiple uses are planned for at the briefing stage.

The challenges are greater with primary schools than secondary schools, because of the potential conflicts in scale.



Small children have very different perspectives from those of teenagers or adults. While different needs for furniture and equipment can be met by providing additional items, so long as there is sufficient storage, this is not a practical solution for the building itself. Spaces for sports and arts need to be designed so that they appeal to, and function for, both children and adults without requiring costly and time-consuming alterations between uses.

Schools are often the most distinctive buildings in a neighbourhood, but many are not. If they are to function well as the focal points for communities, they need to be attractive to children and adults alike. This programme will create opportunities to raise the status of the schools involved through imaginative design.

Funding of GBP 130 million is available for the initiative – GBP 75 million being provided jointly by the Department for Education and Skills (DfES) and the Department for Culture, Media and Sport, with a further GBP 55 million coming from the National Lottery. This is expected to fund projects in around 350 schools. Sixty-five out of 150 local education authorities were selected to receive funding, on the basis of the greatest needs, and their preliminary proposals were approved in spring 2001. Their architects then began the design phase, and most schemes should be submitted for approval by the end of October this year. Construction work on many of the projects should start early in 2002.

The DfES produced illustrated design guidance for participating authorities, schools and their consultants. For a copy of the 20-page publication "Designing Space for Sports and Arts", contact Chris Bissell by e-mail at chris.bissell@dfes.gsi.gov.uk.

PROJECTS

AN INTERNATIONAL CAMPUS IN SWITZERLAND

A need

The development of Geneva due to the presence of international and multinational organisations has led to an increased need for infrastructure. Over the past ten years, the International School of Geneva has seen its enrolments grow by 1 000 pupils, and the number of pupils whose parents work in international organisations has risen from 600 to over 900.

The International School of Geneva has three campuses in the region of Lake Geneva and now has a total enrolment of some 3 500 pupils; more than 100 nationalities are represented. In order to prevent overcrowding on existing campuses and to meet the growing demand, the Foundation of the International School of Geneva plans to build a fourth campus, at Saconay. It wishes the architecture of this new site to reflect the school's ideal of service to the local and international communities, while effectively meeting the challenges that it must face at the beginning of the 21st century.

Criteria

For the design of this new campus, the school's Foundation launched a competition in which architects were invited to submit projects. The selection criteria included functional aspects and an organisation of the site and buildings that would:

- encourage pupils to participate in school life;
- develop a spirit of belonging to an educational and social community;
- be responsive to new educational practices;
- provide for flexibility;
- solve problems of access and of pedestrian and vehicle traffic.

The future campus will house 1 000 primary, lower and upper secondary pupils and 150 adults. The campus, which will be highly innovative, will be a place where people can meet and develop, a place conducive to learning and facilitating the integration and interaction of pupils from around the world. The campus, which will be multi-

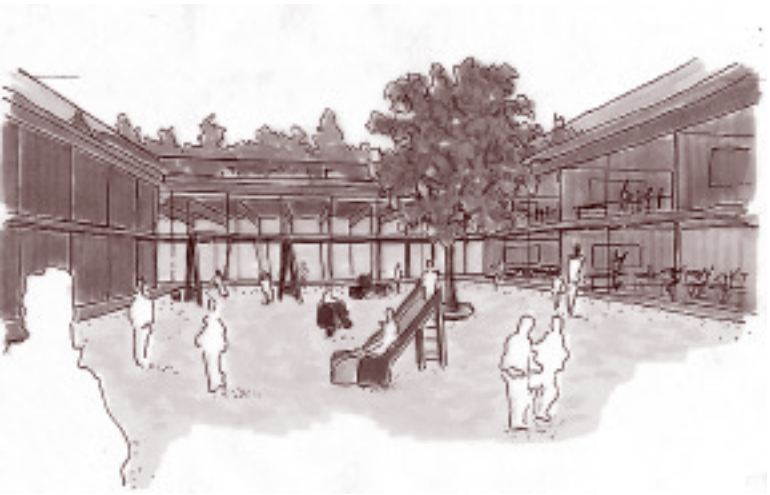
functional by nature and will be structurally adaptable to new developments in education, will meet current educational needs while being adaptable to changing needs at lower cost. It will also allow for individual work and accommodate the activities of different sized groups. Some areas (the cafeteria, physical education rooms, etc.) will be separated from teaching areas so that they will be accessible outside school hours and can be made available to the community. Lastly, as this campus is located near prestigious international institutions, its identity as an educational institution will be clearly affirmed.

The available land is in the area where Geneva's international organisations are traditionally located. This extensive district is one of Geneva's assets that enables it to fulfil its major international role and is a key area, not only in relation to the activities of international organisations, but also for the urban development of greater Geneva.

The project selected

The project chosen is appropriate for an international institution and is adapted to the urban characteristics of the site. The interior and external architecture are designed to promote exchange and contacts between the future occupants. The project comprises buildings of simple design, which are placed at the front of a site that is integrated into the natural slope of the terrain. Access and traffic flow are clearly defined: to the south, private and public transport have easy access to the school and an underground parking lot, while to the north, by the playgrounds, access is reserved to pedestrians and two-wheel vehicles.

The site includes a terrace with a panoramic view of the alpine landscape on one side and of the neighbouring arboretum on the other. It is a meeting place for pupils and teachers and is the focal point of the life of the school. Located nearby are the cafeteria and media library, art rooms, study halls and a large space housing pupils' lockers.



The project's modular concept provides for great flexibility. Levels 1 and 2 of the main building are devoted to general education. The primary division is organised as an independent unit around two patios, which creates a safe and quiet area for young children. The rooms for lower and upper secondary education facing to the south-east and the administrative offices facing north-west have extraordinary views of the Jura Mountains, the Alps and neighbouring parks. In the project's initial design, which was later modified, the administrative offices had been grouped on the top floor of the building; but in the final project, they were integrated into the two educational levels, which made it possible to reduce the upper building to two floors, thereby allowing for more sunlight on the terrace. The four sports rooms are located at the far end of the buildings, leaving a large, open area at the back of the site for outdoor sports activities. Outside regular school hours (8 a.m. to 5 p.m.) when facilities are being fully used, some activity areas will remain open at the end of the day, in the evening and on Saturday and Sunday.

John Boggs, chair of the Foundation's Governing Board, already foresees the changing use of the school: "To tell the truth, it is certain that in a few years' time the Saconay building will no longer function exactly as was originally planned in the models and plans submitted during the competition, given the increasingly rapid pace of change in all fields, and especially in education. The application of technology to education, the constantly changing needs and diverse origins of our pupils, the changes in the outside environment and many other factors will have an impact on the vision of Saconay presented in the competition projects."

The competition provided an opportunity to reflect on the school's programme and to take fuller advantage of the site's potential and new developments in education. The flexibility of the project selected has already made it possible to make some major changes in the programme for the premises, without making any fundamental changes in the design or internal functioning of the future building. This demonstrates the great interest of this project in terms of its educational objective and adaptability.

The Saconay campus is scheduled to open in August 2004. The volume of the project is 124 500 m^3, and its cost is estimated at CHF 67 000 000 (excluding VAT). For economic reasons, the Foundation's Governing Board plans to build in two stages, the first being a volume of 84 000 m^3 at an estimated CHF 55 000 000 (excluding VAT).

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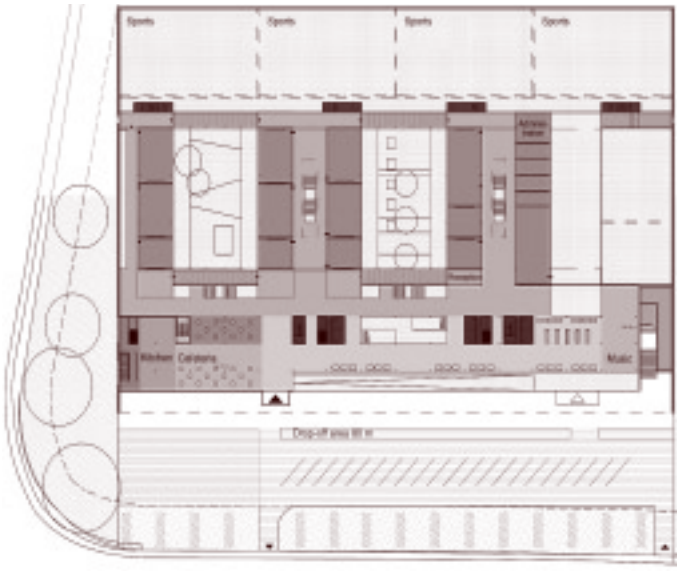
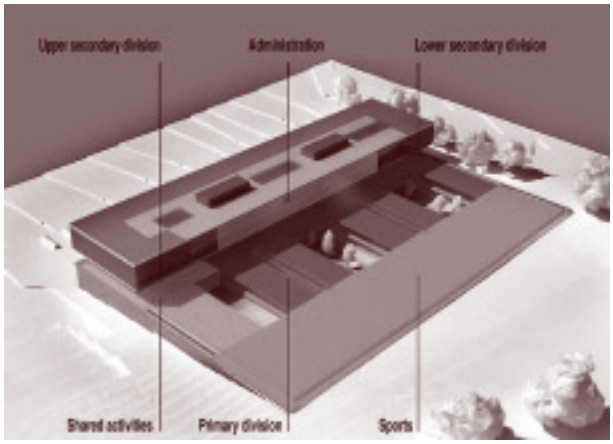




THE RELATIONSHIP BETWEEN CAPITAL INVESTMENT AND PUPIL PERFORMANCE: AN ANALYSIS BY THE UNITED KINGDOM

The United Kingdom's Department for Education and Skills (DfES, formerly the Department for Education and Employment) commissioned a major study to examine the relationship between capital investment in schools and subsequent academic attainment. In particular, a key objective of the study was to establish, if possible, the additional effect in terms of pupil attainment of every GBP 1 invested in schools capital.

