Many predictions have been made about the future of education, the demise of the classroom-based teacher, and an information technology lead revolution in schools, universities and organizations. Often it is espoused in glowing terms that push the agenda of equity and access. But what are the dangers, the impediments and costs in both human and quality terms? This paper will look at the strategic development of educational models that are designed to exploit current technological opportunities by placing the issues in context and challenging both new and traditional models.

Introduction

It is not feasible to discuss the role of multimedia in the future of education without paying some attention to the future of education (at all levels) itself. The issues are broad and varied without any evidence to date that there is a foolproof solution which educators may use. Nor is this likely to happen. Moreover, there is little sign of agreement amongst educators regarding the future structure and function of educational institutions servicing the different sectors. To predict the role of multimedia in such an uncertain climate would be ambitious to say the least. However, by adopting a suitable set of principles, educators are able to set themselves some viable targets which are less prone to the fickle changes in technology.

There is much current debate in the educational community regarding the concepts of putting education "online". A quick visit to any one of the conference listings on the Web (as in Yahoo) will reveal the extent of global investment being made in debating these subjects. Against this background it is probably useful to expect debate to move to a new level. Advocacy or opposition are meaningless without an appropriate context (This context is discussed in later sections.).

When dealing with the role of multimedia in education, it is obvious that little useful information will result from debate that becomes focused on technological ability rather than pedagogical strategy; achievement of machines, software and programmers rather than achievement of learners and mentors; and quality of technological wizardry rather than quality of learning experiences and outcomes.

That is not to say that the technological parameters and achievements are not important. They are vital, as long as you have suitable educational strategies, goals, experiences and outcomes at which they can be focused.

For the purpose of this discussion, let us simply assume that all that has been stated as technologically possible now, actually is, and that if it isn't, it will be by the time all the groundwork has been done to enable its use. Notwithstanding that, if certain achievements are not possible, there is most likely a substitute. From this perspective we are able to move the debate away from the technology and deal with the pedagogy and strategy.

Terminology

Substantial anecdotal evidence suggests that discussions about multimedia regularly become fruitless because those participating are not using the same interpretations for their words. Much of this difficulty seems unavoidable because concrete definitions of frequently used terms like multimedia, new media, online and others are constantly being challenged by usage before widespread understanding is in place. To assist clarity of communication in this paper, let me explain my usage of some of these terms. My purpose is not to stimulate debate about their absolute accuracy, but simply to clarify their meaning in this paper to the reader.

Multimedia

Frequently avoided in this discussion in favor of "interactive media." Broadly, the term describes multiple media types being accessed interactively via computer. It is frequently limited to CD-ROM (though it needn't be) and is driven more by marketing goals than utility.

Interactive media

This term is used because it is independent of the distribution mechanism (CD-ROM, World Wide Web, etc.) and carries with it the most important dimension, interactivity, without the requirement for multiple media types. There are many viable uses of interactive media that use one media type only.

Online

Used to denote material that is accessible via a computer using networks or telecommunications rather than material accessed on paper or other non-networked medium.

New media

In many cases the transition from analog to digital media domains allows greater functionality and adds new characteristics to the media type (such as image manipulation, compression, etc.). This term is used to reflect that difference.
Education Online: To be or not to be? Is that the question?

By mid-1996 there were over 2000 courses already offered on the World Wide Web ...

By 2007 there were millions of courses offered on the World Wide Web.

There is little doubt that a significant percentage of educational activity will take place online. By mid-1996 there were over 2000 courses already offered on the World Wide Web (Tapscott, 1996). That number has been growing steadily as strategic plans of universities and educational governance bodies worldwide have been pushing for alternative solutions to dwindling education budgets. James R. Mingle, in his forward to the CAUSE publication Reengineering Teaching and Learning in Higher Education: Sheltered Groves, Camelot, Windmills, and Malls (1993), describes the dilemma very effectively:

Meanwhile, institutions struggle to meet their current commitments to "quality." Citing a long tradition, a structure built around bricks and mortar and a labor-intensive production process, institutions face what on the surface appears to be a difficult choice: Cut access or lower quality. It is an artificial choice, however. "Doing less with less" is a prescription for irrelevance. If higher education adopts this strategy, it will end the decade a smaller and less socially relevant institution. Our clients - whether they be students or employers or taxpayers - will voice their anger in destructive ways. Like the corporate sector, our only responsible alternative is to "do more with less" by restructuring our enterprise. This means virtually turning the enterprise on its head to find a better, cheaper, more effective way to deliver education, service, and research products.

