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Multimedia, Internet, the Nintendo Generation, and Health Professions

Zelmer, A C Lynn

Department of Mathematics and Computing, Central Queensland University, Rockhampton 4702

During 1996 the author visited a number of agencies to look at innovative uses of new technology. The visits included a boutique multimedia developer in Brisbane, the National University of Singapore, Athabasca University and the University of Alberta in Canada, the South Bank University in London, and the Ngapartji Cooperative Multimedia Centre in Adelaide. This paper reflects on those visits and the applicability of some of the practices observed for health profession education and information programs.

1. Introduction

The author is a senior lecturer with the Department of Mathematics and Computing of Central Queensland University (CQU). While not directly involved in training health professionals, he managed a National Priority (Reserve) Fund project within CQU's Faculty of Health Science which began their computer-based learning program, authored *Computer Basics for Health Practitioners* (1, 2), developed a Committee for the Advancement of University Teaching (CAUT) funded interactive multimedia package for diabetes education (3), and provided technical assistance to a recently published CD-ROM for nursing history (4). His teaching duties include a core introductory unit for Bachelor of Information Technology students and the lead unit for CQU's new Bachelor of Multimedia Studies degree as well as supervising honours and postgraduate students. One of his postgraduate students recently completed a research degree on the development of hypermedia documents; current research students are studying the management of multimedia development projects and the design of learning materials which adapt to the learner's preferred learning style. He is an avid user of the new information technologies and is experimenting with the on-line delivery of learning materials (5).

While on study leave in 1996 the author visited six agencies in Australia and overseas to examine their use of the new media technologies. This paper briefly examines the practices observed and provides a number of suggestions for Australian 'best practice'.

We recognise that information delivery and learning patterns have changed with the advent of general access to computer-based services ranging from digital cameras and the Internet to high-tech medical imaging equipment. Further changes will occur as the telecommunications companies' rollout increases capacity and widens current digital networks.

We often don't recognise, however, that many of the new services are glamorous but content-free, and will remain so until we undertake the expensive task of translating information and practices to the new technologies. It is ironic that many highly visible and glamorous Internet sites contain only flashy animations while content-rich government, education and health agency sites remain unused because they lack good design and are boringly text-based.

Equally, we often do not recognise that political and social priorities constrain the effective use of the new technologies. This includes the attempts of some governments and public interest groups to control the content of new media as well as the changing nature of the individuals entering into and graduating from our tertiary institutions. The Nintendo Generation has arrived and doesn't comprehend our insistence on quality content, format, and style.

We need to combine the strengths of new and old if our education and information programs are to be successful.

2. The Site Visits

2.1 Singapore

2.1.1 APCHI '96 Conference

The APCHI '96 Conference (First Asia Pacific Conference on Computer Human Interaction--Human Factors of IT: Enhancing productivity and the quality of life) was sponsored by the Singapore Information Technology Institute, local and international vendors and organisations. Approximately 80 participants from 17 countries (large contingents from Australia, UK, and USA) attended four keynote presentations and three streams of technical papers focussing on groupware, implementing human factors programs, user performance (including cross-cultural issues), interaction/user interface design, and education cum multimedia/hypermedia (6).

Three of the four keynote speakers were themselves colleagues in the UK, the fourth (an American) was unable to attend at the last moment for personal reasons but was represented by her work colleagues from Australia and a videotaped presentation which was shown during a break. Two of the three CQU presenters, postgraduate students, were almost the only Malaysians present, although Malaysia is one of the region's most active IT promoters.

2.1.2 Singapore's CyberHospital (Professor K C Lun)

Dr K C Lun, the originator of National University Hospital of Singapore's World Wide Web-based CyberHospital (Figure 1), explained that the site is a promotional tool for the hospital as well as having significant in-service and public education components. It includes a hospital directory, explanations of procedures, and links to medical education sites worldwide. Now officially supported by the Hospital with a 'mirror' of the Visual Human files for Asia, the site began as a personal project and continues to be expanded on a voluntary basis. One of Professor Lun's students, for example, maintains a virtual medical school section, posting lecture and tutorial notes in addition to maintaining links to resources on other sites.

