IRRODL

THE INTERNATIONAL
REVIEW OF RESEARCH IN
OPEN AND DISTANCE LEARNING

Vol 2 No 1

July 2001

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (July, 2001)

Editorial: Global Diversity of Distance Education

Peter Cookson
Athabasca University

In a panel presentation at the recent International Council for Open and Distance Education (ICDE) world conference in Dusseldorf, Germany, I had the opportunity to explain the unique role and mission of *International Review of Research in Open and Distance Learning* (*IRRODL*) vis-à-vis our more established sister journals: *Open Praxis*, *Open Learning*, *Journal of Distance Education*, *Distance Education*, and *American Journal of Distance Education*. Although all of these journals share a common commitment to the advancement of the knowledge and practice of open and distance education, each one has a unique role and mission. As the non-refereed international publication of ICDE, *Open Praxis* focuses primarily on distance education practice worldwide. As a refereed journal based at the Open University (UK), *Open Learning* regularly publishes articles relating to other parts of the world, although its primary emphasis is distance education theory, research, and practice with a British accent. As the official publication of the Canadian Association of Distance Education, *Journal of Distance Education* understandably focuses on Canadian distance education, although a significant number of articles in each issue relate to other parts of the world. As another example of an official publication of a national association, (Open and Distance Learning Association of Australia), *Distance Education* features several articles in most issues describing theory, research and/or practice in other countries. As is consonant with the geographical scope explicit in its title, *American Journal of Distance Education* emphasizes North American contributions to the theory, research and practice of distance education in North America, although contributions appear occasionally from other parts of the globe.

In contrast to the respective national and regional domains of these well established print journals, *IRRODL* is dedicated to the advancement and diffusion of knowledge relating to the theory, research, and practice of open and distance education in all nations and regions throughout the world. In soliciting manuscripts for "theme issues" and in receiving unsolicited manuscripts for "open issues," no single country or area of the world is given priority over another. Even when articles focus on experience gained in one country or region of the world, it is anticipated that they will contain "lessons" or "insights" of relevance to distance educators in other countries and regions. Our commitment is to have our geographically diverse content reflect the full diversity of global perspectives, not just those of Anglophone and Francophone North America. Our sponsor, Athabasca University, as Canada's Open University, is dedicated to the removal of barriers to access to education. With subscriptions free of cost for anyone connected to the Internet anywhere in the world, *IRRODL* is likewise

dedicated to the removal of barriers experienced by many distance educators, in both industrialized and non-industrialized countries, who cannot afford paid subscription fees or who otherwise do not have convenient access to a library able to pay the commercial subscription fees normally charged by academic refereed journals. By removing the economic constraints on access to subscriptions, the free subscription policy of *IRRODL* parallels the growing popular movement to favor open source software that eschews the global hegemony of commercial software.

This issue reflects the global diversity of knowledge about international distance education to which this journal is dedicated.

In their article, Jim Taylor and Peter Swannell describe how the University of Southern Queensland marked and followed a course of intentional evolution to become a *dual mode* (campus and distance teaching) university. Internal organizational structures and procedures were deliberately created and amended in order to reach out beyond the single Australian state to develop a unique higher education market niche, via the Internet, as a world class international distance education university. Taylor and Swannell's analysis demonstrates the axiom that advancement of distance education requires far more than applications of information and communications technologies.

In his article, Lorenzo García Aretio recounts the history of technologies that have been adopted by the National Distance Education University (UNED) in Spain since its founding in 1972. In turn, print, radio and audio recordings, television and video recordings, online applications via the Internet and cellular phones – each of these is described along with their respective weaknesses and strengths. This article will be of great interest to distance educators who are considering the full range of distance education technologies that are possible as well as those that are only now emerging.

Next, Insung Jung describes what appears to be a successful national teacher training program, nationwide in scope in Korea, delivered via the Internet. Jung's report on the evaluation of the Cyber Teacher Training Center analyzes the major results of online teacher training, and makes recommendations for improving the quality of such initiatives. In terms of learning achieved and applied, if not in terms of being less expensive, this experience demonstrates a cost-effective model and offers valuable lessons for countries interested in upgrading the professional qualifications of teachers.

