Developing a digital campus: Helping learners embrace the knowledge age.

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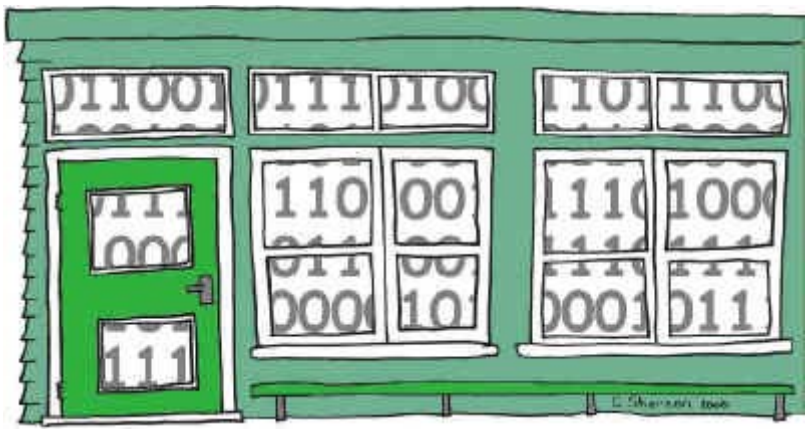

Abstract

This presentation will touch on the use of technology to enhance learning. Educators know that the learning environment has an important role to play in successful learning at all levels. The challenge is creating the digital environment that will make learning successful.

Introduction

There is a growing need for schools and other education institutions to digitize their content and activities, and adapt their systems to allow teachers to work effectively in a digital environment. The field of education is entering an ‘information world’ that De Diana and Aroyo (1999) term ‘educational infospace’ where ‘networked education with all related processes is taking place’. It is clear that this ‘advance of technology makes constructing new and richer contexts for teaching and learning ever more tenable and more necessary’ (Kinnaman in Wellburn, 1996).

A school, like any organisation, relies on information for it to work. More often than not the institutional information, such as planning and teaching resources, are spread spatially and in a range of formats, not the least of which is the collective mind of the teachers involved.
It is also important to note that creating a digital campus does not remove the value of the teacher. The key to any learning environment is the teacher behind it - good or bad. 'If teachers merely add on technology to ineffective instructional methods ... there will be no improvement in student learning' (Clark, 1983). Or to put it another way 'the technology itself is relatively unimportant' (Brown,1997).
What is apparent is that the digital revolution an unstoppable reality and teachers will need to be encouraged to make effective use of digital resources. Teachers will need to be provided with ideas on how digital resources can be used to support them in such a way that the relationship between the information and education is maintained. It has been said that 'learning can only take place effectively given a suitably supportive environment, able to provide both a rich resource and a flexible stimulus' (Papanreou and Adamopoulos, 1997, p208). The use of digital resources is able to create that environment.
It is important that teachers manage this move toward networked digital resources in a way that they can provide the education needed in a digital world.

Activity, Content and Resources (Data)

To look at the possibilities of a digitized learning environment requires an investigation into the activity of the teacher, the related content and the data used to support that content. In general, teachers are involved in activities relating to planning, facilitating and evaluating (Charles 1976, p124). Added to that is the support activity required to maintain the teacher's own development. Within each activity are subsets with related content. The content in turn relies on particular resources or data. Table 1. outlines some of the typical activity of teaching staff at an education institution. The first column lists the teaching activity under the headings of planning, facilitating evaluating and supporting. The second column identifies the content required to achieve the listed activities. The last column lists some of the resources or data that a teacher may use to access or create the content.