Figure 1 CyberHospital, Singapore National University Hospital: http://CH.nus.sg/

2.2 Australia

2.2.1 Edge Interactive, Brisbane (Dr Paul Campbell)

Edge Interactive is a boutique multimedia developer which, among other projects, employed (at that time) 5 conventional programmers on a project developing tools for displaying multimedia presentations on-line.

Dr Campbell stressed that the Australian multimedia industry is still very small, the people working in the industry all come from other disciplines, and a successful multimedia production firm requires three strengths for success: business, creative, and technology. The multimedia industry, he noted, is currently modelled after the film industry with teams of independent specialists assembled by an executive producer for a specific production and then dispersed at the project's completion. The economics of multimedia titles are changing and it is no longer possible (early 1996) to spend $500,000 on a title when it will likely only bring in $250,000 ($3-5 per sale for perhaps 50,000 sales).

Dr Campbell was concerned about university-based programs for professional multimedia developers. Ignoring the probability that there will not be any jobs for the graduates of a university-based multimedia career entry program, such a program would need to be clear about its scope. A rounded program must address all three areas (business, creative, and technology) and have a strong emphasis on teamwork and projects instead of isolated technical studies. He went on to suggest that a postgraduate course would be more reasonable than undergraduate as postgraduate students would be more mature and have a (subject) discipline to build upon. In any event, he recommended that selection to any multimedia program should be on the basis of a creative portfolio (any medium) rather than simply based on grades.

2.2.2 Ngapartji Cooperative Multimedia Centre, Adelaide

This is perhaps Australia's most exciting venture in the development and use of multimedia for education and entertainment. Both TAFE and university sector students have access to the industry-supported commercial training facility which includes state-of-the-art hardware and software for producing commercial and educational multimedia products. However, the centre also includes a true 'cyber-cafe', providing both coffee and a 'window' on the electronic world for the general public with free access to computers and the Internet. This may well be the only training centre in the world for computer professionals which has a front wall which opens to the street, and thus the walk-in public in Adelaide's downtown cafe precinct.

2.3 Canada

2.3.1 Edmonton and area

Professor Emeritus Milt Petruk of the University of Alberta was one of the initiators/implementors of their 'Alternate Delivery' project (Figure 2), now known as Academic Technologies for Learning. He discussed a variety of issues relating to implementing change, the use of technology in tertiary institutions, and the inability of senior administration to understand the issues of delivering instruction.

Figure 2 University of Alberta, Alternative Technologies for Learning: http://www.atl.ualberta.ca/

Petruk's students have access to, and a private area on, 'his' WWW (World Wide Web) server (located under his desk, attached to the UofA network, tolerated but not authorised) for collaborative work (dropping assignments and group work, collecting assignment materials left by other students and Petruk, ftp (file transfer protocol), WWW, e-mail, etc.).

Professor Bobbi Carey, Athabasca University (AU), until recently Vice-President (Academic), has been responsible for AU's project to assist Sri Lanka's Open University initiative, especially in the delivery of nursing programs. Most significantly perhaps, AU has made a profit from this multi-year technology transfer/institution building project but will not necessarily have a continuing presence in Sri Lanka. Some Sri Lankans have gone to Canada or elsewhere for postgraduate study but most of AU's involvement has been in training on-site to enable local staff can continue the program without on-going support.

Judith Hughes (Executive Director, Student Services) and Pete Holt (Computing Lecturer) described AU's continuous intake/exit operations. AU staff and students are dispersed across Western Canada with operational challenges similar to those being encountered by CQU with its multiple campuses. One response has been to use desktop video conferencing for informal staff meetings and on-line chat facilities for more formal meetings (one staff member types a discussion summary into the chat line as the meeting progresses and verbalises on-line comments for the face-to-face participants). AU's 'Virtual Helpdesk' (Figure 3) is a student operated student support service with staff spread over an area larger than Victoria and New South Wales.