Terry Evans, Elizabeth Stacey, and Karen Tregenza continue the theme of distance education technologies with their account of an application of technology that fell far short of its expectations – not because the technology did not work, but because the organizational structures and procedures needed to accompany and complement the instructional delivery were not consistently and adequately put in place. This article reminds us of the constant need for comprehensive program planning of all aspects of educational programs. Attention must be

given to adequate preparation of the learners and other details associated with participation – not merely to aspects directly related to the instructional delivery.

One of the technological developments now emerging that potentially will dramatically change the landscape of online distance education curricula is the innovation of *learning objects*, the focus of Stephen Downes' article. To ensure an international perspective on the topic of this technology, we asked Muain Jamlan, one of *IRRODL*'s Consulting Editors, and two of our international professors at Athabasca University, Osama Shata and Oscar Lin to share their perspectives on the meaning of learning objects for distance educators in their respective native countries, Bahrain, Egypt and China.

In the final article of this issue, Pat Fahy, Gail Crawford, and Mohamed Ally report on their continuing progress in developing an instrument distance educators can use to measure different dimensions of online teaching-learning interactions. As this instrument becomes increasingly refined, it may become or lead to development of a reliable, valid device that will enable distance educators to test the effects of specific interventions designed to increase the effectiveness of online teaching and learning.

In the "Notes" sections that follow the refereed section of this issue appear news and announcements of distance education happenings and developments in different parts of the world. We hope that distance educators around the world will regard these sections as an international notice board to share with colleagues in different countries what is happening in their countries and regions.

Our next issue, Vol. 2, No. 2, will again highlight the fact that *IRRODL* is a journal for distance educators around the world. The theme will be the hybridization campus universities are experiencing as they become dual mode institutions, creating and expanding their distance education courses and programs. With more than 20 case studies from institutions, countries, and regions, it will be a virtual treasure trove of experiences and insights of interest not only to distance educators, but also to higher educators in general who are grappling with the worldwide phenomenon of online learning and teaching.

The following issue, Vol. 3, No. 1 will be another "open issue." Remembering that our first priority is international diversity, we invite distance educators anywhere to submit manuscripts on any topic related to open and distance teaching theory, research and practice.

We trust you will find the articles in this issue, Vol. 2, No. 1, to be of value. As a relative newcomer in the community of distance education journals, we welcome your suggestions for improvement, as well as your manuscripts and contributions to our "Notes" sections. We look forward to hearing from you.

Peter S. Cookson, Editor

Athabasca University – Canada's Open University
July 2001

Citation Format

Cookson, Peter (July, 2001) Editorial: Global Diversity of Distance Education. *International Review of Research in Open and Distance Learning*: 2, 1.
http://www.icaap.org/iuicode?149.2.1.9

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (2001)

USQ: An E-university For An E-world

James Taylor
University of Southern Queensland

Peter Swannell
University of Southern Queensland

Abstract

The rapid rate of technological change and the rapidly growing number of institutions now embarking on Internet-based delivery means that more institutions are involved in distance education than at any other time in history. As institutions throughout the world increasingly offer courses via the Internet, there will emerge a global higher education economy in which institutions will face global competition for students, especially those involved in continuing professional education and lifelong learning. The emergence of the global higher education economy could well act as a catalyst for overcoming the institutional inertia that typifies the organisational culture of many universities. This transition from the Industrial to the Information Age was encapsulated by Dolence and Norris (1995), who argued that to survive organisations would need to change from rigid, formula driven entities to organisations that were "fast, flexible, and fluid" (p. 31) – adjectives not typically used to describe the salient features of universities! This case study outlines the response of a well-established dual mode institution, The University of Southern Queensland (USQ), to the "gales of creative destruction" (Schumpeter, 1950, p. 84) that currently beset higher education institutions throughout the world.