In order to address these objectives, three main strands of work were undertaken:

- a review of existing literature on the links between capital spending and pupil performance;
- a qualitative stream of work involving visits to 27 schools;
- a quantitative stream of work which involved conducting a statistical analysis of information on capital investment and pupil performance in 1 916 English schools.

The study was conducted between September 1999 and March 2000 by PricewaterhouseCoopers. The subsequent report, "Building Performance: An Empirical Assessment of the Relationship Between Schools Capital Investment and Pupil Performance", outlines the main findings from the study and provides an overview of the methodology adopted in each of the three main strands of research.

Literature review

In total 54 studies were reviewed, most of which had been conducted in the United States. The approach included as wide a range of studies as possible, *i.e.* studies from different disciplines (*e.g.* economics, sociology, architecture), and studies which adopted different methodological approaches (*e.g.* statistically based quantitative analysis, as well as studies of a more qualitative nature).

The estimated impact of capital spending on pupil performance varies according to the broad type of study under consideration. There is, effectively, a spectrum of studies. At one end, there are those studies which find a broadly positive relationship. These tend to be in the architecture literature, and related to specific design features of schools and the overall quality of school buildings, as opposed to capital spending *per se*. At the other end of the spectrum there is a range of economic studies, the results of which are rather ambiguous with respect to the impact of capital spending on performance. How can these differing results be reconciled? There is considerable scope for further and detailed research into the capital performance relationship to clarify this uncertainty, but it is likely that the answer lies in two areas: methodological differences, and isolating the impact of spending quantity and quality.

Qualitative analysis

Structured, face-to-face interviews were conducted with headteachers from primary and secondary schools, as well as community, voluntary and foundation schools. The qualitative research with headteachers found that capital investment was judged to have a strong influence on three main factors, each of which had a major impact on pupil performance (see figure on the next page):

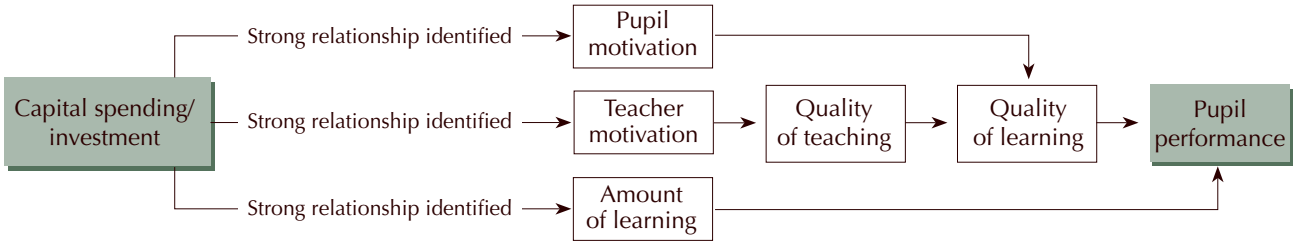
- teacher motivation: capital investment was found to be one of the two most important levers on teacher motivation through, for example, the boost to morale which teachers get from working in an appropriate and quality physical environment;
- pupil motivation: *e.g.* through the visible sign that their education is valued by the teaching staff and society in general;
- amount of learning: *e.g.* by reducing the amount of time lost moving between different school buildings and classrooms.

Quantitative analysis

The main aim of the quantitative analysis was to assess statistically the nature and strength of the relationship between capital spending and pupil performance, using data from English schools. The analysis is based on a database constructed as part of this study. Amongst the key findings to have emerged from the research are the following:

- The analysis provides *some* evidence of a positive and statistically significant relationship between capital investment and pupil performance, *i.e.* there is some evidence to suggest that investing in school capital can help to improve overall pupil performance.
- However, the estimated relationship between capital and performance is not universally positive, nor is it universally statistically significant. Nevertheless, on balance, the research suggests that where there are statistically significant effects of capital on performance, these are positive and, therefore, consistent with prior expectations. These findings are consistent with existing research in this field.

Overview of key findings from qualitative research



- The results also suggest that some performance measures are more sensitive to capital investment than others. In particular, the most important effects seem to be in relation to the earlier stages in the education process, especially Key Stage 1 (children aged five to seven) and Key Stage 3 (ages 12 to 14). Improvements in pupil performance at other levels seem to be relatively unresponsive to capital investment.
- The absolute size of the effect of capital spending on pupil performance is relatively weak, *i.e.* capital-related changes in performance are small when compared with changes which can be related to other factors such as the socio-economic composition of the school.
- Good teaching takes place in schools with a good physical environment, *i.e.* schools in which the quality of the capital stock is judged to be favourable.
- Good school leadership can also be found in schools with a high quality capital stock.
- The general attitudes, behaviour and relationships amongst pupils and staff are more conducive to learning in those schools which have had significant capital investments.

Conclusion

The literature review showed that the majority of existing quantitative studies have found positive relationships between capital spending and performance. It also showed, however, that these relationships were not always significant from a statistical point of view, and that some studies have found negative relationships to exist. Similarly, the quantitative work conducted as part of the study has provided additional evidence of a positive and statistically significant relationship between capital investment and pupil performance. However, in common with the findings of other studies, the estimated relationship is relatively weak. Furthermore, the relationship was not positive in all cases, nor was it always statistically significant.

The relationship estimated by the qualitative studies examined in the literature review, however, is a stronger one. This is consistent with the more positive findings from the interviews undertaken with headteachers and others in the qualitative work stream. The general view emerging from these interviews was that capital expenditure in schools is strongly linked to pupil attainment. Perhaps the most intuitive evidence of a positive relationship is to be found in the architecture literature in those studies relating to specific design features of schools and the overall quality of school buildings. It was these very design features that the headteachers interviewed emphasised as having strong links with teacher and pupil motivation, which were themselves identified as being strongly linked to pupil performance.

It appears, therefore, that the findings of qualitative studies tend to be rather more positive about the capital-performance relationship compared to quantitative studies. This is likely to be related to the fact that quantitative studies are based on aggregate measures of capital expenditure which include certain forms of spending which one would not expect to be linked directly to pupil performance.

It is clear on the basis of the above discussion that there is considerable scope for conducting further research on the capital-performance relationship.

DfES have now commissioned PricewaterhouseCoopers to undertake Phase 2 of the research, which includes examining in more depth the impact of different types of schools capital investment (*e.g.* condition, suitability and sufficiency) on pupil achievement and also on its effect on the wider community.

This article is composed of excerpts from "Building Performance: An Empirical Assessment of the Relationship Between Schools Capital Investment and Pupil Performance". Copies of the publication can be obtained from:

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64 pages, ISBN 1-84185-402-6, GBP 4.95
Ref. No.: RR242

FEATURE

THE SCHOOL OF THE FUTURE

On the occasion of its 30th anniversary, PEB invited experts to debate the continuing need for educational buildings at a one-day seminar in June 2001 entitled "Temples of Learning or White Elephants? What Future for Educational Buildings?" Manfred Hinum (Austria), an active member of the PEB Steering Committee throughout its existence, gave an overview of the developments in educational building that have been the focus of the Programme during the past three decades. The OECD Centre for Educational Research and Innovation presented possible scenarios for schools over the next 15 to 20 years (see page 11). The effects of information and communication technologies (ICT) on the learning environment were addressed at both school and tertiary levels, as well as the views of teachers and other users of educational facilities.