Activity	Content	Resources / Data
Planning		
Diagnosing	lesson plans, curriculum, student information, industry contacts	archived data (personal and institutional), policy documents, curriculum documents, email, phone/voicemail, unit standards, peer discussion lists, library, intranet
Selecting Appropriate Methodology	ideas from: books, journals, www, peer suggestions, education theory, other contacts (industry)	internet, library, archived data (personal and institutional), policy documents, curriculum documents, email, phone/voicemail, unit standards, peer discussion lists, technology support people, intranet
Arranging Activities	timetable, guest speakers, peers, institutional activities.	online timetable, phone/voicemail, email, intranet
Selecting Resources	books, journals , web pages, video, CDRom, interactive software	internet, library, archived data (personal and institutional), policy documents, curriculum documents, email, phone/voicemail, unit standards, peer discussion lists, technology support people
Facilitating		
Motivating	multimedia, guests, CDRom	internet, computer based presentations, video, video conferencing
Introducing	information, examples, experiments, workshops, video, handouts, computer presentations, guests	internet, computer based presentations, computer applications (presentation and publishing) video, video conferencing
Guiding	tutorials, discussions, mentoring	student information, support documents
Managing	co-ordinating discussions, scheduling tutorials, understanding health and safety, knowledge of other programmes	email, timetable, personal calendar, prospectus, health and safety regulations,
Disciplining [Mentoring]	policy documents, understanding health and safety, knowledge of other programmes	secure filing system, policy documents, web support documents, governmrnt
Evaluating		
Appraising	observation, note taking, formative testing, mentoring	tests, result recording system, secure filing system, video player, mentoring documents
Judging	summative testing, curriculum, viewing student’s portfolio work	written tests, video, intranet, result recording system, secure filing system
Feedback	reporting results to student and institution	MIS system, computer publishing? red pen
Supporting		
Maintaining Relationship	news, peers, management, internal communication	meetings, phone/voicemail, email, phone lists, employee handbooks, vacancy information
Marketing	programmes offered	internet intranet
Support	helpdesk, supervisor, peers	helpdesk, discussion, email, phone/voicemail
Staff Development	human resources, staff, self paced study, external study	library, computers, workbooks, other institutions, desktop video conferencing
Research	perform research in area of study	research assistants, library, statistical and bibliographic support, internet

Table 1. Teacher activity, the content used in that activity and the resources and data source required to provide the content.

The items identified in the resources and data column are becoming increasingly digital. The method of access to the resources has already changed dramatically in the last few years. Where most of the data and resources were once paper-based, they are becoming digital. Email and internet/intranet based information services are now being used where letters, facsimiles and the library where used previously. Multimedia and presentation software is

replacing overhead transparencies and epidiascopes. The internet is being used more and more and is now a very useful source of material for teachers.
As data and resources become digital, all of the content and activity potentially becomes more accessible, effective and efficient, particularly when put on an intranet.

Making Use of an Intranet

The intranet has the potential to revolutionize the way teachers work. ‘Intranets probably will become of great importance for education, not only from the point of view of instructional opportunities, but maybe even more so from the point of view of the organization and management of education’ (De Diana and Aroyo, 1999).
Intranets can be used by teachers for efficient document management and information sharing. The document sharing extends beyond the lesson planning and curriculum documents to policy documents and other institution wide information including material stored in databases.
Murray (1997) in De Diana and Aroyo, (1999) suggests that the application of intranet technology will result in better and more effective information access and will stress collaborative work and skills rather than individualistic work and skills. A more collaborative environment has the potential of reducing some workload due to economies of scale. Rather than one resource supporting one teacher, one resource could support several teachers, particularly document resources.
Education is traditionally strongly involved with documents such as text books, manuals and work books. With the intranet most, if not all, of these resources can be made available to all teachers in an institution.
Multimedia resources can be available so that any video or image can be searched for and played based on the learning moment. In some cases more resources will be available but as Negroponte (1995) points out ‘multimedia is both about new content and about looking at old content in new ways’ (p63). It is the new ways of looking at resources that creates both the possibilities and some issues for teachers.
Multimedia for the teacher encompasses all of the data involved in the delivery process. Photos, videos, audio, and interactive software along with the previously mentioned document information. Currently the vast majority of this data is kept by the individual teacher in analog format. Staff store videos, texts, and graphic material on shelves in their office space. As the move to digital resourcing continues, this information is likely to become a shared resource stored on the institution’s intranet. Such an approach offers rich possibilities for distributing and presenting study materials and other information in any desired format at any desired place (De Diana and Aroyo, 1999).