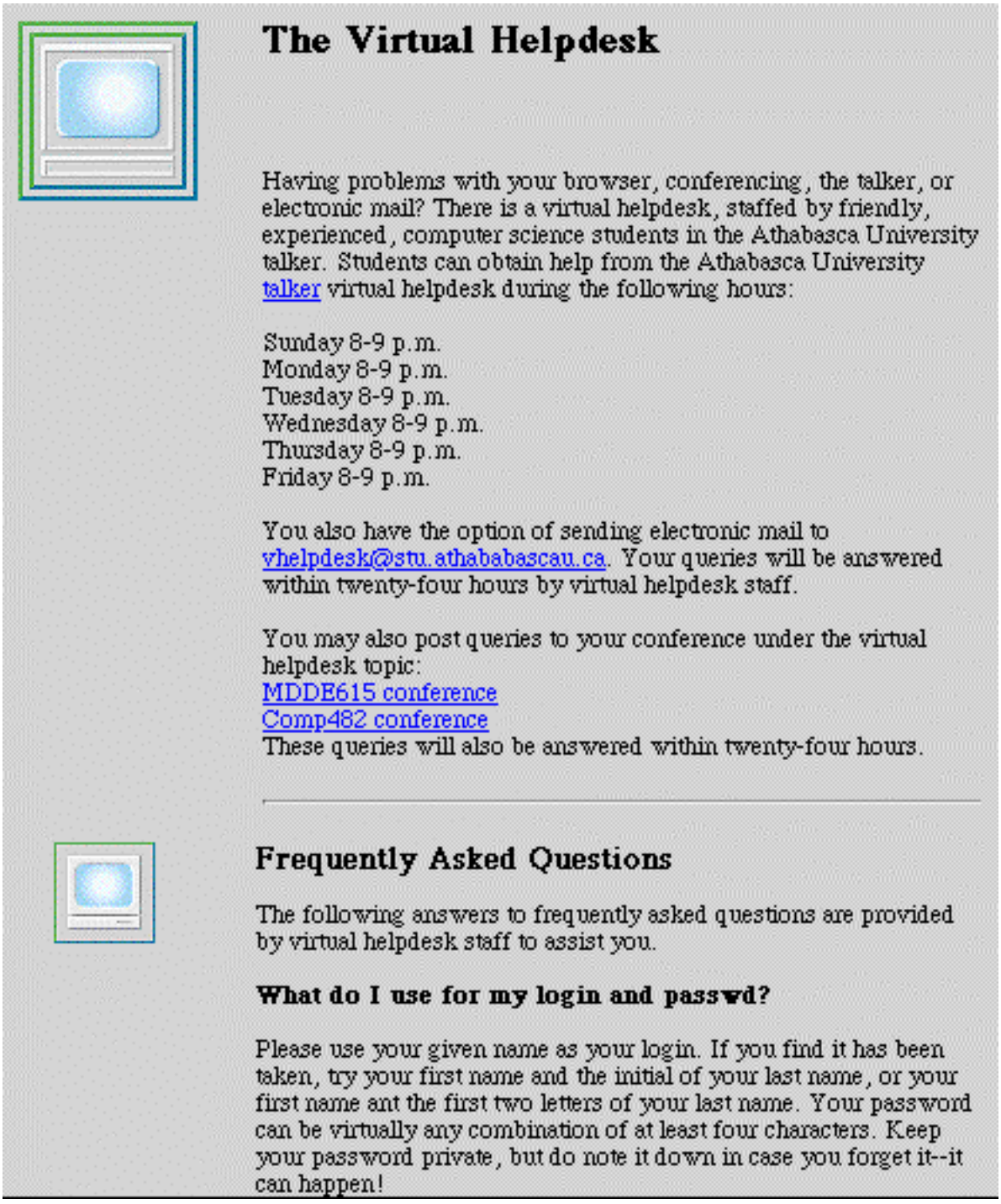

Figure 3 Athabasca University Virtual Helpdesk:
http://www.uathabasca.ca/html/courses/global/edtech/talker/ quickfaq.htm

Community education groups in Alberta have competitive access to a funding source for developing new delivery initiatives provided they collaborate with one of the tertiary institutions. Augustana University College in Camrose is beginning to work with such groups in rural areas to help solve issues ranging from submitting assignments electronically to copyright and developing and delivering on-line learning materials.

2.3.2 ITCH '96

ITCH '96 was the (6th National, 4th International) biennial Conference on Information Technology and Community Health (7). The School of Health Information Science at the

University of Victoria (the first Canadian academic program for training healthcare system IT professionals), a Cooperative Education program, is an ITCH sponsor.