Effects of ICT

Stephen Heppell (United Kingdom), director of ULTRALAB, Anglia Polytechnic University's learning technology research centre, issued challenges to received wisdom about grouping classes by age group and about young people's capacity to learn. To illustrate the latter, he presented a virtual school used to teach those for whom school had not worked. Notschool.net[1] is an online learning community. Each student, or "researcher", is given an attractive I-Mac and accessories to use at home. With the help of retired teachers, undergraduate students and experts from museums, galleries and elsewhere, the researchers engage in interactive programmes where they learn music, mathematics, sciences, etc. Though they had been out of school for at least four years, 99% of the people in the pilot group were still actively participating in the programme at the end of the first year.

Tony Bates (Canada) of the University of British Columbia described some current developments in distance education and speculated about the future for campus universities.[2] Three models for the learning environment were discussed: classroom, distance and mixed mode. Bates reported that with the increasing use of ICT, students are asking for more social areas on campus. It is unlikely that the cost of higher education will drop with the increasing use of ICT, given the high costs of faculty training and of replacing computers and servers approximately every three years. The danger of global dominance by a few private sector or public/private partnerships was also mentioned.

Clive Booth (United Kingdom), chair of the Teaching Training Agency, questioned whether computers would be transformational and spoke about the importance of social interaction in the classroom. He emphasised how little the classroom has changed over the last 100 years. This is evidence perhaps that the traditional classroom layout has served its purpose up to the present and has been relatively cost-effective. He stressed the necessity of finding a medium between what has worked and embracing new possibilities. Booth stated that the 7% of parents in England who pay private schools for their children's education do so for small class sizes rather than for ICT. Interaction between people has its place in education, and the teacher has a moral influence on his or her pupils. The teacher can play an important role in giving young people a sense of purpose and a set of values that will transcend the immediate environment.

Users' views

Marie-Claude Derouet-Besson (France) of the National Institute of Pedagogical Research gave a users' perspective of educational buildings. She told of the grand inauguration a century ago of France's first high school for women, a beautiful, modern construction. When it came time for the director to make her speech, she disappointed the eminent gathering by listing everything that was wrong with the new facilities, all the equipment that was missing. Users, quipped Derouet-Besson, are never satisfied. And listening to them instils fear of increasing costs. Users, however, are the inventors of school spaces. Building should begin with the needs for teaching. Not only teachers must be taken into consideration but children, parents, child specialists, etc. In France, local authorities are not obliged to consult future users. The occasions for dialogue with architects are very rare; the gap that exists between the architects and users is exacerbated because users rarely talk about space except in general terms, *e.g.* "renovating a laboratory" or "building a playground". To be able to express themselves, users need to be made aware of architecture and to become conscious of space. Derouet-Besson recommends confiding to users the responsibility for facilities, such as classroom furniture, that directly concern them and that have a short life-span.

1. A description of Notschool.net as well as of the Learning in the New Millennium project presented by Heppell are available at http://www.ultralab.ac.uk/projects/

2. Visit http://bates.cstudies.ubc.ca

DIFFERENT POSSIBLE FUTURES FOR SCHOOLS AND THEIR BUILDINGS: THE OECD SCENARIOS

Introduction

This article reports six scenarios for the future of schools developed through the Schooling for Tomorrow programme of the OECD Centre for Educational Research and Innovation (CERI). It also raises some questions concerning how buildings and facilities might be affected by each of the six. These are preliminary and illustrative, with the view of stimulating discussion. Each scenario is described, and questions concerning buildings are presented, along with more general issues arising for each possible future.

Scenarios are tools to stimulate policy thinking and invite reflection on the strategic choices to be faced over the medium to long term. Those presented below are neither purely empirical (predictions) nor purely normative (visions) as they combine both elements – already-visible trends, plausible inter-relationships and guiding policy ideas. None of these alternatives should be expected to emerge in a pure form as they are "ideal type" possible futures. Perhaps surprisingly, forward-looking policy thinking has been relatively little developed in education compared with other sectors, despite education being *par excellence* about preparation for the future with very long-term impacts.[1]

The Schooling for Tomorrow scenarios have been developed through international discussions, in larger and smaller groups, culminating in the November 2000 Rotterdam conference on "Schooling for Tomorrow". They were presented to the ministers of education at their April 2001 conference as a chapter in the most recent OECD *Education Policy Analysis* (OECD, 2001*a*), and the full report is being published in October 2001.[2] In their full versions, they have each been constructed around the following dimensions:

- attitudes, expectations, political support;
- goals and functions for schooling;
- organisation and structures;
- the geo-political dimension;
- the teaching force.

The six scenarios have been clustered into three main categories – two described as the "status quo extrapolated", two as "re-schooling" and two as "de-schooling".

The status quo extrapolated

Scenario 1
Bureaucratic School Systems Continue

- *Strong bureaucracies and robust institutions*
- *Vested interests resist fundamental change*
- *Continuing problems of school image and resourcing*

The scenario described: This scenario is built on the continuation of systems characterised by powerful bureaucratic features and strong pressures towards uniformity. Robust systems prove extremely resistant to radical change, given the strength of vested interests in present arrangements. In fact, while a common complaint directed at schools is their resistance to change, many actually feel more comfortable with the familiar and with gradual evolution only. Nor in this scenario do resource levels pass the thresholds that would allow for radical change, while the new tasks and responsibilities that are continually added to the remit of schools further stretch available resources. There would be the continuation of a distinct teacher corps, sometimes with civil service status, while professional status and rewards are problematic in many countries.

Buildings and facilities: This scenario supposes a substantial degree of continuation with present arrangements, and hence a broadly similar range of opportunities and problems confronting school buildings. A wide diversity would be apparent in the quality of buildings and facilities, and the necessary investments would continue to struggle in the face of intense competition with the alternative calls on resources. Pockets of innovation and new sources of funds would develop alongside very conventional arrangements. A general conservatism would oppose radical developments in flexibility or educational design across most of the school system.

Some issues arising: While bureaucratic systems are commonly criticised, they address a range of fundamental tasks, especially of guardianship and socialisation, that generally pass unnoticed compared with the obvious ones relating to school knowledge and diplomas (Hutmacher, 1999). If strong systems were not in place, the question arises of what alternative arrangements for schooling as a whole would meet their very diverse responsibilities more effectively. Despite the powerful factors acting to maintain bureaucratic school systems, emerging forces – the spread

1. Ylva Johansson, the former Sweden Education Minister, emphasised this point in her conclusions as chair of the Rotterdam conference, in describing forward-thinking approaches as being "woefully under-developed in our field."

2. OECD (2001), *What Schools for the Future?*, Paris.

of information and communication technologies (ICT), new forms of accrediting competence outside formal education, teacher supply problems – may yet prove powerful enough in a time frame of 15 to 20 years to seriously disturb the "status quo".

Scenario 2
Extending the Market Model

- *Widespread dissatisfaction leads to re-shaping public funding and school systems*
- *Rapid growth of demand-driven "market currencies", indicators and accreditation*
- *Greater diversity of providers and professionals, greater inequality*

The scenario described: Trends towards more market-oriented schooling models are much closer to the experience and cultures of some countries than others, and cover a widely diverse set of developments.[3] In this scenario, these become significantly extended as governments encourage diversification in a broader environment of market-led change. Many new providers are stimulated to come into the learning market, encouraged by thoroughgoing reforms of funding structures, incentives and regulation. A flourishing set of indicators, measures and accreditation arrangements start to displace direct public monitoring and curriculum regulation. There would, in contrast to Scenario 1, be a less distinct teaching force as a wide range of new professionals with diverse profiles – public, private; full-time, part-time – are pulled in. Flourishing training and accreditation for these new professionals would spring up.

Buildings and facilities: As in their nature, a wide range of market-driven changes would be introduced into the ownership of, leasing of, running of and investing in, the learning infrastructure. Very innovative solutions could be expected to flourish. What would happen to existing premises is a major question raised by this scenario. Another is how far smaller scale/fragmentation would permit a high degree of specialisation in educational plant and facilities. A third question concerns the widening inequalities between different areas and communities, and the extent to which this would be mirrored in flourishing educational resources in some places contrasting with decaying infrastructure in others.

Issues arising: The development of this scenario would be fuelled by a strong sense of dissatisfaction by "strategic consumers", especially articulate middle-class parents and political parties, in cultures where schooling is already viewed as much as a private as a public good. Wide differences of educational performance would add weight to the criticisms, while the flourishing of the "market model" would itself depend on a relatively high general tolerance of inequalities. Innovation abounds but so do painful transitions, while inequalities worsen. The likelihood of a fully-fledged market scenario emerging depends partly on the level of education in question – it is more plausible for the higher than lower cycles of schooling.

