MOVING THE EXISTING PHYSICAL INFRASTRUCTURE INTO THE 21ST CENTURY?

Abstract:

The reality of the day is that governments, schools systems and or schools are not necessarily going to replace existing physical infrastructure to accommodate change. Rather the scenario is how to accommodate change within the existing infrastructure.

From a technology perspective, we have had to cater for the advancement of the mechanical typewriter to the electric/electronic form; the introduction of the early desktop computers; the development of the 'computer laboratory and more recently the explosion of provision of low cost, moderately high powered desktop and lap top computers coupled with insatiable appetites for information from the Internet.

The pervasion of the computer into most areas of the curriculum is well documented, but how can facilities designed and built in the 50's, 60's and 70's cope with this new and rapidly developing technology in the 21st Century?

This paper does not necessarily answer the question. It provides an interactive window to current world wide opinion.

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SECTION ONE: <u>What are we confronted with</u>? <u>Obsolescence, the Educational Administrators' nightmare!</u>

The infrastructure of Australian schools and many of their educational programmes is composed of a high level of plant and equipment provided in many cases during the expansionary period of the nineteen fifties through to the late nineteen seventies. Much of this plant and equipment has now become, or is rapidly becoming, obsolete.

A major cause of obsolescence of the physical infrastructure is simply the passage of time exacerbated by pressure of limited resources. Given a theoretical life span of 40 years, the reality is many schools are wearing (if not, worn) out.

The infrastructure profile of permanent buildings within the South Australian Department of Education, Training and Employment is outlined in Table 1. In excess of 23% of the school asset base has exceeded the theoretical life span, with another 37% approaching the mark.

Decade	No of School Buildings	No of Children Services Buildings	No of DTAFE Buildings
1850	4	0	1
1860	6	1	0
1870	66	4	4
1880	43	3	2
1890	19	0	1
1900	34	2	1
1910	74	4	1
1920	110	9	0
1930	93	6	2
1940	76	9	3
1950	712	46	13
1960	1948	75	103
1970	1102	105	76
1980	523	70	70
1990	458	35	66
2000	1	1	0

Note: These figures exclude transportable buildings

Table 1. Age profile of DETE built asset base.

As a broad principle, the core facilities of a school, ie those facilities that provide accommodation for the long term stable enrolment, are provided in permanent buildings. Where enrolments increase, accommodation is provided through the use of temporary buildings, either timber, metal or DEMAC construction. This paper will focus on permanent buildings, noting that the same principles apply to temporary accommodation, but in a much reduced timeframe.

Another cause of obsolescence is technological change. The greater percentage of the physical infrastructure was constructed at a time when (portable) computers (indeed even the FAX) were a figment of someone's imagination. Computers that were placed in schools only a few years ago have already been superseded by subsequent developments in technology. Industry sources suggest that computers have an average life of 30 months. Compounding the problem is the issue of appropriate network/electrical infrastructure to sustain the advances in technology, noting that schools of 25 years ago were coming to terms with the provision of additional power points required to cater for the electric typewriter. Do schools pursue a hard wired communication backbone (eg fibre optic cable) or embrace the 'wireless'solution? Then there's the laptop versus standalone debate with the consequential demand for more space when standalone units are introduced into existing classrooms.

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Not only are schools attempting to meet international standards of access to computers, but now there is the Internet Revolution. In the US, the federal government has been committed to assisting schools and classrooms to be connected to the internet by 2000. The study "Internet Access in Public Schools and Classrooms, 1994-98", C Rowlands, (http://nces.ed.gov/pubs99/quarterlyjul/3-Elem-Sec/3-esq12-h.html) outlines the current score card. How do Australian Schools compare? The demand remains to provide access to technologies within the existing infrastructure.

Impact of Inadequate Facilities on Learning

There is an argument that good facilities appear to be a precursor to student learning. The poor condition of many schools is thought to contribute to poor behaviour and to limit learning opportunities. This premise is supported by a number of studies undertaken in the United States, namely 'Impact of Inadequate School Facilities on Student Learning', US Department of Education. (http://www.ed.gov/inits/construction/impact2.html)

Legislative Pressures

The impact of legislation on the school sector over recent times has meant an increasingly significant proportion of the construction dollar has had to be allocated to legislative compliance rather than the educational attributes of the facility. Education planners have been required to meet:-
(a) the provisions of the Building Code of Australia (as incorporated within respective State Acts), the Disabilities and Discrimination Act (Federal) and State equivalent legislation, noting recent successful decisions in the Human Rights Commission,
(http://www.hreoc.gov.au/disability_rights/decisions/decisions.html)
(b) the Occupational Health, Safety and Welfare Act, Regulations and Guidelines
(http://www.austlii.edu.au/au/legis/sa/consol_act/ohsawa1986336/index.htm) and
(c) environmental legislation including contributions to the Kyoto protocol,
to list but a few.