With all of the information available from any part of the network, the teacher is then able to go deeper into a topic, or branch in a different direction to match the learning readiness of the students. This ability to adapt to meet the needs of students is not new as stated here - 'It falls upon the teacher to constantly recreate the instructional process and offer a variety of choices for approaching information and tasks in order to meet the learner's ever changing, individual needs' (Smith, 1997). What is new is the potential to be able to achieve it. Negroponte (1995) puts the opportunity this way. 'In the digital world the depth/breadth problem disappears and we can expect readers and authors to move more freely between generalities and specifics. The opportunity of tell-me-more is very much part of multimedia and at the root of hypermedia' (p69). Digital media in many ways, gives teachers the tools to turn the classroom into a centre of student-directed enquiry (Department of Education Forum, 1995). As Tiffin and Rajasingham (1995) put it 'To be capable of a broad spectrum of instruction, education needs a symbiotic relationship between human and artificial memory that allows for rapid, on-demand access to information in any sensory modality about the knowledge and problems which are the subject of study' (p44).

In a non digital situation the teacher is often only able to take to a class what can be carried there. In an intranet based, digital multimedia environment, the teacher can access and present on any of the stored material on the intranet. Those resources may include video, graphics, simulations or even virtual reality and whole new opportunities arise for delivery providing new learning opportunities in a more active, flexible and more economic way.

Making Use of the Internet

All levels of education are under pressure to move toward more flexible learning. The Web allows education to go to the learner rather than the learner to their education. The concept of workplace learning and just-in-time learning are becoming more widespread, allowing students to access their learning and still practice in their own environment. Even at Primary and Secondary school level the opportunities the Internet offers for learners is enormous. Students being able to tap into all the school resources from home such as the Library, the lessons they missed, or even the video and texts they saw during the day, allow for significant educational opportunity.

Access to resources outside the institution allow for even more learning. Students are able to build up links to resources that, unlike a textbook, will continue to be current long after their study has ended. They learn how to get access to experts and resources without being hindered by distance or time. Or as Dede (1996) puts it 'A personal brain trust scattered geographically, but offering answers to immediate questions'.

So far schools and tertiary institutions have not managed to make good educational use of the Internet. According to the June 1998 IEEE Computer magazine, ‘The web is not yet suitable for learning’ (Bork, 1998). One reason mentioned is that ‘In some Universities administrators pressure the faculty to provide such courses without offering guidelines for how the internet might best be used ... Those developing courses on the Web often seem to be confused about the difference between delivering information and delivering learning’. There is a caution here for a digital campus – information does not equal learning in the same way that a library does not equal learning. As Race (1997) puts it ‘how easy it is to spend hours with textbooks without any substantial learning payoff ... people don't learn much just by reading the fine words of experts’. It comes back to managing the learning and the professional educator is still the key to achieve success for learners.

The Learning Environment

In our classrooms we are well past the notion that learning is a case of opening a learner's head and shoving information in. Within education there is a return to focussing on the learning approach more than the information. The information and literacy revolution meant that we put considerable importance on information. Now that more information is disseminated, we are putting more emphasis on learning by doing and applying rather than only reading and listening.

No fixed environment is going to be the best for every learner. Whatever the learning style, it becomes obvious that a teacher is needed to manage the learning. A teacher who can monitor and modify the environment to keep the student actively learning. ‘It falls upon the teacher to constantly recreate the instructional process and offer a variety of choices for approaching information and tasks in order to meet the learner's ever changing, individual needs’ (Smith, 1997). This is where the digital campus comes into its own allowing for rapidly changing flexible, personalised learning. In a digital or web-based delivery system, the role of teacher becomes more interactive. They become actively involved in ‘creating a learning environment, shaping web-based activities and hands on facilitation while the students are in the learning process’ (March, 1997). In a traditional environment, the competent teacher identifies the areas of learner motivation and readiness and provides structured and incidental resources, instruction, direction, feedback and support to assist learning. They analyse student progress and support the flagging student or extend the hungry learner. The wealth of digital resources provides the platform for teachers to achieve this more efficiently and effectively.

It still comes back to the teacher managing the learning environment. The teacher is the professional who has been trained to provide the best learning experience for the student.