***Höhere Technische Bundeslehranstalt*, Vienna, Austria**

This vocational and technical college is housed in a former tobacco works. A classified historical monument, it is owned by the Federal Real Estate Company, which has restored the building and leased the facility to the college. An active partnership has been established between industry and the college, providing financial support for the purchasing and maintenance of technical equipment.

The "re-schooling" scenarios

Scenario 3
Schools as Core Social Centres

- *High levels of public trust and funding*
- *Schools as centres of community and social capital formation*
- *Greater organisational/professional diversity, greater equity*

The scenario described: The school here comes to enjoy widespread recognition as the most effective bulwark against social fragmentation and a crisis of values, stressing its role as "social anchor" and fulcrum of residential communities (Kennedy, 2001; Carnoy, 2001). This is still further supported by those analyses suggesting the erosion of "social capital" to the detriment of individual well-being, society and the economy (OECD, 2001*b*). Levels

3. Depending on the country, this scenario might more convincingly classified under the "de-schooling" scenarios.

Tomaree Education Centre, Australia

Following discussions with the local council and other government service providers, this education centre (foreground) was designed as a wide-ranging educational and community resource centre for the Tomaree peninsula. It provides for primary, secondary and tertiary education and includes a health clinic, library, multipurpose centre and sports facilities for both school and community use.

of financial support would probably need to increase well over current levels in order to meet demanding equalising requirements for quality learning environments in all communities and to ensure the high levels of esteem for teachers and schools that underpin this scenario. Current trends in favour of individualised learning would be tempered by a strong collective and community emphasis. This would not necessarily be to the neglect of the cognitive but it assumes widespread post-school opportunities for lifelong learning taking over some of these tasks. There would be extensive shared responsibilities between schools and other community bodies, sources of expertise, and institutions of further and continuing education. The involvement of many other professionals, community players, parents, etc. around the core of teachers would complement rather than conflict with high status teacher professionalism.

Buildings and facilities: Very major investments in buildings and facilities would be part of this scenario, some of them raised from the local tax base as communities recognise the importance of schools to their vitality. Such investments would be aimed at improving the quality of the premises and equipment in general, at opening the school facilities towards new forms of community learning, and at extending the range and quality of social functions that the school would serve. Greater diversity of funding and involvement could be expected, from community and corporate sources, but also a very significant public investment especially to ensure that major divides do not widen between richer and poorer areas.

Issues arising: This future, however desirable, would imply substantial changes in most countries. Re-definitions of purpose and practice would have to be identified, widely endorsed by all the main stakeholders, and the requisite means made available. Fundamentally new practices and structures would need to be established. Furthermore, the very problems in communities, families and social capital making this scenario attractive could equally hinder its implementation – much closer ties between schools and communities might only serve to exacerbate the gaps between the vibrant and the depressed. This would clearly need to be avoided if the future is to lie with this scenario.

Scenario 4
Schools as Focused Learning Organisations

- *High levels of public trust and funding*
- *Schools and teachers in networks and learning organisations*
- *Strong quality and equity features*

In this scenario, schools are revitalised around a strong "knowledge" agenda rather than prominent social/community responsibilities. This would not mean, however, a return to traditional methods as experimentation is the norm; curriculum specialisms flourish, as do innovative forms of assessment and skills recognition. Teachers would in general be highly motivated; conditions would be favourable, with a strong emphasis on research and development, continuous professional development, group activities and networking. ICT are used extensively alongside other learning media, traditional and new. The very large majority of schools would now justify the label "learning organisations". As with the previous scenario, educational politics are characterised by high levels of trust and generous resourcing. Close links flourish between schools (especially at the secondary level), tertiary education establishments, media companies and other enterprises.

Buildings and facilities: This scenario would likely lead to intense competition between the different sources of funding, as it calls for substantial investments in all aspects of schooling. It is likely to result, however, in the burgeoning of flexible, state-of-the-art facilities. In part, this would be afforded through partnerships with the corporate sector. The distinctiveness of schools as learning centres, as opposed to community centres, would be clearer than in Scenario 3, while blurring boundaries with tertiary education would lead to more diversity in educational plant than visible at present, as well as more diversity in ownership and leasing arrangements.

Issues arising: Such links notwithstanding, the strong "knowledge" focus of schools lessens the risk of schools being burdened with an unrealistic array of social tasks, picking up pieces when other solutions have failed. Many would regard Scenario 4 as a desirable future, but how realistic is another matter given the gap with much current practice (OECD, 2000*a*). It is not obvious how a highly supportive media and political environment can be created if these do not already exist, still less if there is actual hostility. Its equality assumptions are also highly demanding.

The "de-schooling" scenarios

Scenario 5
Learning Networks and the Network Society

- *Widespread dissatisfaction with/rejection of organised school systems*
- *Non-formal learning using ICT potential reflects the "network society"*
- *Communities of interest, potentially serious equity problems*

Issues arising: In this scenario, dissatisfaction with available provision leads to a quickening abandonment of school institutions in favour of diverse learning networks, further stimulated by the extensive possibilities opened up by powerful and inexpensive ICT. The result is the radical de-institutionalisation, even dismantling, of school systems as part of the emerging "network society". More diverse cultural, religious and community voices come to the fore in the day-to-day socialisation and learning arrangements for children, some very local in character, but some using distance and cross-border networking. There is no longer reliance on particular professionals called "teachers": the demarcations between teacher and student, parent and teacher, education and community, blur and even break down entirely.

Buildings and facilities: The thorough-going dismantling of the system would imply substantial reduction in public facilities and institutionalised premises. Diverse market arrangements would take their place to some degree as in Scenario 2, and community and private facilities would also play an important part. A key problem could turn out to be the decline in specialised learning facilities, as smaller groups and individuals find themselves too fragmented to invest at levels comparable with education authorities. Another issue would be how existing premises would be dealt with and used, and whether sold off altogether. The possibly temporary nature of the scenario would also raise critical issues relating to premises if it had resulted in wholesale sell-off of schools that would prove prohibitively expensive to re-acquire at the market rate.

Issues arising: Advocacy of "de-schooling" is not uncommon, especially among futurists searching for clear alternatives to bureaucratic school-based models. It is in tune with themes underpinning the broader lifelong learning agenda (flexibility, individualisation, non-formal learning, etc.). Some see home schooling as already growing quickly even if it is only still small-scale (*e.g.* Hargreaves, 1999). The scenario gives rise to serious questions, however, of feasibility and sustainability. How well would such de-institutionalised arrangements meet the range of critical "hidden" functions, including of socialisation, currently performed by schools? What would happen to those individuals and communities not actively participating in the "network society" – far from this scenario bridging the "digital divide" (OECD, 2000*b*), it might deepen it. Do visible trends lend plausibility to the "networks of interests" model as the dominant social structure? However attractive to some, it may well not describe a viable or "steady-state" future.

Scenario 6
Teacher Exodus – The "Meltdown Scenario"

- *Severe teacher shortages tend to be unresponsive to policy action*
- *Retrenchment, conflict and falling standards leading to areas of "meltdown", or*
- *Crisis provides spur to widespread innovation but future is still uncertain*

The scenario described: This "meltdown scenario" postulates a major crisis of teacher recruitment that would be relatively impervious to the usual policy responses. It could be triggered by a rapidly ageing profession, as is already visible in some countries, but this would not be the only cause. There would be a sustained period of high net outflows of teachers that would be difficult to offset given the long time lags involved before recruitment measures make a tangible impact on numbers of practising teachers. This would be exacerbated by tight labour market conditions and general skill shortages impacting on the relative attractiveness of teaching as a career. The sheer size of the teaching force makes improvements in relative attractiveness extremely expensive. As the teacher exodus takes hold, potentially very different outcomes could be part of this scenario. At one extreme, a vicious circle of retrenchment, conflict and decline sets in, exacerbating the inequalities and problems further. At the other, the teacher crisis provides the spur to radical innovation and change, with different stakeholders joining forces behind far-reaching emergency strategies. More evolutionary responses lie between the two extremes.

Buildings and facilities: One eventual outcome of the scenario might be to move to an alternative – the market model, one of the re-schooling scenarios, the network society – each with its own set of implications for buildings and premises as discussed above. As the meltdown took hold, however, it would be likely that investments in physical capital would be very badly squeezed, as funds switch increasingly into salaries in an effort to attract more teachers. The detrimental effect of this on working conditions might be recognised as counter-productive, however, leading to some rectification of the neglect of educational plant.