Demographic Implications

What is the optimum size of a school? This discussion is undertaken world wide and has many opinions but no definitive answer. From a South Australian perspective, the base brief of a 'standard primary' school of 480 is predicated on a demographic distribution of one primary school per 6500 head of population. The planning process incorporates a core plus policy to cater for growth through the provision of transportable accommodation based upon demonstrable need.

Whilst this is the 'ideal' situation and readily applied to a new or developing suburb, the reality of demographic decline leading to an over supply of educational facilities within a given community, must also be addressed.

The decline in public school enrolments is further exacerbated by home schooling trends and recent changes in federal funding policy that has lead to a growth in the non-government sector, especially in small low fee schools and low fee systemic schools.

Community Expectations

Secretary of Education, United States, Richard R Wiley points the way:- "Instead of building schools for 1950, let us build schools for 2050. We need schools that are healthy, energy smart, environmentally sensitive, using up to date technology that complement and enhance academic excellence; schools designed by the community and with student and community in mind" (October 1999). (underlining added) (http://www.ed.gov/inits/construction/ctty-centers.html) 'Schools as Centers of Community, A Citizens' Guide For Planning and Design', page 1)

Jamie McKenzie in "Beyond Technology, Making a Difference in Student Performance" (http://www.electronic-school.com March 2000) writes "even as school leaders across North America and the rest of the world are rushing to wire classrooms and schools, some early adopting districts are

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waking up to an un-welcomed surprise. After spending millions of dollars to connect their schools and their students to the internet, many districts are asking why so many of their newly acquired computers are sitting unused. These districts want to know what they might have done differently to achieve an impressive and sizable return on their technology investments. In addition to raising technologically savvy kids, they expect to see improved student performances in reading, writing and thinking. They want evidence that new technologies can make a measurable difference. They want a sign that information technologies can help their students score on the new state standards and tests. Districts that are just now wiring their schools are asking many of the same questions, but they are asking them before they finalize plans or commit their funds. They expect to learn from the experiences of the early adopting districts. They look forward to broad based acceptance by all teachers of the new technologies. They hope for sustained, daily classroom use. They are investing heavily in new technologies because they see a strong grounding in information skills as a foundation for learning, working and living in this new century ". (underlining added) The article continues to develop strategies to optimize the use of new technologies.

Rather than developing this theme any further, your attention is drawn to a number of sessions within the LETA 2000 Conference program and to the on-line articles:-
(a) 'Community Use of Schools' (http://www.edfacilities.org/ir/community_use.cfm) and,
(b) 'Schools of the Future' (http://www.edfacilities.org/ir/future.cfm)
compiled by the National Clearinghouse for Educational Facilities, National Institute of Building Sciences, Washington USA.

Student Expectations.

"With the increased availability of multimedia tools in the classroom, many instructors have begun accepting the challenge of enhancing their traditional courses with an array of information technology applications. Many of the IT Planning efforts within colleges and universities advocate that every classroom be equipped with the latest multimedia and networking equipment available, at a cost anywhere between $US3000 and $US50000 per classroom". 'Student Expectations of Information Technology Use in the Classroom', J Rickman & M Grudzinski. EDUCAUSE Quarterly, No 1, 2000. (http://www.educause.edu/ir/library/pdf/eq/a001/eqm0013.pdf)

The paper continues detailing the outcomes of a campus survey into student expectations leading to a cautionary note in the conclusions:-

"From the comments by students it became evident that the use of technology did not ensure that the instructional process was always enhanced. In fact, it was pointed out that a faculty member using IT sometimes resulted in material being presented faster than students desired. Students also commented about instructors not being as well prepared for a class and reverting to reading information from the display. This appears to be an electronic version of the old stereotype of the boring instructor who uses class time to read the text book out loud. It is evident that technology can in fact amplify instructional weakness as well as strengths." (underlining added)

Signs of the Times!