The Gartner Group has predicted that "By 2001, more than 75% of traditional US colleges and universities will use distance-learning technologies and techniques in one or more 'traditional' academic programs" and cite a 0.9 probability (Zastrocky, 1997). In addition, Dolence and Norris (1995) point out that the growth in demand for new learning opportunities resulting from the combined factors of work force growth and the requirements for lifelong learning in an information driven society will create a demand that cannot be resourced through traditional methods. Such methods are also unlikely to offer the best response to need. The evidence suggests overwhelmingly that we should not be questioning if the transition should take place, but rather that we should debate more pertinent questions of who, how, how much and where. Who should be educating/training whom? How should it be done? How much education/training should be done this way? Where should these new learning opportunities take place? Similar to all other discussions in this domain, there are no simple answers. There are also likely to be many battles concerning the ownership of education and training (Zastrocky, 1997; Tapscott, 1996; Norris, 1996) before clear models emerge. To understand these issues it is necessary to examine some of the driving forces behind the change.

While the financial imperative for the change is often cited, it is not the only driving force. Other contributing factors include: the demand for greater flexibility from individuals and organizations, the removal of geographically relevant boundaries to the individual through the World Wide Web, impacts of the digital economy, competition with business for the role of educator, and demands from government, enterprise and individuals for an education system that promotes lifelong learning from its earliest stages. These themes are not only present in all the cited literature, but within many other sources as well. Tapscott (1996) advocates that as a result of the trends indicated as we transition to the digital economy "a far-reaching rethinking of education and, more broadly, learning and the relationship between working, learning and daily life as a consumer" is required. Reading between the work of Tapscott and that of Dolence and Norris (1995) the following picture emerges.

As we transition from an industrial age into the information age, a primarily knowledge-driven economy will create workplaces in which working and learning are increasingly the same activity. In this model, however, the demand for learning as part of a lifelong challenge will in turn create a demand in the work force for education that will exceed the capability of traditional institutions to deliver. This creates opportunity for new intermediaries and learning agents that are not part of the traditional, formal education system. Such opportunities are likely to be enhanced by the comparatively slow rate of change within colleges and universities. Dolence and Norris further caution traditional education that "Just because we are changing a great deal does not mean we are transforming." Tapscott's sixth emergent theme of learning in the digital economy describes the mechanism and product of such a transformation. "The new media can transform education, creating a working-learning infrastructure for the digital economy."

Therefore, when examining the driving forces behind the required transformation, interactive media can be seen as both a contributing factor in creation of the demand, and at the same time, an important part of the solution that needs to be employed.
The Problem is the Solution

No matter how one chooses to read the above subheading in the context of this paper, the meaning is both true and universal. While more time has been spent in defining the issues in terms of higher education and business, the underlying themes of threat, opportunity, and transformational challenge are just as relevant for all educational sectors. The background so far, however, now gives us a foundation to discuss the potential future of interactive media in education.

As our attention is focused on this issue, it is important to clearly understand the type of technology with which we are dealing. Although many descriptions and labels are assigned to interactive media, the most useful is that of communication tool. Technology-based descriptions may assist in describing the technical capabilities of the medium, but do not provide any fundamental understanding of the nature of change taking place now, why it is happening, or what is likely to be required in the future. The communication we are concerned with takes place between people. More importantly, they are individuals with individual requirements, and it is in this domain that interactive media sets itself apart from other communication media. Where previously communication to groups of individuals required generalization of content with no discrimination based on personal knowledge, experience or preference, it is now possible for the source of communication to provide choice to the target audience, thereby affording a degree of individualization of the content. It is also possible, depending on the type of interactive tool being used, to provide mechanisms for spontaneous feedback to individuals or groups. This is most commonly implemented in a World Wide Web environment, though not exclusively.

As stated in the introduction, a vision of the educational model most desirable in the future is a necessary prerequisite to any discussion of the role of interactive media therein. Given the information dealt with so far, certain aspects are clear. The determination of these issues is not the sole domain of any educational sector, solutions will be learner driven, and viable educational institutions in the future will have transformed their approach to access, equity and process.