Issues arising: There are many uncertainties in this scenario, but its value is perhaps less in its predictive power and more in sharpening awareness of the possibilities and their consequences. Some might judge it to be unlikely given the proven resilience and adaptability of school systems: they would argue that some matching of teacher supply and demand will always be achieved and "meltdown" avoided, though perhaps with costs to be paid in educational quality. Perhaps, indeed, the scenario is less plausible for affluent societies with burgeoning professional labour markets and more likely in societies where the highly qualified job market itself suffers wholesale collapse.

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THE INTELLIGENT SCHOOL

On 14 and 15 December 2000 the Milan Centre for Educational Innovation and Experimentation (CISEM), a research institute reporting to the Province of Milan and the Union of Italian Provinces, held an international seminar sponsored by the province and entitled "Intelligent School – Towards the Scholastic Architecture of the Future". It was attended by some 150 people from various professions – architects, local officials, researchers, teachers and education system administrators. Most of them were Italian but the topic also attracted speakers from other countries (Austria, Belgium, France and Mexico). François Louis was invited by the organisers to speak on behalf of the OECD in his capacity as chair of the Steering Committee of the Programme on Educational Building (PEB) since 1997. The present article is the contribution he made to the seminar.

Since its launch in 1972, PEB has been providing assistance to OECD Member and Associate Member countries participating in the Programme, the aim being to ensure optimal use of educational building resources at all levels. In liaison with various tiers of local government, it seeks to promote international exchanges on both policy issues and research and experimentation in the field of educational building, bearing in mind three main objectives:

- to improve the quality and suitability of educational buildings and thus contribute to the quality of education;
- to ensure the best use is made of the substantial sums of money which are spent on building, running, cleaning, heating and maintaining educational buildings;
- to give early warning of the implications for educational facilities policy of trends in education and in society as a whole.

The "intelligent school" approach developed in PEB's work, particularly during the 1990s, ties in very closely with the vision emerging from the many other viewpoints expressed at the Milan seminar, particularly that of the CISEM. First, the "intelligent school" approach encourages the design of school architecture and environments that serve and foster learning. However, designing "intelligent schools" does not mean confining reflection to the role that new information and communication technologies and "smart" buildings should play in the school environment. It also means rethinking schools as "intelligently" as possible in terms of their mission and their environment.

Groupe scolaire Roger Gavage,
Fontaines Saint Martin, France

In this school for children aged 2-11, a series of interconnected multimedia workstations are linked to the Internet, including in the nursery school and in the library and documentation centre. Primary classes are encouraged to use word processing in written activities, and nursery classes use educational software.

"Intelligent schools": architecture and an educational environment conducive to learning

Thinking on "intelligent schools" is closely in line with work by PEB on "schools for tomorrow", as well as the work by the OECD Centre for Educational Research and Innovation on the role of new information and communication technologies (ICT) in education systems, one recent outcome being an international conference on the subject in Rotterdam in November 2000.

Buildings and facilities to provide the easiest and broadest possible access to information and knowledge

The "intelligent school" approach strongly emphasises the importance that can – and should – now be given to computers and multimedia in the design of school buildings and facilities, from a number of interrelated standpoints:

- ensuring these resources can be shared by all and are widely available by locating them throughout the school rather than in dedicated computer rooms;
- cabling and inter-school networking links;[1]
- locating and designing school resource centres and libraries. PEB held a seminar on this subject in Lisbon in June 1999.

Other factors, however, also enter into the equation:

- likely maintenance costs: lavish "showcase" facilities may be prohibitively expensive to maintain; the school of tomorrow is not necessarily futuristic;
- the pedagogical issue: the new ICT are not a panacea but a resource, an aid for students, especially those with learning difficulties;
- equal opportunities: new technology facilities for schools should not widen the gap between privileged and disadvantaged schools; a digital divide between schools must be prevented at all costs.

On the role of the new ICT, PEB published a report in 1992 entitled *New Technology and Its Impact on Educational Buildings*, followed by *Redefining the Place to Learn* in 1995; a report on the Lisbon seminar was published in 2001 (see page 24).

Functional, adaptable space to facilitate learning and foster academic attainment

As well as buildings and facilities, the "intelligent school" approach means looking into spatial design. School architecture is not in fact neutral, although only one of many factors contributing to a smoothly run school and high student attainment.

Nevertheless, it is widely recognised by countries participating in the Programme on Educational Building that specific factors help to foster an atmosphere that is more conducive to learning. They include school size, the layout of buildings, leisure facilities or even corridors, and environmental factors such as lighting and wall colours.

By the same token, it is important to take the educational purpose of school buildings into consideration from the outset. Here, close dialogue with future users is a way of carefully integrating pedagogical requirements.

Another point worth stressing is the importance of adaptable, modular space, in particular to facilitate working in small groups and providing individual tutoring for some students; this will also encourage teamwork on the part of teaching staff. For while the new ICT will not "do away" with teaching, the challenge for the school is to go beyond infrastructure and facilities and seek to integrate these technologies fully into teaching practice. Emphasis on the flexibility of school buildings is not enough; there must be sufficient scope for innovation and for an effective appraisal of the impact of these technologies, the essential aim being quality.

1. A paper on the experiment "*Tutti in rete*" ("Everyone in Networks") was presented at the Milan seminar.

It is this concern with enhancing the *quality* of education that underpins OECD work in the field. The same preoccupation has governed preparations for a second PEB compendium[2] of fifty-five exemplary educational facilities. Not only did the selection process look at the architectural quality of the newly built or renovated schools chosen in participating countries, it also studied the positive impact that architectural design and facilities (in particular new ICT) had had on the atmosphere in the school, on school life and on teaching conditions.

"Intelligent schools": designing schools around their mission and environment

Second, designing "intelligent schools" means giving full consideration to the school's own mission and its environment, in other words reaching beyond the otherwise important issues of facilities, lay-out and "smart" buildings.

An "intelligent" school should become a resource available for lifelong learning

In January 1996 OECD ministers of education set lifelong learning as a priority in the Organisation's work; schools were "a major social asset and should become 'community learning centres' offering a variety of programmes and learning methods to a diverse range of students, and remain open for long hours throughout the year." PEB has successfully incorporated this broader mission for schools into its work, taking into account a whole range of elements relating to the provision of facilities for lifelong learning, including crèches and pre-school facilities, continuous adult training, and commercial and industrial vocational training. It has also focused on the needs of higher education. Several international seminars and publications have addressed these topics, including vocational training, (Quebec, 1994), making better use of school buildings (Lyon, 1995),[3] facilities management in higher education (Greece, 1995, and Quebec, 1999),[4] and the changing role and functions of university libraries.

So opening up to lifelong learning in this way, rather than just school-based education, is closely akin to the education and training approach promoted by the Organisation for Economic Co-operation and Development, a central concern of which is to optimise "educational investment", given the considerable costs that spending on education and training represents in various countries. Educational facilities represent a very substantial investment in terms of both capital and recurrent expenditure for any society, and efficient management of educational assets remains a priority in OECD Member countries. Strategies for managing educational infrastructure are therefore aimed at optimising those assets and material resources. PEB held a conference in Luxembourg in November 1998, with the European Investment Bank (EIB), on "The Appraisal of Investments in Educational Facilities"[5] and a seminar in Toledo in February 2000 on financing educational facilities.

"A common good" that considers and serves its environment

Finally, the "intelligent school" approach means viewing the school as a "common good", a community centre, opening up interactively onto its environment and, in addition, providing support for and protecting that environment. The lifelong learning approach is an encouragement to go beyond strictly school-related needs. But school architecture is a "policy issue" in the noblest and etymological sense of the term, if we consider that a school is one of the few symbolic buildings in the "city"; it cannot therefore turn in on itself but should instead be a modern version of the forum, since the social concerns involved are very much in line with the economic concern for public resource optimisation. In this regard, PEB published *Schools for Cities* in 1995, and *The Educational Infrastructure in Rural Areas* in 1994, following a seminar in Belgium. Another seminar in Stockholm in 1996 addressed the subject of providing integrated schools and community services "under one roof".[6]

As a resource structure that is an integral part of the environment it serves, an "intelligent school" should be clearly delineated, easily located and accessible to everyone, including people with disabilities, all year round. As such it will be open, yet protected where necessary if at risk from its surroundings; "Providing a Secure Environment for Learning" was in fact the subject of a seminar in Bologna and Florence in 1997.[7]

As well as relating to its close environment, a school can also play a decisive role in educating future citizens if it is in touch with the outside world, particularly via Internet, and if

2. *Designs for Learning: 55 Exemplary Educational Facilities*, 2001. The first compendium, entitled *Schools for Today and Tomorrow*, was published in 1996.

3. The report on the Lyon seminar was published in 1996 under the title *Making Better Use of School Buildings*.

4. *Facilities for Tertiary Education in the 21st Century* ("tertiary" meaning "higher education"), 1998.