Research funded by the program of Research on Education Policy and Practice at the National Science Foundation and the Office of Educational Research and Improvement, US Department of Education examined Internet use by Teachers. Becker, in the report "Internet Use by Teachers, Conditions of Professional Use and Teacher-Directed Student Use", Centre for Research on Information Technology and Organizations, February 1999, reported over 90% of schools have some sort of access to the internet, someplace in their building. (http://www.crito.uci.edu/TLC/findings/Internet-Use/startpage.htm)

Ann Flynn (Technology Purchasing: Ten Tips by Ann Flynn: http://www.nsba.org/itte/friend23.html) writes "the landscape has become increasingly crowded with companies anxious to enter the education

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marketplace, estimated at $US740 billion annually by Merrill Lynch's 1999 Book of Knowledge. Companies wanting to launch their own schools as well as traditional firms that provide products and services to the K-12 market have set the stock market abuzz with talk about IPOs. This sudden view of education as a source for serious financial gain has brought an interesting mix of entrepreneurs to the forefront of education marketing. A recent Education Week series (http://www.edweek.org) showcased several firms that offer their own for-profit solutions for education"

Randy Knuth raises the question 'How is refurbishing a '68 Camaro with your Dad like using computer-based technologies in schools'? Knuth in the article, "Creating Optimal Learning experiences" (http://www.nsba.org/itte/friend20.html) enumerates a number of capabilities of technologies and proceeds to discuss the question of Total Cost of Ownership when purchasing technology.

The cost issue is further developed by Sara Fitzgerald "Technology's Real Cost – Protect your investment with Total Cost of Ownership" (http://www.electronic-school.com/199909/0999sbot.html After the school district makes an investment in hardware, the major components of Total Cost of Ownership (TCO) are professional development, software, support, and the cost of replacing computers and peripherals after a few years of use. Retrofitting older buildings for technology installations is another cost that is often overlooked or under budgeted. And the cost of connectivity, which is not necessarily included when businesses calculate their TCO, is important for schools. For additional information see 'Taking TCO to the Classroom', http://www.cosn.org/tco .

Pam Zuege's ninth-graders tracked Hurricane Mitch as it swept across Central America. They've also seen the effects of volcanoes, followed thunderstorms and watched as scientists charted seismic tremors from Japan to California. "The kids could actually see the data as it came out…….that's something a textbook couldn't do". Will computers replace textbooks? Perhaps the more pertinent question is when? (Learning On-Line: As web-based curriculum grow, are textbooks obsolete? (http://www.electronic-school.com/199906/0699f1.html)

"Web High. Move over distance learning – here comes the virtual high school", Donna Harrington-Lueker (http://www.electronic-school.com/0997f2.html)Visit the CyberSchool, Eugene, Oregon and Utah's statewide Electronic High School. (links provided in the aforementioned article).

"Ergonomics 101 – How to guard against health problems in the computer lab", Julie Rasicot (http://www.electronic-school.com/2000/01/0100f2.html) discusses issues surrounding potential repetitive use injuries and computer use in schools. In our haste to provide the technology are we ignoring other environmental issues such as furniture, lighting, the development of good posture and work habits necessary to avoid potential injury?

The Pressure

Schools and school systems are under increasing pressure to upgrade the physical infrastructure in order to maintain existing levels of educational provision let alone cater for the developing technologies of the 21st Century.

The problem is exacerbated by the fact that existing provision creates expectations that may no longer be appropriate. For instance, the very existence of an home economics centre in a school leads to the expectation of its eventual upgrading, not of its disappearance or reconfiguration. Because upgrading, rather than, for example, the review of educational provision, is the expected response to obsolescence, the ability of school systems to respond to changed circumstances and changed priorities can be restricted.

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Equally important is whether the problem of continuing obsolescence can in any way be mitigated. Should schools even attempt to reflect current, but continually changing, standards of plant and equipment in business and industry? To provide schools with large numbers of the type of computer controlled lathes now becoming industry standard, for example, is probably to invite the need for major upgrades every few years.