What we need to do is keep being teachers, take the digital resources and be innovative and creative with them. ‘Online education might not be easier, and it might not cost less ... it does open up a universe of learning possibilities’ (Smith, 1997). We need to exploit the opportunities the digital information age offers. For example, ‘Virtual classrooms have a wider spectrum of peers with whom learners can communicate than any local region can offer and a broader range of teachers and mentors than any single educational institution can afford’ (Dede, 1996). What we must do is create the environment with managed content, quality collaboration and feedback that matches the learning to the learner. Everything that we know that works, apply it to Digital Learning

Making it Work

According to Negroponte (1995) the distribution of atoms is far more complex than the distribution of [digital] bits (p83). That may be true, but new tools must be developed to support the information needs of teachers and administrators in a digital environment. The first major hurdle is the importance of institutional consistency. For information to be shared effectively the format and form of the resources must be the same across the whole institution. It would be a barrier, rather than a stepping stone, if each section of an institution stored their lesson plans or resources differently. Imagine being a recently appointed teacher having to learn six or seven formats for each of the numerous pieces of data listed in table 1! All resources and data need to be presented to teachers in a way that makes the job of teaching easier not more complicated The goal needs to be that the educational multimedia applications provide a friendly and consistent user interface to present information in convenient and comprehensible formats allowing the user to create, edit, transmit receive, store, retrieve, compute and delete multiple types of information in an integrated manner (Papanreou and Adamopoulos, 1997, p208/p214).

Another issue for a digital campus is the management of all of the digital data, sometimes referred to as an ITEM system (information technology in education management) (Visscher and Wild, 1997 p266) or an ILS system (Integrated Learning System) (Underwood, 1997, p277). ‘Much has been written about how IT fits into the school curriculum and the role of IT in learning. However, the role of IT in supporting teachers and school managers to manage their work environment has received much less attention as a specific aspect of education gain through IT use’ (Visscher and Wild, 1997 p263).

Data management or knowledge management can become a dominant approach for teaching and is probably necessary as the globalization of education allows new methods of packaging and delivering educational products (Adam, et al. 1997). Education institutions need mechanisms to gather, store, manipulate, and manage knowledge in order to make the

most effective use of it. With this change to an almost totally digital resource base there needs to be adequate support to make sure that the content and ultimately the activity of teachers is useful, efficiently and effectively used. De Diana and Aroyo (1999) suggest that ‘knowledge management supported by computer tools and techniques may become daily practice as we are involved in building knowledge, storing knowledge, distributing knowledge and using knowledge. The initial set up of digital resourcing in the form of templates for lesson planning and formats for data types will have to be thought through very carefully. To establish an unwieldy, unfriendly or difficult environment will have a disastrous effect on the future of the institution. As more information is added to the system it may, in fact, dominate the institution which brings up another issue, that of change management.

In many ways, teachers will have to get involved in this process or find that their institutions have left them behind. The need for quality teaching will still be the measure of success and there are many variables involved other than the shared or stored knowledge.

It may get to the point that those excluded either through their own technophobia or access problems may feel threatened and cut off from the information necessary to achieve in their positions (O’Donovan, 1998, p8). This is where the support offered to teachers through this process is vital for the survival of the institution as emphasized by Stenerson’s comment, for both staff and students, that ‘there is seen to be a direct relationship between support and instructional effectiveness’ (1998).

There are other issues that need addressing such as the difficulties with copyright that are enormous and unlikely to be resolved easily (Whalley, 1995) and the fact that current computer screens result in reading that is approximately twenty-five percent more difficult than reading from paper (Nielson, 1996). These issues will be solved by the technology in the long term but in the short term will need to be managed carefully.

The essential point is that a digital campus will have advantages that far outweigh the disadvantages. The digital campus can ‘go with the flow’, easily adapt and evolve with the future directions in education. Whether an institution becomes more flexible in its delivery style or becomes more global and distance based, if it has taken up the digital challenge then it can provide the resourcing for teachers in almost any delivery format.

Research is still needed to establish consistency and appropriate format and forms for effective document and resource sharing across the institution. Going digital is inevitable – doing it well will take a little more planning and a lot of well supported teachers.

References

Bork, A & Britton,D (Jun 1998) The web is not yet suitable for learning, IEEE Computer, pp115-116.

Brown, S (1997) Open & distance learning: case studies from industry and education. Kogan Page, London

Charles, C. (1976) Educational psychology. The instructional endeavor. Mosby St Louis.