Technological Development and Globalisatio

Distance education operations have evolved through the following four generations (Taylor, 1995): first, the Correspondence Model based on print technology; second, the Multimedia Model based on print, audio and video technologies; third, the Telelearning Model, based on applications of telecommunications technologies to provide opportunities for synchronous communication; and fourth, the Flexible Learning Model based on online delivery via the Internet (Table 1).

While the first generation has a long history, it is generally accepted that most of the technology enhanced distance learning developments have occurred over the past twenty-five years. Indeed, it is fair to say that the fourth generation of distance education is only just beginning to have an impact in many contexts, due partly to the rate of institutional development in higher education,

which tends to be stymied by a predominantly conservative ethos and associated mindsets.

Until recently, many on-campus educators have largely ignored the new technologies, with the process of face-to-face conventional teaching regarded as patently superior to all other forms of teaching. While distance educators have striven to overcome the tyranny of distance, the perceived constraints associated with limited opportunities for face-to-face interaction, on-campus educators appear to be basically satisfied with traditional approaches. It is in this context of institutional inertia that the senior managers and leaders of educational institutions have been bedevilled by complex decision making structures. The typical collegiate decision making process often entails a sequence of deliberation, documentation, reflection, review and refinement through consideration by a series of learned groups often including a working party, at least one committee, several faculty boards, the Academic Board, the Vice-Chancellor's Executive Committee and perhaps the University Council. This modus operandi for management is no longer sustainable in an environment where the changing scale and scope of technological change is greater than ever. Today, change is the only constant.

As more and more institutions embrace Internet-based delivery (see [http://www.dlcoursefinder.com] for examples of courses and providers) competition for students is becoming increasingly competitive on a global scale. In effect, a global lifelong learning economy is emerging. The result is that higher education will become increasingly market driven, such that in the near future institutional success will depend primarily on students' perceptions of flexibility of access, quality of service and value for money. Each institution has unique characteristics and will, of course, respond to these challenges in its own way. The individual response of any institution will be a function of its history, present organisational culture and the beliefs and personalities of current institutional leaders. The following exemplary case study of the University of Southern Queensland (USQ) highlights the need for institutional leaders to take a proactive stance and to generate an organisational development strategy appropriate to the ethos of their particular institution.

USQ: Structures, Culture and Processes

Established by the Australian Federal Government in 1967, to provide on-campus higher education opportunities primarily for residents of the Darling Downs region of Southern Queensland, The University of Southern Queensland (USQ) became a dual mode institution when it initiated distance education delivery in 1977. Twenty-three years later, the USQ has over 13,000 distance education students studying off-campus in over 60 countries, and over 5,000 students studying on-campus in Toowoomba.

Organisational Structure

An overview of the organisational structure of the University is presented in Figure 1.

Student Profile

The successful transition to dual mode operations is evident in the current overview of the geographical location of USQ's Australian students (Table 2) and USQ's international students offshore (Table 3).

USQ has more international students studying offshore than any other Australian university. Further, international students studying on-campus constitute more than 20% of enrolments.

The current ratio of off-campus to on-campus students expressed as a percentage (74%: 26%) is a manifestation of USQ's vision "to be a leader in distance and international education" (USQ, 1999). The emphasis on distance education has had a significant impact on the student profile, with a much smaller percentage of school leavers and a larger group of mature age students (Table 4) exemplifying the trend towards lifelong learning.