These issues invite the reconsideration of many of the forms of educational provision now often taken for granted. They invite also the serious investigation of alternative forms of provision. Some alternatives which invite consideration for the degree to which they offer more cost effective ways of allowing schools to respond both to the present circumstances and to the future changes are:

• greater reliance on TAFE for vocationally specific forms of education,

• the development of educational programmes which draw on the resources of industry and business,

• the concentration of specific curriculum areas in specialist schools eg music, languages,

• moves to demonstration levels of equipment in certain areas, and

• moves from task specific educational practices to procedures which emphasize general principles and transferable skills.

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SECTION TWO: FACILITIES ASSESSMENT

Where are we and where do we wish to go? Simple questions, but in the context of educational facilities management, somewhat difficult to answer, especially in times of fiscal restraint and structural change.

Facilities assessment is the key, but what are the benchmarks? How do we combine condition assessment of the physical structure with its educational suitability? How do we define educational suitability in the context of rapid change?

The National Clearinghouse for Educational Facilities (http://www.edfacilities.org) has assembled a significant number of current resources on this issue. Your attention is drawn to the following:-

Assessing the Fit Between Educational Programs and Older Buildings: http://www.edi.msstate.edu/theoretical.html , Lackney J.A., Educational Design Institute, Mississippi State University, Feb 2000. The article covers school condition assessments, considerations regarding building new or renovating, and presents a methodology for performing a school condition assessment.

School Facilities Report: The Results of a Statewide Survey To Determine the Physical Condition and Capacity of Wisconsin's Public Schools: http://www2.dpi.state.wi.us/facsrvy/ , Solder B., Wisconsin State Dept of Public Instruction, Jan 2000. This paper covers information on physical condition as well as information on the educational appropriateness and suitability of school buildings.

(School) Asset Management Plans (UK): http://www.dfee.gov.uk/amps/index.htm , United Kingdom Dept for Education & Employment, 1999. These asset management plans assist schools to determine future needs and include information on condition assessment and suitability assessment.

Facility Management Plans (Australia): http://www.on.net/clients/pacs/fmp/toc.htm , Department for Education, Training and Employment, South Australia. The web site provides on-line access to the asset management planning process and relevant data on the physical condition of the assets.

For **additional reading** (approximately 56 articles or references)
http://www.edfacilities.org/ir/facilitiy_assessment.cfm

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SECTION THREE: Design Solutions for an Existing Infrastructure:

The sites identified below are examples of educational designs creating effective learning environments for students at the commencement of the 21st Century. The designs reflect current directions in information technology; facilities for students with special needs; the development of the 'middle school'; the development of employment and vocational education and meeting changing legislative requirements.

Students with Special Needs

Devitt Avenue Primary School (severe multiple disabilities unit integrated with school)
Contact: Mr Don Aplin, Site Property Services, 08 8226 1037, Aplin.Don@saugov.sa.gov.au

Redevelopment

Norwood/Morialta High School (reconfiguration of existing facilities)
Contact: Mr Don Aplin, Site Property Services, 08 8226 1037, Aplin.Don@saugov.sa.gov.au

Hamilton Secondary & Adult Re-entry School (replacement and reconfiguration of existing facilities)
Contact: Mr Malcolm Solly, Site Property Services, 08 82262406,
Solly.Malcom@saugov.sa.gov.au

Brighton Secondary School (replacement of facilities)

Christies Beach Secondary (EVE program)

Victor Harbour High School (redevelopment program, middle school)

Urrbrae Agricultural High School and TAFE College (redevelopment and integration with TAFE)

Cleve Area School (Science laboratories replacement)

Charles Campbell Secondary School Library (new library and school administration centre)
Contact: Mr Don Aplin, Site Property Services, 08 8226 1037, Aplin.Don@saugov.sa.gov.au

Glenunga International High School (upgrading existing buildings, new library)
Contact: Mr Don Aplin, Site Property Services, 08 8226 1037, Aplin.Don@saugov.sa.gov.au

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Westbourne Park Primary School

Swallowcliffe Primary School (major redevelopment of existing facilities)
Contact: Mr Andrew Pill, Site Property Services, 08 8226 0889,
Pill.Andrew@saugov.sa.gov.au

Clovelly Park (ex Mitchell Pk) Primary School

Smithfield Plains Primary School

New facilities

Playford Primary School (environment sustainability)

The Briars (ex Kent Town Special)

Use of existing commercial infrastructure

DePaul University, Chicago (reuse of ex-department store for educational purposes)
Contact: Mr Brian March, Department of Education Training and Employment,
08 8226 1962, bmarch@webmedia.com.au

For more information on South Australian facilities projects, contact:

The Manager,
Site Property Services
Department for Education, Training and Employment,
31 Filnders Street
Adelaide
South Australia 5000

Phone: 08 8226 1379

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SECTION FOUR: Looking to the Future

The hard yards! Planning appropriate educational facilities for the 21st Century should be conducted within a framework of planning for flexibility and not obsolescence. We have experienced considerable change over the past 25 years and in particular, the last decade. The only thing that is certain is change – change for the better.