5. A summary of this seminar and the main papers presented there were published by the OECD in February 2000 under the seminar title.

6. See *Under One Roof: The Integration of Schools and Community Services in OECD Countries*, 1998.

7. *Providing a Secure Environment for Learning*, 1998 (available in English, French, Italian and Spanish).

Asqua – Centro di Educazione e Formazione Ambientale, Ponte a Poppi, **Italy**

The Asqua Centre for Environmental Education, housed in a renovated forestry building, uses low-consumption electrical systems and promotes environmental awareness through hands-on projects.

it can raise their awareness of nature and the environment, in the broadest sense of the term. Its educational mission can be backed up by architecture and choice of materials and by running the school in such a way as to avoid wastage (*i.e.* heating, ventilation and plumbing systems designed to save energy and water), promote nature conservation and foster heritage awareness and enhancement. This concern is quite manifest in Italy, where some older, derelict buildings (factories, monasteries and even palaces) have been renovated with the dual aim of making them functional in terms of future use while respecting and developing their historic interest.[8] In this regard PEB's work definitely takes into account the "sustainable development" aspect promoted by the OECD in particular, and a seminar in the United Kingdom in 1998 addressed environmental conservation issues.

Conclusions

Three main conclusions can therefore be drawn:

- For a number of years now, and more specifically over the past decade, PEB's work (seminars and publications) has been piecing together a picture or vision of schools for today and tomorrow.

- This vision – as pointed out in the introduction – is closely in line with the "intelligent school" approach described by the Italian speakers in Milan, particularly those from CISEM; here, there is an evident convergence of views.

- The approach of PEB is by no means a vision "imposed" from above; it builds upon contributions from the countries and institutions participating in the Programme, since PEB is a forum for discussion and exchange serving all the stakeholders, be they Member countries, local authorities or research institutions. The idea is to draw upon experiments and innovations by all concerned, if only to avoid making similar mistakes.

Financial contributions to the Programme are limited owing to its modest budget, but when it comes to schools for tomorrow – given what is at stake for our education system and society at large – this kind of programme is definitely worthwhile.

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8. See the first PEB compendium of exemplary educational facilities, *Schools for Today and Tomorrow*, 1996.

THE IMPACT OF TIME ON THE DESIGN OF LEARNING ENVIRONMENTS

This article is a report on the Time Workshop held at the international conference on "Innovative Alternatives in Learning Environments" in November 2000.[1] The report, written by Prakash Nair, a U.S. expert on school facilities and technology, includes significant input from Hans F. Van Aalst, the co-leader of the workshop, and all participants involved.

Introduction

Time is a critical component that shapes educational systems and school buildings. However, it is an element whose impact is rarely considered in the design of schools because time-bound learning is a "time-honoured" tradition that remains largely unchallenged, despite enormous evidence that it precludes a great number of students from learning effectively.

How time shapes schools and dictates their organisation

In the United States, subjects are taught in clearly defined 45-55 minute periods. Children are organised by chronological grouping, each attending school for one academic "year" per grade level, which is in turn broken down into quarters or "marking periods". There is a long break in the summer, a shorter one in the winter and at least one other break during the spring.

School itself is broken up into five time-bound sessions called pre-kindergarten (below five years), kindergarten, elementary school (1st through 5th grades), middle school (6th through 8th grades) and high school (9th through 12th grades.) While this system represents the American form of education, some equivalent system is present in every country with a formal education system. The programme that determines a school design is largely shaped by these pre-defined time constraints.

The need for timeless schools

There is now research that shows how the idea of teaching students the same thing at the same time at the same pace is unworkable. It is known that learning does not start or end with school; lifelong learning is a term that is entering the mass consciousness. Physical learning places need to reflect current educational wisdom which places far less emphasis on time and more emphasis on developing each student's full potential at his or her own pace.

Toward the timeless school

With information no longer having the power it once had, the focus of learning has shifted from memorisation to critical thinking and analysis, supplemented by hands-on

1. See *PEB Exchange* issue 43, June 2001, "Amsterdam Watershed", pp. 12-17.

project-based instruction. Even when it is not possible to learn by doing in a real-world context, computer simulations are often used to mimic real-life experiences. Collaboration and teamwork and extending learning beyond school and into the outside community are all features of the timeless school.

It is important to remember that the movement towards timeless schools represents a significant paradigm shift away from the time-bound paradigm represented by most of today's learning facilities. The following are some of the factors that must be considered by architects and others interested in building schools that will endure well into the 21st century.

Schooling vs. learning

Though often used interchangeably, schooling and learning are not the same. Since schooling was traditionally seen as an objective process, it is one that was believed could be segmented neatly into pre-determined time increments. The underlying assumption is that, with some exceptions, most students will learn approximately the same things within the same allocated times. In other words, consistent schooling equals consistent learning. This assumption is the absolute foundation of most educational systems and, by extension, school buildings also represent this segmented time approach to learning.

Personal vs. societal clock

In designing the time-bound paradigm of education, there is little attention paid to the idea that each human being experiences time differently. In other words, time is not objective, but subjective and experiential. Different individuals perceive the same objective time-segment as being longer or shorter depending upon their interest and absorption in any given activity. This shows that learning is a very personal thing. One reason for this is because each learner "constructs" meaning differently, influenced as he or she is by his or her own unique life experiences.

Any attempt to hold both learning and time constant frustrates the purpose of education: to give each student a chance to succeed. In other words, to learn, a student must be given the time he or she needs to fully understand the subject being taught. Conversely, if time is held constant, it is inevitable that some students will not learn.

Personalised learning

The idea that each student is unique and, therefore, requires individualised attention, has led to the personalised learning movement. Very simply, personalised learning recognises

Laboratorio di Educazione Ambientale della Maremma Toscana – La Finoria, **Italy**

This environmental education laboratory, set in a forest, offers five-day programmes for groups of school children and adults. Teaching is based on practical activity and group work.

that education is only meaningful in the context of each learner's unique interests and abilities. Instead of focusing on identifying learning problems and correcting them (the basis for test-based assessments), personalised learning attempts to discover and maximise each learner's inherent potential.

In order for personalised learning to be successful, students need to be exposed to a variety of learning modalities; while some students will excel in modes where cognitive abilities are stressed, others may excel in the areas of social or artistic abilities. If success is defined as the attainment of personal realisation and fulfilment, then it is only logical that educational systems should be geared toward delivering personalised learning.

From the perspective of educational facilities, personalised learning will entail many different activity areas not only within the classroom, but also throughout the rest of the school. Naturally, this approach to learning will also create the need for radically reforming the time-based administration of schooling – be it the period-based organisation of the school day or the chronological groupings that characterise the grade breakdowns in elementary, middle and high schools.

Time as a dependent variable

The problem with time-bound educational systems is that they see time as an independent variable. All the stated goals of education are therefore defaulted into dependent variable status, subordinate to the tyranny of time.

The solution to this problem is to relegate time to dependent variable status. In other words, the primary goals of education become the independent variables and time becomes subordinate to achieving those goals.

Under this scheme, the following are some independent variables freed from time-bound strictures that limit their realisation insofar as individual learners are concerned. This does not mean students are not taught how to manage time, only that time cannot be seen as independent of the expected outcomes. These independent variables are also examples of important educational goals for the 21st century:

- developing time management skills;
- nurturing creativity;
- encouraging independent thinking;
- developing emotional intelligence;
- building self-awareness;
- nurturing the multiple intelligences;
- acquiring knowledge;
- applying knowledge;
- creating communities;
- providing useable skills in various disciplines.

***Chr. Hogeschool De Driestar,* the Netherlands**

Modular partition walls throughout this college building will allow the space to be rearranged in the future, as needs change.

Project-based learning

Under the scheme where time becomes a subordinate variable in the learning process, project-based learning can take the place of subject-based learning. Projects are a good way to manage time because they are organisational units that permit holistic development of the person while serving as the vehicle to impart specific life-skills. Project-based learning solves the problem of students being forced to absorb information without context. Such rote learning has been shown to have no long-term benefits. Hands-on project–based instruction, on the other hand, engenders a greater level of interest and motivation in students and results in learning whose influence is often lifelong.

Lifelong learning can be anytime, anywhere

Disconnecting education from the strict adherence to time-based elements also requires a rethinking of the place of education. When the 9 a.m. to 3 p.m. school day no longer governs, educational systems must expand the concept of learning not only to include "anytime" but also "anywhere". Once schools begin to offer choices in scheduling and course delivery, they will inevitably have to offer choices of location. This is facilitated by the advent of virtual learning over the Internet and the widespread use of e-mail, video-conferencing and other forms of electronic communication that do not require the student and teacher to be physically present at the same location.