Academic Programs/Enrolments/Online Access

The initial transition to dual mode status in 1977 was stimulated by a move to provide professional upgrading opportunities for teachers. However, the relatively rapid transition to dual mode is now reflected by the fact that all six Faculties are involved in the offering of 130 degree programs via the distance education mode. Further, 31 of these programs are now available online [http://www.usqonline.com.au]. Further, all students have online access to a range of services including discussion groups, library services, supplementary instructional resources incorporating links to relevant sites and a variety of student administration functions, including access to personal records of enrolment and academic results. In effect, all 18,000+ USQ students (whether on- or off-campus) have access to a range of online services, whereas approximately 2,000 of these choose to study solely online. When the USQ*Online* initiative on the NextEd platform was launched in Semester 2 (1999), there was a total of 398 students operating solely online, and 40 of these were new students. In the following four semesters, USQ*Online* attracted new students according to the following pattern, increasing from 40 to 69, then to 167, then to 293, and finally to 285. The latter number for Semester 3 (2000) entails study from November to February, a semester that is never as popular as the "mainstream" semesters. To date, the highest number of students operating solely online was 2,263 in

Semester 1 (2000). Further, almost without exception the response of these students to the e-learning experience has been universally positive.

Organisational Development: Towards An e-University

Since embarking on dual mode operations in 1977, the resource allocation model at USQ has enabled the Distance Education Centre (DEC) to emerge as a major cost centre, currently receiving more funding than all but one of the six faculties. An overview of the DEC infrastructure is provided in Figure 2.

Although a detailed description of the role of the various DEC sections is beyond the scope of the present paper (for more detail, see Taylor, 1997), the essence of the USQ approach is encapsulated in the overview of the multi-disciplinary team model to courseware design and development presented in Figure 3.

In the initial phase of the multi-disciplinary unit team process, the content specialists work with an instructional designer on the development of an instructional blueprint for the courseware. This process leads to the development of a sample courseware module at which time access to the relevant technical specialists (graphic designers, audio/video producers, etc.) in the team is available as required. Upon completion of the sample module, the pedagogical approach is reviewed and possibly revised. The refined sample module then acts as a model for the development of the remaining courseware. While this process is systematic and leads to an efficient use of time and resources, it accommodates a wide range of pedagogical approaches appropriate to different disciplines and various student target audiences. The systemic management of the courseware design, development, production and distribution of the courseware has been incorporated into a quality assurance initiative.

In 1997, under the auspices of the International Standards Organisation, the DEC achieved ISO 9001 quality accreditation for the following processes:

- Courseware design and development
- Project management
- Audio and video production
- Photographic services
- Distance learning evaluation
- Examinations preparation and production
- Telecommunications support
- Microcomputer support

- Systems administration
- Courseware production and distribution
- Multimedia development
- Graphics design
- Instructional design research
- Electronic publishing
- Student support systems
- Technical consultation, installation and repairs
- Network design and maintenance
- Organisational management

The allocation of time and resources to achieve ISO 9001 accreditation is symptomatic of the need for USQ, a relatively small, relatively new, regional university, to differentiate itself from the competition emerging in the global higher education economy, which threatens USQ's distance education market. It was also stimulated by an emerging trend whereby an increasing number of business organizations and government departments require ISO accreditation as a prerequisite to any business partnership. Further, the achievement and maintenance of ISO accreditation reflects USQ's commitment to continuous improvement and organisational development as a corporate management strategy. Fortunately, its size, ethos and history mean that USQ does not face some of the potentially insurmountable challenges to change of some of the long established traditional universities. Nevertheless, the effective integration and management of online delivery is the greatest organisational development challenge facing USQ.

Critical Initiative

The initial impetus for the move to online delivery occurred in 1995 when USQ was the only Australian university to be awarded an AT&T Global Learning Initiative research grant (U.S. $50,000). This research grant funded the development of the online delivery of the University's Graduate Certificate in Open and Distance Learning, the first complete program to be offered totally online by an Australian university. In 1996, the quality of the program was recognised by a major review (independently commissioned by IDP Education Australia) of *Technology in International Education*, which cited the USQ Graduate Certificate in Open and Distance Learning as, "state-of-the-art in international delivery, curriculum content and form" (IDP, 1996). Subsequently, it was selected for a showcase of best practice in leading edge educational technologies

at the 13th Commonwealth Conference of Education Ministers in Gaborone, Botswana, 1996. The success of the initial online program, and the gradual expansion of the development of other online programs, including the Master of Professional Accounting, led to a major strategic, organisational development initiative.