The following articles may be of assistance in planning the move forward:-

Organizational Change

A technical solution can not take place in the absence of organizational change. The following articles provide a limited insight into organizational change supporting the information technology revolution in education. The following articles focus upon organizational change in higher educational facilities, but the lessons learnt are transferable to the school environment:-

"The next decade will be a transition period as colleges and universities revise and expand their mission and services while still embodying the traditions that have dominated higher education for hundreds of years. This transition period will require administrators at all levels of the institution to make tough choices in strategic directions and the allocation of limited resources. In particular, the administrators of non academic core operations such as libraries and information technology services will have to find ways to address the forces affecting their units, including increasing costs along with rising expectations for quality and timely service, efficiencies and accountabilities.

There is much to be gained from considering organization design as a way to achieve advancement in productivity and quality service". 'Optimizing Organizational Design for the Future', Shiela Creath, EDUCAUSE Quarterly, No 1, 2000. (http://www.educause.edu/ir/library/pdf/eq/a0014.pdf)

"…..centralized, producer oriented services are giving way to decentralized learner-oriented services. This shift includes numerous opportunities for self help as well as access to information and services on the part of students and faculty and with that comes greater local authority and responsibility. Services are being provided electronically – at any time from any place – and without the inter-mediation of student service staff." 'Transforming Student Services – The University of Minnesota takes a fresh look at client/institution interactions', Robert B Kvavik and Michael N Handberg, EDUCAUSE Quarterly No 2, 2000. (http://www.educause.edu/ir/library/pdf/eq/a002/eqm0022.pdf)

"For most institutions, however, new technologies represent a black hole of additional expense as students, parents and faculty alike demand access to each new generation of equipment and software. Most campuses have bolted new technologies onto fixed plant, a fixed faculty and a fixed notion of classroom instruction. Under these circumstances, technology becomes part of the problem of cost containment rather than part of the solution.

Making use of new technologies to reduce the cost of instruction requires a fundamental shift in thinking". 'Institutional Readiness Criteria', Carol A Twigg, EDUCAUSE Review, March/April 2000.
(http://www.educause.edu/ir/library/pdf/erm0024.pdf)

"Whether your e-Business initiative is an electronic commerce application, Web-enabled student services or distance education, your institution will benefit by thinking through the drivers, implications, framework for evolving your e-Business strategy, strategies for the future and lessons learnt." 'Preparing Your Campus for e-Business', J Kidwell, J Mattie and M Sousa, EDUCAUSE Quarterly, No 2, 2000. (http://www.educause.edu/ir/library/pdf/eq/a002/eqm0021.pdf)

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Planning for redevelopment

Whenever educationally and economically feasible, preservation and restoration should take precedence over new construction, especially in cases where re-using existing facilities can preserve natural resources and or valuable historic and cultural assets for future generations. (http://www.ed.gov/inits/construction/ctty-centers.html)'Schools as Centers of Community, A Citizens' Guide For Planning and Design', page 10)

Renovating Early and Middle 20th Century Schools:

The American Institute of Architects has produced a paper entitled 'Renovating Early and Middle 20th Century Schools' provides a useful guide to establishing facilities management plans to move existing facilities into the 21st Century. The paper deals with evaluating and assessing the existing facility; providing a managed approach to renovation, and describes a case study under the heading of 'School Houses That Will Live On'. (http://www.e-architect.com/pia/cae/stlouis_r/two_a.asp)

Reinvigorating Our Schools

"To get the best additions, renovations, and new construction for your school funds tomorrow, you need to plan today", American Institute of Architects. The Institute has developed a guide "Reinvigorating Our Schools" (http://www.e-architect.com/resources/schools/home2.asp) of which Anne Bryant, Executive Director National School Boards Association writes "Local school boards across the nation are addressing the challenge of providing modern school facilities that will contribute to the achievements of their students. 'Reinvigorating Our Schools' is an excellent resource – not only for school boards – but for anyone concerned with creating excellent learning environments for our children and communities".