Under the timeless learning paradigm, the central school building, so long the staple of our educational systems, will be relegated to the place for the physical meeting, but not necessarily the place for all learning.

Role of the mentor/coach in the timeless school

In the early learning years, teachers will assist learners to understand that, even with flexible time, there are self-imposed boundaries and structures. Time management is a skill that must be taught early in life so that it becomes naturally practised in later years of life.

Teachers in their role as advisors and facilitators seek to write themselves out of the learning equation as they teach students the art of independence and self-responsibility. The "teacher" is not always a designated instructor, but anyone who is able to transfer knowledge. In classrooms and other learning settings, the teacher may often be a peer or other mentor.

From "frozen time" to "improvisational theatre"

It is easy to understand how a school built in the early part of the 20th century stands today as "frozen time", representing an educational system no longer relevant in today's information age. It is somewhat more difficult to explain why schools built in the 1990s have also become relics so quickly.

In the business community, there is an understanding that every few years the form and content of the workplace will undergo radical reform. Buildings are, therefore, simple "shells" with some core infrastructure elements built in such as elevators, power and water and toilet facilities. Individual occupants can "fit out" the space to their exact specifications as often as they choose. In stark contrast, and for reasons that are hard to fathom, hundreds of millions of dollars are expended on "frozen time" schools. For example, in New York City, with some rare exceptions, new schools are still being built with permanent masonry partitions – as if the curricular requirements of the 1980s and 1990s frozen in place by today's design will remain unchanged well into the 21st century. As it happens, most of these schools are already obsolete on the day they open.

So what is the answer? The solution opted for by the business community will not work for schools, which are less likely to undergo major interior rehabilitation every 15 years or so. Besides, unlike business establishments whose activities are more easily predictable and therefore easier to design for, schools need designs with far greater flexibility. In schools, a variety of teaching modalities and audience sizes need to be accommodated within per-occupant square foot standards that are a fraction of what is allowed in the business world.

One way to look at the design of the 21st century school is to see it as designing for improvisational theatre. The improvisational theatre is used in ways the designer of the space could never fully contemplate. On any given day, the theatre could become a stage for one single individual, a duo, a small group or even a large group such as a chorus. The idea is that the occupants define the space and the activities within the space define its purpose. This is a departure from traditional schools whose spaces define its purpose and whose occupants must live by the limits of its pre-determined purpose.

Conclusion

There is one significant manner in which school designs for the 21st century will deviate from the simple black set that defines improvisational theatre. In the black set, the actors are expected to supply all the stimulation. In a school, however, the set must have elements that the actors can interact with, elements that entertain a variety of interactions. For example, its users may treat a sitting area around a fountain with moveable furniture very differently than a similar area with fixed seating. Classroom configurations with moveable walls, adaptable furniture and mobile casework are likely to encourage more learning and teaching styles than those with fixed walls, standard furniture and built-in casework. A painted mural is likely to have less educational value than an electronic mural that changes every day – and perhaps allows students to express themselves artistically.

Spaces need to be designed not simply to stimulate action. Some spaces are necessary to stimulate contemplation. In a frenetic world where external stimuli of all sorts bombard people from every direction, learning places need to provide some opportunity for reflection and quiet, to refresh spirit and soul. Such spaces need to be designed in a way that learners will naturally be drawn to them. They should be places where time, indeed, stands still – at least for the moment.

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OPINION

THE LEARNING ENVIRONMENT: REFLECTIONS ON THE FUNCTION OF FACILITIES

If you wish to respond to this article contributed by the director of a vocational school in Quebec, please send your comments to the PEB Secretariat (see page 28).

The rapid development of new types of interior and exterior architecture for public buildings in recent years has made us increasingly aware of the dynamic and subtle relationship that people establish with their immediate physical environment. The impact of architecture on this environment has long been neglected in our cities, hastily built to meet industrial and commercial needs, as our contemporary designers have often focused solely on visual and functional aspects.

Architects have assumed that the outer environment could be reduced almost exclusively to its conceptual dimension, as in a museum. Invariably, users have reacted to the cold and lifeless forms and materials by seeking continuously to make them more human. The environment should reflect people's state of mind and needs whatever they are doing; for, whether they are working, walking in the city, on holiday or in school, they are always affected by their surroundings. People live in a dynamic relationship with the outside world and perpetually seek to make this relationship harmonious. They must interact with their environment, and this must be borne in mind when we design the spaces in which we live and work.

***École Polymécanique de Laval,* Canada**
The cafeteria

École Polymécanique de Laval,
Canada

Some modern architecture has not respected the dynamics of this interaction, which is a two-way street. Our professional designers have vainly sought to place people in a stage setting rather than a living environment. For example, it is impossible to create a working environment without the close involvement of the people who actually work in it, who must establish their own codes of communication. It is only by doing so that they will be able to live harmoniously in their environment.

Similarly, the architecture of educational buildings must be very different from that of commercial and/or industrial buildings. In recent years, too many public buildings have been built using designs based on values derived from modernism, concepts difficult to understand, abstract ideas and messages that are irrelevant to the concerns and interests of students as opposed to buildings in which students can feel at home.

To create a learning environment, architecture should use forms and materials that reflect educational values, academic concepts, self-fulfilment and high achievement and the on-going, lasting relationship that everyone must establish with their human and physical environment; it should embody projects that enable learners of all ages to become involved with their environment and should reflect other symbols of the role of education in society. In functional terms, the learning environment must include

the school facilities, premises and laboratories that support learning and educational attainment. This cannot be based solely on abstract concepts.

This environment, as well as mirroring the concerns of students, should stimulate and support them in their task of acquiring knowledge and mastering skills and in their individual personal, psychological, intellectual, moral, social and physical development. Students should find an atmosphere that is conducive to their intellectual and emotional growth and that projects an image of serenity, thoughtfulness, interpersonal communication and the organised flow of energy. Light, plants and the layout of rooms are some of the elements that should enable students to gather together and provide more intimate spaces that are relaxing, harmonious and comfortable.

Although the conditions conducive to learning must meet the needs of individuals, they must not prevent students from congregating or stifle the energy generated by hundreds of students interacting with each other and with their teachers. The sound management of this flow of energy will contribute to the personal and professional development of all students and help them to become well-rounded citizens, which is the ultimate goal of education and training in society.

***École Polymécanique de Laval,* Canada**
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E-mail: BDufourd@cslaval.qc.ca

PUBLICATIONS

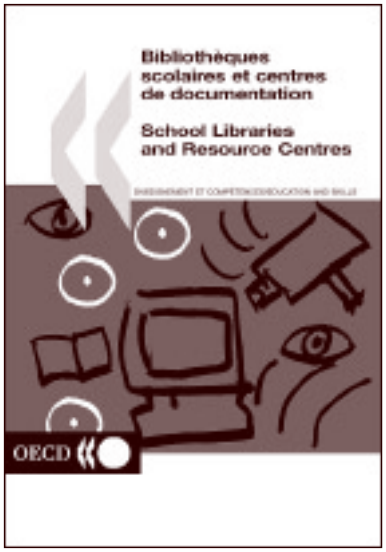
OECD PUBLICATION

School Libraries and Resource Centres/
Bibliothèques scolaires et centres de documentation

School libraries and resource centres are constantly changing in response to the emergence of new technologies and new ways of learning. How should the library of the future be designed? What role will it play as a school facility, within the educational system and in society as a whole? This book addresses these questions through examples from diverse OECD countries.

Bilingual, 2001, 204 pages

OECD code: 95 2001 02 3P1, ISBN 92-64-08604-8
EUR 20, USD 19, FRF 131.19, DEM 39.12,
GBP 12, JPY 1 900



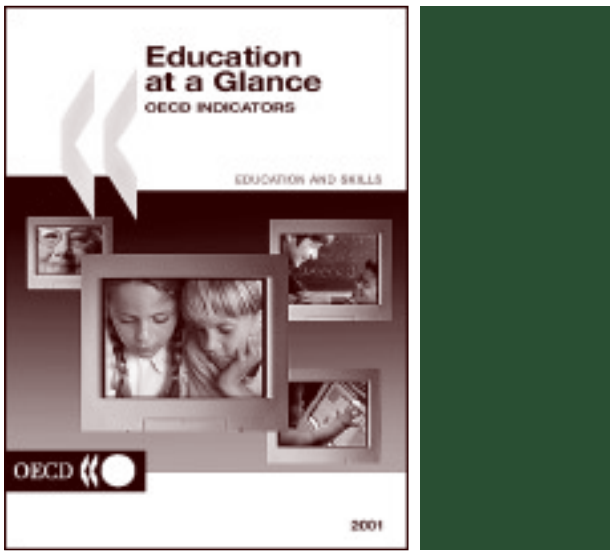
E-Learning: The Partnership Challenge

Are the new information and communication technologies transforming education and learning in OECD countries? There is certainly an upsurge in investigations and inquiries into e-learning by all kinds of parties and interest groups – governmental, professional, commercial – and from education communities. The universal "mega-trends" associated with globalisation mean that partnership in providing e-learning material is needed to manage cost and complexity in the face of competition that may come from any part of the world. This raises important questions about the public interest and the public good especially in school education which find different responses in different OECD countries; yet increased public-private sector partnering appears a well-nigh universal phenomenon. This publication explores closely the e-learning developments respectively in the school and in the higher education sector in terms of market prospects and partnership creation. The fastest developments are seen in post-secondary and corporate education. However, technology alone does not deliver education success. It only becomes valuable in education if learners and teachers can do something useful with it. There is now a definite shift of focus from technology to content and people in several OECD countries.