In 1997, recognising that the rate of development was being somewhat stymied by lack of resources, the USQ senior management executive team, with University Council approval, opted to change the liquidity ratio of University operations in order to commit $3,000,000 to the development of USQ*Online* [http://www.usqonline.com.au]. Through the business arm of the University, the USQ*Online* initiative includes a major investment in a Hong Kong based company, NextEd, that provides a virtual campus service, not only to USQ, but also to other institutions throughout the world. USQ not only became a foundation shareholder of NextEd, but also became a major customer of the company. Such a strategy not only enabled USQ to gain access to more resources, but also to a wider range of technical and business expertise. USQ's relationship with NextEd has attracted considerable media attention. For example, a major article appeared recently in Forbes Global (Johnstone, 2000). This effective outsourcing of USQ's international virtual campus services also led to the establishment of a number of management committees (Figure 4), which are based primarily on available expertise rather than on representation of each of the major cost centres.

From an organisational development perspective, the Vice-Chancellor's Committee is responsible for: (a) determining the range of courses to be offered online, (b) the associated decisions on resource allocation and (c) the establishment of the management structure aimed at implementing the USQ*Online* initiative. The Online Teaching Management Committee (OTMC) is essentially concerned with implementing the online teaching programs and ensuring the appropriate professional development of staff. This is coordinated through a series of Faculty Focus Groups, supported by the Staff and Student Support team. This latter team involves staff from the DEC, the Library, Student Services, the Office of Preparatory and Continuing Studies and Information Technology Services, who were previously involved only in various forms of discrete staff training programs. Further, under the auspices of the OTMC, the Research and Evaluation Focus Group is attempting to coordinate investigations into various aspects of the online teaching/learning environment on an institution-wide basis. Such coordination and integration of previously relatively discrete activities is indicative of the emerging more fluid organisational structure of USQ.

The addition of the online mode of delivery of courses previously offered only on-campus and through "traditional" distance education approaches was managed through the well-established unit team process (Figure 3). In many ways, it was a natural step for USQ based on a team teaching ethos established over the past twenty years. It was, of course, not without its pedagogical and logistical chal-

lenges, with the standard unit-based team approach being supplemented by a series of pedagogically focussed workshops offered to each discipline group, and a series of hands on training sessions to familiarise staff with the features of the delivery platform. A detailed account of the pedagogical issues arising in the addition of the online mode has been published (Postle & Sturman, 2000). To date USQ has loaded 169 single units/courses, which gain credit towards 31 of the University's award programs. While there has been healthy debate of numerous issues, including workloads, download times, evaluation, cost-effectiveness, online pedagogy and marketing, to name but a few, practically no one has questioned the University's strategic commitment to the development of a significant e-learning capacity

The Online Systems Management Committee (OSMC) is focussing primarily on the technical interface between the outsourced virtual campus software and USQ's existing management information systems, and the associated review of course regulations. Given course accreditation considerations and the legacy of Government legislation and reporting requirements, this task is far from simple. As well as academic and legislative considerations, the work of the OSMC incorporates the establishment of effective technical interfaces between the outsourced virtual campus platform and existing student record systems, electronic library services and financial systems. The OSMC is essentially working within the existing policy and regulatory structures of the University, but with the ultimate goal of enhancing student choice and flexibility. To date, however, the only major initiative that has emanated from the OSMC is a review of financial issues, including course fees and associated refund policies.

The Online Marketing Management Committee (OMMC) challenged the conventional role of academic staff by involving the teaching staff in decisions about marketing through the establishment of an approach based on product managers. With the guidance of the OMMC, which consisted of marketing specialists from the Faculty of Business, the Director of Marketing and Public Affairs, the Marketing Manager of the International Education Centre, the Corporate Relations Manager, and the Commercial Planning Officer (a new position), product managers nominated by the faculties began working on the creation of business plans for each online program. In this task, they were supported by the Commercial Planning Officer and the USQ Account Manager of our commercial partner.