Planning with Community Involvement

For a comprehensive view of planning involving the community in the process, your attention is drawn to: 'Schools as Centers of Community, A Citizens' Guide For Planning and Design', US Department of Education, (http://www.ed.gov/inits/construction/ctty-centers.html).

Build New or Renovate:

Build new or renovate – that is the question! To answer this question, clearly there are many other questions:-

1. What are your educational objectives/outcomes for the 'proposed' development?
2. What is the current status of existing infrastructure?
3. What options are available, ie undertake a feasibility study to ascertain the most appropriate way forward, whether it be renovation or replacement? Within the feasibility study, undertake a full cost benefit analysis taking the whole of the life of the asset into consideration.
4. What limitations are imposed by each proposed solution from an educational and financial perspective, given the constraints of a budget?
5. What assurances have you that the solutions have moved 'outside the envelope', ie a vision of the future (coping with change) is included in the proposed designs?

In moving the project forward, the time has come for the application of project management discipline. Most education system subscribe to various Project Initiation Processes leading to the expenditure of capital funds, eg the Queensland Capital Works Management Framework: http://www.build.qld.gov.au/p_sam/cwmf/cwmf.htm .

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Additional information is available from:-

'**Build New or Renovate'**, National Clearinghouse for Educational Facilities, http://www.edfacilities.org/ir/build_or_renovate.cfm , provides a series of articles and references on the topic. Of particular interest are:-

Renovating Older Schools Workshop: http://www.edi.msstate.edu/edioswkshop.html The workshop offers a number of papers and powerpoint presentations dealing with the topic.

Assessing the Fit Between Educational Programs and Older Buildings: http://www.edi.msstate.edu/theoretical.html The paper includes economic analysis and case studies used in the workshop as well as powerpoint presentation of 50 slides.

Technology Integration:

The integration of technology into existing infrastructure is difficult at best. The majority of the existing infrastructure was constructed at a time when power points were limited in teaching spaces, and network cabling unheard of. The challenge, therefore, is to equip existing buildings with appropriate electronic infrastructure in a cost effective manner.

From a South Australian perspective, the Department for Education, Training and Employment has created the DECStech2001 project, a project designed to facilitate the purchase and integration of computer technologies into schools. Details of the project can be found at http://www.decstech.nexus.edu.au .

The Department of Education, Tasmania, Australia, Facility Services Section has a comprehensive set of guidelines for learning technologies. These may be found at http://www.tased.edu.au/facnet/direfac.htm or http://www.tased.edu.au/facnet (main menu).

The **National Clearinghouse for Educational Facilities** (US) has 97 references on the topic at http://www.edfacilities.org/ir/technology.cfm**.** Your attention is drawn to the following**:-**

The Future Connection: http://www.asumag.com/magazine/Archives/0100coverstory1.html **.**

Building with Purpose: http://www.asumag.com/magazine/Archives/0100coverstory4.html

Computer Classroom Schematics: http://www.cudenver.edu/public/ITI/classroom.html

National Science Foundation Wireless Field Test for Education Project: http://wireless.oldcolo.com This article examines the use of 'wireless' technologies in educational situations.

All wired Up: A How-To Guide to Wiring Classrooms: http://www.electronic-school.com/199809/0998f1.html A cautionary note: Before undertaking any project involving wiring, always check with the appropriate authorities that the proposed work complies with legislative requirements of the day. Further, some jurisdictions require certified trade-persons to undertake such work.

A Guide to Networking for K-12 Schools: http://www.netc.org/network_guide/

Guiding Principles for Designing and Growing a Campus Network for the Future, Philip E Long, EDUCAUSE Quarterly No 1, 2000 (http://www.educause.edu/ir/library/pdf/eq/a001/eqm0015.pdf)

Building a Teaching and Learning Community, James Frideres and Gregory Harris, EDUCAUSE Quarterly, No 2, 2000, describes the development and operation of Information Commons, 24 hour multimedia research facility within the library at the University of Calgary. (http://www.educause.edu/ir/library/pdf/eq/a002/eqm0028.pdf)

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Conclusion:

This paper focussed specifically on the issue of obsolescence of the physical infrastructure and its ability to accommodate (or lack of it) the changes prompted by the technology revolution.