Clark, R. (1983) Reconsidering research on learning from media, Review of Educational Research, 53, (4), pp. 445-449. Foreword found at [WWW document, URL: http://www.educause.edu/nlii/articles/clark.html] (Accessed Feb 2000)

De Diana, I., and Aroyo, L. Knowledge management for networked learning environments: applying intelligent agents [WWW document, URL: http://projects.edte.utwente.nl/proo/italo.htm] (Accessed Feb 2000)

Dede, C. (1996) The evolution of learning devices:smart objects, information infrastructures, and shared synthetic environments. The future of networking technologies for learning. U.S. Department of Education white paper [WWW document, URL: http://www.ed.gov/Technology/Futures/dede.html] (Accessed Feb 2000)

Department of Education Forum, (1995) Technology's impact on learning [WWW document, URL: http://www.nsba.org/sbot/toolkit/tiol.html] (Accessed Feb 2000)

March, Tom. (1997) Theory and practice on integrating the web for learning. [WWW document, URL: http://www.ozline.com/learning/theory.html] (Accessed Feb 2000)

Negroponte, N. (1995) Being digital.Random House, Toronto.

Nielson, J. (1996) In defence of print. [WWW document, URL: http://www.sun.com:80/960201/columns/alertbox/](Accessed Feb 2000)

O'Donovan, T. (1998) The impact of information technology on internal communication, Education and information technologies, 3, (1) 3-26

Race P. (1997) The open learning handbook Kogan Page, London pp 42-43 see also http://www.geocities.com/ResearchTriangle/3387/pg000002.htm](Accessed Feb 2000)

Smith, Karen L. (1997) Preparing Faculty for Instructional Technology: From Education to Development to Creative Independence. CAUSE/EFFECT, 20, (3), 36-44, 48. [WWW document, URL: http://www.educause.edu/ir/library/html/cem9739.html] (Accessed Feb 2000)

Stenerson, J. F. (1998) Systems analysis and design for a successful distance education program implementation Online journal of distance learning administration,1, (2)[WWW document, URL: http://www.westga.edu/~distance/Stener12.html] (Accessed Feb 2000)

Papanreou, C. & Adamopoulos, D. (1997) A framework for the application of distributed broadband multimedia communication services in education and training. Education and Information Technologies, 2, (3) 207-218.

Tiffin, J. & Rajasingham, L. (1995) In search of the virtual class. Routledge, London.

Underwood, J . (1997) Integrated Learning systems: where does the management take place? Education and Information Technologies, 2, (4)

Visscher, A & Wild, P. (1997) The potential of information technology in support of teachers and educational managers managing their work environments. Education and Information Technologies, 2, (4), 263-274

Wellburn, E. (1996). The status of technology in the education system: a literature review. Ministry of Education, Skills and Training, British Columbia, Canada. [WWW document, URL: http://www.cln.org/lists/nuggets/EdTech_report.html] (Accessed Feb 2000)

Whalley, W. (1995) Teaching and learning on the internet. Active Learning, 2, 25-33

Further Reading

Bogdanov, D. (1999) Information & communication technologies impact on academic curricula Educational Technology & Society, 2, (1) [WWW document, URL: http://ifets.massey.ac.nz/periodical/vol_1_99/bogdanov_short_article.html] (Accessed Feb 2000)

Lane, C. (Accessed 1999). The role of technology in the systemic reform of education and training part 1. This study was conducted under a Star Schools Dissemination Grant to The Distance Learning Resource Network (DLRN) through OERI, U.S. Department of Education. [WWW document, URL: http://www.wested.org/tie/dlrn/reformtechpart1.html] (Accessed Feb 2000)

Kahn, T. M. Ph.D., and Taber Ullah,L.K. M. Ed. (accessed 1999) Learning by design: Integrating technology into the curriculum through student multimedia design projects

[WWW document, URL: http://www.newhorizons.org/tech_irlkahn.html] (Accessed Feb 2000)

Ottenberg, M. A. (1994) NCOSE-94 -- Systems engineering in a social application: Designing an evolved system of education [WWW document, URL: http://www.nhpress.com/nge/lib/papers/ncose94.html] (Accessed Feb 2000)

Siviter, D. (1999) Objects in education: from courseware widgets to virtual universities. Educational Technology & Society,2, (2) 1999 [WWW document, URL: http://ifets.massey.ac.nz/periodical/vol_2_99/siviter_article.html] (Accessed Feb 2000)

Taylor, R. G., Peltsverger, B. W. & Vasu, M. L. (1997) The nature of virtual organizations and their anticipated social and psychological impacts. Education and Information Technologies, 2, (4) 347-360