Decisions emanating from the OMMC and endorsed by VCC have since led to the establishment of the USQ*Online* Support Centre, aimed at engendering effective and timely responsiveness to enquiries from prospective students and monitoring the efficacy of particular marketing activities. The involvement of staff in the commercial aspects of the online initiative is further reflected in the endorsement of another OMMC proposal to establish an incentive scheme, with 2% of gross revenue being distributed as follows: 1% to the teaching team at the unit/course level, and 1% into a bonus pool for all members of the USQ staff

establishment, irrespective of their specific roles, or even their direct involvement in online activities. Yet another initiative stemming from the activities of the OMMC will provide staff with the opportunity to become part of USQ*Net* [http://www.usqonline.com.au], an international network of marketing representatives, who are compensated financially for the recruitment of new students for USQ*Online*. Such initiatives are a further indication of the more fluid organizational structure and flexible management processes that are emerging to support USQ*Online*.

The increasingly fluid and flexible nature of USQ is also reflected in the restructuring in January 2000 of the University's marketing function, followed by the recent (June 2000) replacement of the OMMC with the Marketing and Media Co-ordination Committee. The need for a more co-ordinated corporate approach to marketing was recognised by the OMMC, which generated a proposal (subsequently endorsed by VCC) for the establishment of the new Committee, which includes the dean of each faculty. This new initiative is aimed at promoting a corporate approach to the projection of the USQ brand name. The new marketing management structure reflects the University's growing commitment to the strategic importance of e-learning. Further evidence of such a commitment was the establishment (at the behest of the Vice-Chancellor) of a new executive management position Deputy Vice-Chancellor (Global Learning Services) in June 2000. This new position, which entails oversight of the Distance Education Centre, the Library and Information Technology Services, highlights the growing importance of the need to generate an effective synergy between information, pedagogy and technology in the increasingly competitive environment of global higher education.

The organisational development process is, however, not simply a matter of creating new committees and working groups but entails leadership at all levels, not least from the senior management. In laying the foundation for the USQ*Online* initiative, the Vice-Chancellor and other senior managers addressed a series of University Assemblies and subsequently, a series of meetings were held with each of the faculties and major cost centres to promote the potential strategic benefits to the University. The Deans of the Faculties and other managers of the major cost centres are supporting developments at faculty board meetings and thereby enabling all staff to be associated with the strategic planning process and ultimately the ownership of USQ*Online*.

Conclusion

The USQ approach is unashamedly proactive and based on the belief that the Internet is, in Schumpeter's (1950) terms, a revolution that is generating "gales of creative destruction" (p. 84). Rather than keeping the Internet at arm's length through the development of an attractive Web site, USQ has embraced

the new technology, and is attempting a fundamental rethinking and rewiring of its structure and infrastructure as it strives to become an e-university for the rapidly emerging e-world. While the USQ approach is clearly a function of the specific institutional characteristics and unique personalities that contribute to the ethos of a particular institution, as an exemplary case study it is primarily significant in highlighting the fact that to effect the qualitative change necessary to accommodate the online teaching-learning process, it is also necessary to generate qualitatively different organisational infrastructures.

In many universities the development of online initiatives are not systemic, but are often random acts of innovation, initiated by risk-taking individuals. In contrast, the implementation of web-based applications at USQ is strategically planned, systematically integrated and institutionally comprehensive. This organisational culture evolved over many years, and is essentially a reflection of one of USQ's guiding objectives: "To be a leader in flexible learning and the use of communication and information technologies in a tertiary education context" (USQ, 1999). Recognition of USQ's achievements in these endeavours occurred recently at a presentation made by the Prime Minister of the Good Universities Guides Award of Australia's University of the Year 2000-2001 for criteria focussed on developing the e-University.