2001, 110 pages
OECD code: 96 2001 06 1P1, ISBN 92-64-18693-X
EUR 20, USD 19, FRF 131.19, DEM 39.12, GBP 12, JPY 1 900

Education at a Glance: OECD Indicators, 2001 Edition

Across OECD countries, governments are seeking policies to make education more effective while searching for additional resources to meet the increasing demand for education. The OECD education indicators enable countries to see themselves in the light of other countries' performance. The 2001 edition of *Education at a Glance: OECD Indicators* provides a rich, comparable and up-to-date array of indicators. The indicators represent the consensus of professional thinking on how to measure the current state of education internationally. They provide information on the human and financial resources invested in education, on how education and learning systems operate and evolve, and on the returns to educational investments. The thematic organisation of the volume and the background information accompanying the tables and charts make this publication a valuable resource for anyone interested in analysing education systems across countries. This year's edition of *Education at a Glance* includes new indicators on: how the levels and distributions of student achievement have evolved; the incentive structures governments offer to attract and retain qualified teachers; the availability and use of information and communication technologies in the teaching-learning process; public subsidies and transfers for education and their beneficiaries; and participation in skill improvement among the employed population. Finally, for many indicators, a significantly larger number of OECD countries are now providing data. Through the World Education Indicators programme, a wide range of non-member countries have also contributed to this year's edition of *Education at a Glance*, extending the coverage of some of the indicators to almost two-thirds of the world population. The data underlying the OECD education indicators are accessible via the Internet at: http://www.oecd.org/els/education/ei/index.htm.



2001, 410 pages
OECD code: 96 2001 05 1P1, ISBN 92-64-18668-9
EUR 49, USD 49, FRF 321.42, DEM 95.84, GBP 30, JPY 4 950

Starting Strong: Early Childhood Education and Care

Improving the quality of, and access to, early childhood education and care has become a major policy priority in OECD Member countries. The early years are increasingly viewed as the first step in lifelong learning and a key component of a successful educational, social and family policy agenda. Countries have adopted diverse strategies to policy development in this field – strategies which are deeply embedded in particular country contexts, values and beliefs. In particular, early childhood policy and provision are strongly linked to cultural and social beliefs about young children, the roles of families and government, and the purposes of early childhood education and care within and across countries. Yet countries share many similar challenges and issues. Taking a broader and more holistic approach than previous studies, this book provides

a comparative analysis of major policy developments and issues in 12 OECD countries, highlights innovative approaches, and proposes policy options that can be adapted to varied country contexts. What are the most promising strategies for organising policy in ways which promote child and family well-being? Looking towards the future, the report proposes eight key elements of successful policy for decision-makers seeking to promote equitable access to quality early childhood education and care.

2001, 216 pages
OECD code: 91 2001 01 1P1, ISBN 92-64-18675-1
EUR 45, USD 40, FRF 295.18, DEM 88.01, GBP 28, JPY 4 550

New School Management Approaches

Those who manage schools and educational systems today have an arduous task as schools everywhere are being asked to do more than ever before. They also face a complex world and seemingly endless pressures on resources and demands for better performance. How are schools and educational systems responding to these major challenges? What is the role of school managers within this new context? This book analyses those key questions, focusing on new school management approaches at the primary and secondary school levels. It is based on 29 innovative initiatives examined in nine countries: Belgium (Flanders), Greece, Hungary, Mexico, Japan, the Netherlands, Sweden, the United Kingdom (England) and the United States.

2001, 228 pages
OECD code: 96 2001 04 1P1, ISBN 92-64-18646-8
EUR 40, USD 35, FRF 262.38, DEM 78.23, GBP 24, JPY 3 800

OTHER PUBLICATIONS

Architecture Australia, July/August 2001
The Royal Australian Institute of Architects devoted much of this 100-page issue of its journal to university campuses in Australia.

Architecture Media Pty Ltd
Fax: 61 3 9646 4918
E-mail: publisher@archmedia.com.au
http://www.archmedia.com.au/

From the Pilot… to the Mainstream: Generalisation of Good Practice in Environmental Education

This is a 38-page synthesis of the outcomes of an international workshop organised by the OECD Environmental and School Initiatives programme (ENSI) in Norway in December 1999, published by the Norwegian Ministry of Education, Research and Church Affairs.

To receive a copy, contact Isabelle Etienne, OECD/PEB, tel.: 33 (0)1 45 24 92 72, e-mail: isabelle.etienne@oecd.org; or Statens forvaltningstjeneste, fax: 47 22 24 27 86, e-mail: publikasjonsbestilling@ft.dep.no

Library Buildings in a Changing Environment. Proceedings of the 11th Seminar of the IFLA Section on Library Buildings and Equipment. Shanghai, China, 14-18 August 1999

Edited by Marie-Françoise Bisbrouck
K.G. Saur Verlag, Munich

2001, 230 pages
IFLA Publications 94
ISSN 0344-6891, ISBN 3-598-21819-2
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2001

October

23-27 – The III Regional Seminar on Educational Spaces in Mexico and Latin America and the Caribbean will take place in Xalapa, Veracruz, Mexico. The topic is "Educational Architecture for an Inclusive Education", and the working languages are Spanish and English. The seminar is sponsored by the State of Veracruz and the UNESCO Regional Office for Education for Latin America and the Caribbean.

Contact: Rodolfo Almeida, fax: 334 67 42 37 77, e-mail: ralmeida@unesco.cl or r.almeida@wanadoo.fr

31 October-3 November – The Committee on Architecture for Education of the American Institute of Architects will organise a conference entitled "Learning Environments that Sustain: A Sustainable Future" in New York. The event will focus on three components of sustainable educational environments: pedagogy (learning trends and the academics), social (architectural attributes that encourage interaction) and technical (building techniques, furniture, fixtures and equipment). For more information and the registration form, see http://www.aia.org/pia/.

Contact: Lisa Harkins, AIA registrar, tel.: 1 202 626 7429, fax: 1 202 626 7425

November

7-9 – PEB, the Greek Ministry of Education and Religious Affairs and School Building Organisation S.A. will hold a seminar in Thessaloniki on "Disaster Management and Educational Facilities", with a particular emphasis on earthquakes. The working languages for the seminar are English, French and Greek.

Contact: Isabelle Etienne, OECD/PEB, tel.: 33 (0)1 45 24 92 72,
e-mail: isabelle.etienne@oecd.org

12-13 – "College, University and Medical Facilities: New Strategies and Innovations for Classrooms, Teaching Labs and Research Buildings" is the theme of a conference organised by Tradeline, Inc. It will take place in San Diego, California. The programme and registration form are available at http://www.tradelineInc.com/conferences.cfm.

Contact: Jessyka Sooy, conference registrar, tel.: 1 925 254 1744, ext. 12,
e-mail: registar@TradelineInc.com

2002

February

24-27– PEB, the Mexican Ministry of Education and the Administrative Board of the Federal School Construction Programme (CAPFCE) will hold a seminar in Guadalajara, Jalisco (Mexico).

Contact: Isabelle Etienne, OECD/PEB, tel.: 33 (0)1 45 24 92 72,
e-mail: isabelle.etienne@oecd.org

October

19-22 – The 79th Annual International Conference and Trade Show of the Council of Educational Facility Planners International will take place in Phoenix, Arizona (USA).

Contact: CEFPI, tel.: 1 480 391 0840, e-mail: cefpi@cefpi.org, http://www.cefpi.org

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P E B

(88 2001 44 1 P)

ISBN 92-64-19043-0

2001 subscription (3 issues):
EUR 45 FRF 295.18 USD 55
DEM 88.01 GBP 31 JPY 5 900
ISSN 1018-9327

(Single issue: EUR 19)

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