With 300 plus participants from Canada and overseas (Armenia, Australia, Austria, France, Germany, New Zealand, South Africa, Sweden, the United Kingdom, and the United States) ITCH closely parallels Australia's annual Health Informatics Conference, both in size and scope. However, HISA has the clear lead in terms of the actual use of technology to support the Conference. While ITCH has a WWW site with electronic registration and abstracts of presentations, it neither has an on-line 'virtual conference' nor does it make e-mail facilities available for conference participants.

CANARIE Inc, the Canadian Network for the Advancement of Research, Industry and Education (8) is a Canadian government initiative (Industry Canada) which has funded a national test network (NTN) which includes 140 agencies, 18 universities, 30 companies, 6 hospitals, and various individuals. NTN "provides an environment for developing and testing new technology, applications and services that are needed for future broadband networks". Unfortunately, CANARIE only received seed funding from the government but is expected to become self-supporting in the near future.

A presentation on health sector reform in Latin America (9) highlighted the difficulties of working across agencies with different objectives and priorities. The speed with which technology is changing leads to data- and platform-driven systems with conflicting standards and applications which do not support user needs. In addition, the speaker noted, developing countries (and organisations) lack the analytical skills to make use of existing data in decision-making, let alone defining their future data needs.

Ray Rogers, the IT Director for the National Health Service (NHS) described the UK experience developing their multi-country health IT infrastructure. A national health infrastructure requires, he indicated, a unique client identifier for health use, a national administrative population register, explicit national standards (GP systems are standardised since only commercial systems which meet the national standards are eligible for a NHS subsidy), NHS-wide networking (commercially financed and installed, paid for through usage fees), a 'language' of health (ICD10, Read Codes, etc.), and a security framework.

2.3.3 Vancouver, British Columbia

Two venues provided an 'alternative' approach to education: the Sun Yat Sen Chinese Garden in downtown Vancouver, the only public formal Chinese garden in North America, and the new Vancouver Public Library (Main Branch).

The garden is modelled after a 13th Century classical scholar's garden and was built using traditional methods (no nails, etc.) by artisans loaned from China. The garden illustrates a very different environment for learning (see 5 for description and photographs), but one which continues to be used today by Vancouver agencies (formal and informal).

The Library is a new multi-story building which combines electronic and traditional media. Patrons can, for example, rent computers by the hour for either Internet access or general computing (different laboratories). The Library also has extensive facilities for patron and staff reproduction of its historical collection (large map copiers, colour copiers, scanners and digitisers, etc.).

2.4 United Kingdom

2.4.1 South Bank University

The social context of the new technologies is often overlooked, however, two South Bank University nursing academics (10) are investigating the social aspects of the new technologies; an area of common interest is the problem of communication between work colleagues at a distance. One forum for such research in the UK, operations research (OR), is changing its focus to reflect the increased interest in qualitative research and the social aspects of IT.

3. Reflections

3.1 Change

A columnist in The Australian (11) recently suggested that the life of his wife's just-deceased grandmother demonstrated change has been with us for longer than we often realise:

> You hear a lot these days about the rapid pace of change and how we are constantly bombarded by new ideas…
>
> The idea of perpetual change—capitalism's creative destruction—is further promoted by the media and the marketing and advertising industries.
>
> The clear message is: those who cannot keep up with, or stay ahead of, this juggernaut of change will be crushed under its relentless onslaught.
>
> It's not hard to understand how people can begin believing they have lost control over their lives.
>
> But is it significantly worse than it has been in the past?
>
> Anybody who has seen a newspaper from the beginning of this century knows that people of those days also faced a barrage of dazzling new ideas and advertisements for 'revolutionary' products.

There are individuals still alive (the author's great aunt, for example, is still relatively active at 108) who have experienced the influenza epidemic of 1918-19, the dislocation of various small and great wars and a world depression, to say nothing of the development of the automobile and the aeroplane, electricity, radio, television and electronics. Reflect, for example, on what it meant to live in Australia prior to home refrigeration.