The USQ case study demonstrates that technology alone is not sufficient to engender much needed organisational development. The opportunity for institutional leaders is to adopt a proactive stance, and to generate an organisational development strategy appropriate to the ethos of their particular institution, which will lead to the new technologies becoming a structurally integrated part of practically every aspect of institutional operations. If the power of the increasing array of new technologies is to be exploited in higher education, an appropriate organisational development strategy needs to de devised and implemented to bring about necessary institutional reconstruction. Such reconstruction is difficult; learning to use new technology effectively is difficult; both take time and considerable human and physical resources; both demand sustained human intervention. Therein lies the challenge to the leaders and managers of higher education institutions who are serious about playing a significant role in the global higher education economy of the 21st century.

References

Dolence, M. G. & Norris, D. M. (1995). *Transforming higher education: A vision for learning in the 21st century*. Ann Arbor, MI: Society for College and University Planning (SCUP).

IDP Education Australia (1996). *Technology in international education*. (Research Paper). Canberra, Australia: IDP Education Australia.

Johnstone, B. (2000). Ivory servers. *Forbes Global, 3*(25), 138-141.

Postle, G. D & Sturman, A. (2000, June). *Models of online learning as a factor in online education: An Australian case study*. Keynote address presented at the Society for Research in Higher Education Conference, Stirling, UK.

Schumpeter, J. A. (1950). *Capitalism, socialism and democracy* (3rd ed.). New York: Harper and Row.

Taylor, J. C. (1995). Distance education technologies: The fourth generation. *Australian Journal of Educational Technology, 11*(2), 1-7.

Taylor, J. C. (1997). A dual mode model of distance education: The University of Southern Queensland. *Open Praxis, 2*, 9-13.

USQ (1999). *USQ: Who, why, what, how: An overview of USQ's present status and future directions*. Retrieved December 21, 2000: [http://www.usq.edu.au/StudAdmin/STATS/PS/USQ-SD.htm].

Citation Format

Taylor, James C. & Swannell, Peter (2001) USQ: An E-university For An E-world. *International Review of Research in Open and Distance Learning*: 2, 1.
http://www.icaap.org/iuicode?149.2.1.1

Table1: Models of Distance Education – A Conceptual Framework (Below/End)

Models of Distance Education and Associated Delivery Technologies	Characteristics of Delivery Technologies				
	Flexibility			Highly Refined Materials	Advanced Interactive Delivery
	Time	Place	Pace		
First Generation: The Correspondence Model					
▪ Print	Yes	Yes	Yes	Yes	No
Second Generation: The Multimedia Model					
▪ Print	Yes	Yes	Yes	Yes	No
▪ Audiotape	Yes	Yes	Yes	Yes	No
▪ Videotape	Yes	Yes	Yes	Yes	No
▪ Computer-based learning (e.g. CML/CAL)	Yes	Yes	Yes	Yes	Yes
▪ Interactive video (disk and tape)	Yes	Yes	Yes	Yes	Yes
Third Generation: The Telelearning Model					
▪ Audiotele conferencing	No	No	No	No	Yes
▪ Video conferencing	No	No	No	No	Yes
▪ Audiographic Communication	No	No	No	Yes	Yes
▪ Broadcast TV/Radio and Audiotele conferencing	No	No	No	Yes	Yes
Fourth Generation: The Flexible Learning Model					
▪ Interactive multimedia (IMM)	Yes	Yes	Yes	Yes	Yes
▪ Internet-based access to WWW resources	Yes	Yes	Yes	Yes	Yes
▪ Computer mediated communication	Yes	Yes	Yes	No	Yes

Figure 1: Organisational Structure of USQ (Below/End)