In a 1993 report to the Governor and General Assembly of Virginia titled "The Continuum of Education", their State Council of Higher Education described the progress through post-secondary education in the following manner:

- The time it takes to earn the degree in education today is based on an increasingly outdated model: so many hours in a classroom entitle a student to a receipt in the form of a grade, and so many receipts can be redeemed for a credential in the form of a degree... [This] model guarantees little about what the student will know or be able to do, once that degree is in hand. Education today is just beginning to think of shifting the basis of certification from time served to skills and knowledge obtained.

The notion of "time served" will probably align well with the feelings that many students retain as they leave their institution. In response to the issues of temporal and geographic flexibility, institutions are caught in a rush to put courses "online" (or at least appear to have done so) though many have not first questioned the possibilities afforded by the medium, nor have they sought to understand the human issues in the process. The goal of interactive media in education should not be to force learners into a different kind of mold, but rather to remove the mold altogether. It should be a chance to liberate individuals through exploration and construction that produce learning outcomes.

A Vision for the Future

It is not a forgone conclusion in the higher education sector that all learning should be facilitated in an online environment, and it is certainly not true of the role of technology in primary or secondary education. It is unlikely that all learning activities should be technology mediated in some way. Clear discrimination of what learning tasks require people to be in the same room at the same time is an important research question. The Virginia report cited earlier offers a brief description of what elements may need to be present in the future.

In this new paradigm, some students might take two years to develop what the faculty agreed were baccalaureate-level capacities, and others might take seven. Some of that time would be spent in a classroom, some would be spent in front of a computer or a television, some would be spent in private study, some would be spent in team or individual problem solving, and some would be spent in conversation with faculty or other students. To make this new model work, education has to come to better agreement about what kinds and levels of capacities it expects for each level of credential, and it has to become more sophisticated about measuring them.

In this model, technology does not exclude human interaction in a face-to-face environment. More importantly for this discussion, the converse is also true. For the sake of completeness, one should also add learning in the workplace to the Virginia model. To facilitate communication about one such model, I have named it Flexible, Location-independent Education (FLiE).

When transforming the current educational paradigm into a new model that will promote learning activities that are independent of time and place, it is necessary to consider the infrastructure that allows the current model to function. Much of this infrastructure poses
complex problems. Libraries, arts and cultural centres, learner support systems and the like will all need to be accessible and integrated into the model. Additional references like online encyclopedias and similar resources must form part of the toolset to which learners have access.

Groups of universities like The Big Ten in the United States have negotiated bulk access rights to online resources like the Encyclopedia Britannica and others access the Oxford Dictionary, thereby using some existing solutions to resolve learner needs. This is not unique to these educational groups, but it is indicative of the type of collaboration that will begin to permeate activities that fit the new paradigm. Collaboration for robust educational outcomes has spawned activities like the Western Governors' University and the Michigan Virtual Automotive College.

The role of interactive media in such a model where learning is part of schooling, working or just living, is that of communication tool, as stated earlier. The requirement of such a model, is for such communication to be ubiquitous. This will be enabled by the new technologies. Whether they are WebTVs or NetPCs or some other new technology, is not the major issue provided they function on open systems that pose the fewest possible impediments to access.

New creative learning tasks can be explored within all sectors of education. Lemke (1993), in his discussion of the future of education, raised the notion of a new literacy that would succeed print literacy. He did not claim the demise of the written language, but rather a literacy made up of "the set of skills needed to locate and organize information, for ourselves and others, in cyberspace."

This casual use and authoring of interactive media will be made accessible to ever widening sectors of society through the spread of low cost intelligent devices and authoring tools that are greatly simplified. This will not reduce the demand for professionally produced content. Just as purchasing a pen does not make one a writer, there will always be a difference between interactive media that is professionally produced and distributed, but the transition in technology to enable anyone to author should be welcomed by educators for the potential it offers them and their students.

Conclusion
The future of interactive media in education, when it is separated from the issues of technology that tend to mystify discussion and place it firmly in the sole grasp of those that are highly technologically capable, is that of communication tool. Its dimensions and capabilities will evolve and expand at the same time as the potential to author becomes more widely accessible. The potential for students of all ages to author as part of a creative educational programme that is based on achievement of goals and competencies rather than time served will assist educators to shift from teacher to facilitator and mentor. Interactive communication tools will transform our capability to embrace an educational paradigm that deals with learning as a vital, fulfilling, and continuing part of life at home and in the workplace as well as within educational institutions.

Bibliography

About the Author
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http://orac.art.rmit.edu.au/~i-n mc/FLiE/