However, we should not lose sight of the fact that the physical infrastructure and technology is but a component of a complex educational provision array. Of equal importance is the continuous evolution of teaching methodology and community expectation; learning theory and practice; the needs of students in today's (and tomorrow's) society and the training and employment of professionals who understand the nature of learning in a technological society.

The challenge is to move facilities designed and built in the post war years for students and teachers of that era into the future. A future where students (of all ages) will access their educational requirements from a range of options including 'conventional schooling' and 'electronic schooling' from best practice sources throughout the world.

In moving forward from the slate board to the next generations of technology, let us not forget the wisdom of the past. Let us not forget technology and buildings form but a part of a person's overall development. Social interaction is a crucial learning experience.

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References:

"Schools as Centers of Community – A Citizen's Guide for Planning and Design", US Department of education, April 2000. http://www.ed.gov/inits/construction/ctty-centers.html

"Project Initiation Process – Building Asset Management Framework", Department of Administrative Services, Adelaide, South Australia, Jan 1996.

"What do Information Technology Support Services Really Cost?" K Leach and D Smaller, CAUSE/EFFECT, Vol 21, No 2, 1998. The full text of the article can be found at:- http://www.educause.edu/ir/library/html/cem9829.html

"Support for On-Line Teaching and Learning", Barbara Truman-Davis, Linda Futch, Kelvin Thompson and Francisca Yonekura, EDUCAUSE Quarterly, No2, 2000. The article provides a useful model for developing best practice in educational IT.
(http://www.educause.edu/ir/library/pdf/eq/a002/eqm0023.pdf)

"Distance Education – Are We Being Realistic", Diana Oblinger and Jill Kidwell, EDUCAUSE Review, May/June 2000. (http://www.educause.edu/pub/er/erm00/articles003/oblinger.pdf)

"Integrating Computing and Library Services", Arnold Hirshon, CAUSE Professional Paper Services #18. (http://www.educause.edu/pub/profess.html select article #18 PUB3018)

"Keeping Pace in a Changing Environment", Shannon Burgert, EDUCAUSE Quarterly, No 2, 2000
(http://www.educause.edu/ir/library/pdf/eq/a002/eqm0025.pdf)

Useful Web Sites:

The Electronic School: http://www.electronic-school.com/

Energy Smart Schools: http://www.eren.doe.gov/energysmartschools/

American School Board Journal: http://www.asbj.com/

Taking TCO to the Classroom: http://cosn.org/tco/

ERIC Clearinghouse on School Management: http://eric.uoregon.edu/

Plan Ahead, Online magazine of the Society for College and University Planning: http://www.scup.org/

National Clearinghouse for Educational Facilities: http://www.edfacilities.org/

National Clearinghouse for Educational Facilities, Technology Integration, http://www.edfacilities.org/ir/technology.cfm

National Clearinghouse for Educational Facilities, Build New or Renovate, http://www.edfacilities.org/ir/build_or_renovate.cfm

National Clearinghouse for Educational Facilities, Schools of the Future, http://www.edfacilities.org/ir/future.cfm

National Clearinghouse for Educational Facilities, Community Use of Schools,

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http://www.edfacilities.org/ir/community_use.cfm

DPI Clearinghouse: http://www.schoolclearinghouse.org/

Asset Management Quarterly International: http://www.amqi.com/

APPA: The Association of Higher Education Facilities Planners: http://www.appa.org/

The Council of Education Facility Planners, International (CEFPI): http://www.cefpi.com

Occupational Safety and Health Administration (OHSA, United States): http://www.osha.gov/

Workcover Corporation, South Australia: http://www.workcover.sa.gov.au/

Human Rights and Equal Opportunity Commission, decisions:
http://www.heroc.gov.au/disability_rights/decisions/decisions.html
(http://www.hreoc.gov.au/disability_rights/links/links.html

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Facility Services Section, Dept of Education, Tasmania, Australia: http://www.tased.edu.au/facnet/

School Design and Planning Laboratory: http://www.coe.uga.edu/sdpl/sdpl.html

OECD, (PEB): http://www.oecd.org/els/edu/peb/els_peb.htm

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http://www.build.qld.gov.au/p_sam/cwmf/cwmf.htm

School Planning and Management Journal: http://www.spmmag.com

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