Education, particularly the education of professionals—including health professionals—has been relatively unaffected by many of these changes until recently. Yes, healthcare professionals do utilise technology in the conduct of their work, but training programs still typically depend upon 'lecture' and demonstration, supplemented with 'laboratory' activities (field or clinical practice) adapted from formal apprenticeship-style programs introduced in the middle ages.

Our students, however, experienced the new technologies from early childhood, many are competent in its use by the time they reach tertiary studies, and increasingly they expect that appropriate technologies will be used in their training programs. One aspect of this is an increasing tension in tertiary institutions between older staff who were themselves educated in a pre-electronic age [or even, as with the author, pre-television] and younger staff raised on video games--the Nintendo generation--for whom technology is not a new phenomenon because it has always been part of their lives.

3.2 Innovative web sites

The 'best' web sites, the ones which get the most 'hits', are those developed by professional designers. If the sites are commercial, or at least operated on a commercial basis, *and* ongoing maintenance is the responsibility of a dedicated staff member, then it is quite possible that the sites will also be reasonably current, even if their sophisticated graphical content is also typically 'content free'.

Unfortunately, the 'better' the site in terms of appearance, the longer it takes to load, and the less information it seems to contain. In terms of load time it is perhaps fortunate that most sites developed by institutions such as hospitals and universities are still primarily text based, but the load times for many of the graphically oriented sites may discourage serious viewers in any event.

Content reliability is also problematic. One of the poster presentations at ITCH '96 (12) reported that of 167 WWW documents containing advice on good eating practices accessed during a recent search, 45% (n=76) provided information which was not consistent with Canadian Guidelines for Healthy Eating.

Maintaining currency seems to be a particular problem at sites where updating is the responsibility of an [overworked?] network technician. Of particular concern, almost without question the university and hospital (health) sites that seemed most innovative and up-to-date had been developed (and several were still being maintained) outside of institutional control and constraints. While the sites are now at least tolerated by their institutions (hospital, university, community organisation, etc.) they originated as rogue sites on personal servers, connected to the institutional network but outside the control of the institution.

All of the developers and managers the author interviewed agreed both with the need for responsible use of the bandwidth and some institutional style/consistency/quality control, but most felt that current institutional approaches stifled such use. Dr Milt Petruk, Professor Emeritus and still Director of a Canadian key centre for the study of instructional computing, for example, continued to encourage the establishment of individual (personal) sites to avoid the control mechanisms (content managers, style committees, etc.) which institutions commonly use to stifle innovation and currency in the name of corporate style and consistency. The author's own experience with CQU would reinforce that view.

It is necessary, therefore, that 'standards' are developed with, not for, the users of the new technologies. It is not easy for individuals in the corporate headquarters, oriented as they often are to a corporate style and management control, or for traditional educators to see the value of flexibility and the need for quick response/revision times when working with the new media. Likewise, it is not easy for the media innovators/educators, often characterised as 'cowboys' or 'technonerds', to appreciate the need for ensuring that details such as copyright clearance have been checked or to see that the corporate image suffers when sites have spelling mistakes. However, on-going and effective use of the new media will not be possible until their positions have been reconciled.

3.3 Multiple formats

The author re-learned the hard way in 1996 that materials cannot easily be maintained in multiple formats, word processor files for print and html 'tagged' files for electronic (on-line) delivery in this context. Since CQU's document editing system has always been incompatible with desktop word processors the author had been producing 'camera-ready' copy as a reasonable alternative for maintaining quality control with the ability to easily revise materials.

Unfortunately, the WWW introduced yet another display format. In 1997 the logical solution is to develop text-based student learning materials in a web-compatible word processor. However, a compatible word processor was not readily available in 1996. It seemed more reasonable, therefore, to develop learning materials in the WWW format (html, hypertext markup language), distribute these materials on a diskette as 'browsable' files, and let the students print the required pages direct from the browser. Readings which could not be converted to electronic delivery for copyright reasons were eliminated. It was hoped that this would decrease development time, improve the quality of student materials and decrease the duplication cost, while maintaining an acceptable cost for development and distribution.

The author accordingly prepared the resource materials for one (computing) unit using the WWW format for both on-campus and distance students, but on disk for desktop browsing. The intention was to maintain a WWW site, with regular revisions to the materials as required, giving students with an Internet connection the option of accessing the most up-to-date version via their normal web browser. Unfortunately, time constraints and subsequent difficulties with virus attacks, network failure, and 'spamming' (the sending of multiple copies of a message/file with the effect of overflowing the recipient's mail system) meant that this did not happen.

One of the reasons for switching almost totally to the electronic format is cost. Preparing and mailing a single diskette with a limited amount of paper is less expensive than printing and mailing several hundred pages of paper (the videotapes used with this unit accompany either version). It should also assist quality control and reduce the likelihood of missing items. [Nothing guarantees that everything required will be included, or accessible if included. The author's

quality check failed to identify a missing link to a required assignment 'report form', for example, causing confusion among students.]

Another reason for switching involves the currency of the teaching materials. While it is hard to ensure that teaching resources for any unit are current when they must be prepared months in advance, it is even more critical for a unit in information technology. The widespread use of the World Wide Web pages for the most current version of materials would allow students to access information as it is produced. This does, however, require the institution to either streamline its access procedures for staff using the WWW for the distribution of teaching materials or to accept that such staff will develop their own 'rogue' sites.

3.4 Maintaining a rogue site

The author developed an independent WWW site, using a server located in his office, for the new (1997) Introduction to Multimedia Studies unit for which he is responsible. Students in this on-campus class received paper copies of materials which could not be converted to electronic delivery for time or copyright reasons, but otherwise received all of their instructional materials on-line and were even required to search on-line sources for tutorials and reference materials to assist them in their assignments.

The electronic delivery was not without its problems. As with the computing unit referred to in the previous section, electronic mail frequently went astray due to network problems and a hard disk crash which resulted from a virus attack. The extent of the current difficulties is perhaps best illustrated by the virus attack, which initially came not from students or other web cruisers, but from documents originating with the university Chancellery and the author's Associate Dean.

In contrast to the problems originating outside the author's office, maintaining the web site was merely time consuming. Changes to documents on the site were made in a matter of seconds and even a major restructuring only took a few hours. Contrast that to the Department's 'official' site which remained unmodified for almost a year due to bureaucratic restrictions [individuals were not allowed to change their own materials as a departmental style and an automated updating procedure were being developed by overworked technical staff].

4. Implications

Several of the projects visited by the author provide public access using the technology. It does seem reasonable to expect a hospital or educational institution to provide current, and accurate, information on institutional policies as well as healthcare procedures. If we combine the CyberHospital and Ngapartji models we would provide access to healthcare and other information within the institution, perhaps as part of its cafeteria, chapel (family or quiet room), library or bookshop. The same information would also be available more broadly via the World Wide Web and, as appropriate, using more traditional methods (brochures, patient education sessions, etc.). A HIC '96 presentation (13) examined an initial experiment with such a system in a long-term care facility; the Vancouver Public Library and Ngapartji show what is currently happening in some institutions and what is increasingly expected from all our institutions. [Who would have guessed, for example, that IBM's 1996 Olympic WWW site would be so popular that it embarrassed the world's largest computer company by its inadequate access times, or that most Australian political parties and sports organisations would find it essential to establish web sites?]

Several of the projects visited were originally 'rogue' sites; unfortunately, institutional policies suggest that some will remain outside the institution's control for quite some time. Just as companies such as BHP have eliminated what were their 'computer centres' and refocussed staff onto a new goal--ensuring that productive employees and production processes are always able to work at their best, educational and healthcare institutions must recognise that technology can help achieve their service goals but it is not an end in itself.

Finally, using electronic technologies is expensive, both in terms of infrastructure and materials development. The best materials, whether for desktop or on-line delivery, are the result of a team effort which includes content specialists as well as media experts. The diabetes package referred to above (3) cost over $50,000 in actual cash expenditure, plus staff time and the use of existing infrastructure. It requires a similar expenditure to test, revise and complete. While most commercial products would be significantly more expensive to bring to market, such an expenditure is beyond the budget of most healthcare and educational agencies, requiring a new approach to developing and, most importantly, sharing resources.

The new technologies should not be viewed as a means of saving costs in the short to medium term; the need to creatively use the technology, however, is a given for both our healthcare and educational/training institutions.

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