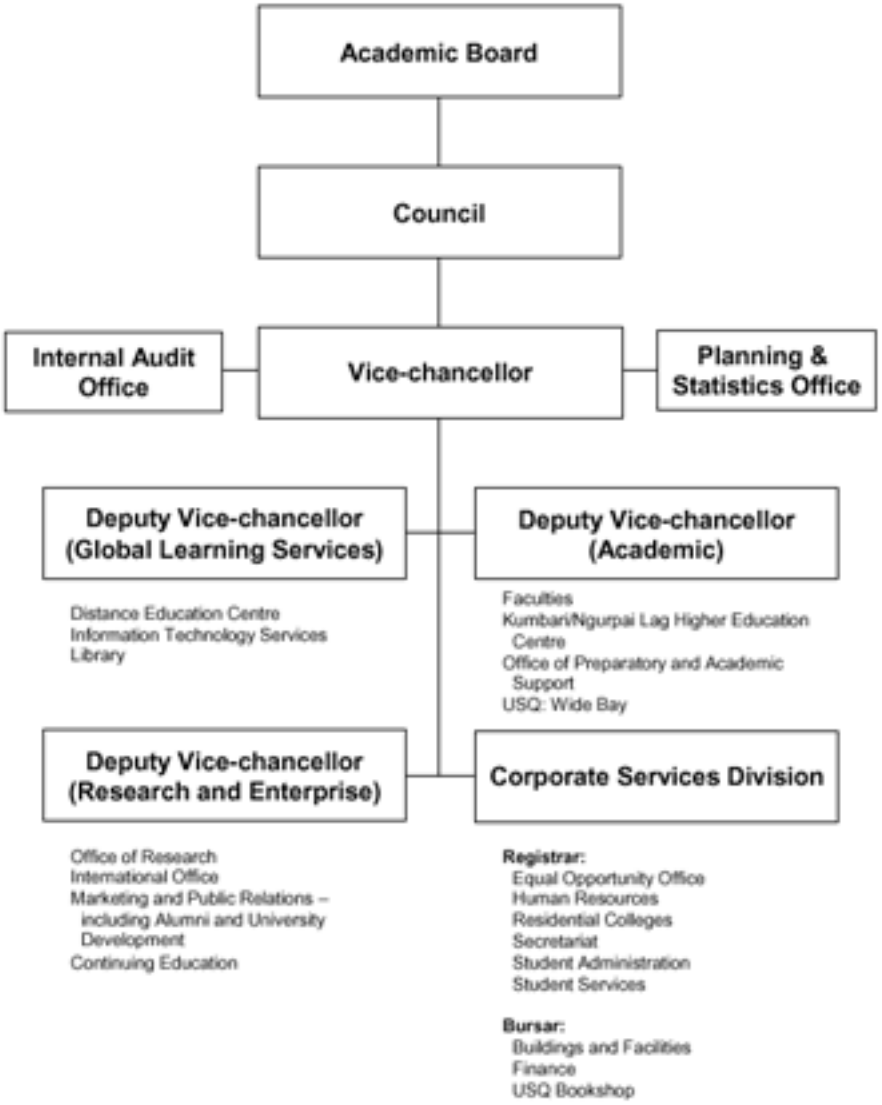


Table 2: Location/Number of USQ's Australian Distance Education Students in 1999 (Below/End)

Region	1999 Enrolments
Queensland	7,597
New South Wales and ACT	1,463
Victoria	354
South Australia	174
Western Australia	156
Northern Territory	100
Tasmania	79
Australians living overseas	280
TOTAL	**10,203**

Table 3: USQ's International Students Offshore in 1999 (Below/End)

Region / Country	1999 Enrolments
Malaysia	1,097
Singapore	928
Hong Kong	353
South Africa	163
Pacific Islands	100
Other Africa	89
Thailand	88
Other Asia	68
United Arab Emirates	46
Other countries	41
Canada	32
Japan	20
United Kingdom	20
Korea (Nth and Sth)	20
Papua New Guinea	17
Indonesia	17
India	17
USA	15
China	13
TOTAL	**3,154**

Table 4: Nature of USQ's Off-campus Student Population: 1999 (Below/End)

Variables	Australian Based	Temporary Visa	Resident Off-shore	TOTAL
Age				
Under 20	3%	0%	0%	3%
20-24	13%	1%	7%	21%
25-29	17%	0%	5%	22%
30-34	14%	0%	4%	18%
35-39	13%	0%	3%	16%
40-49	14%	0%	2%	16%
50-59	3%	0%	1%	4%
Over 59	0%	0%	0%	0%
TOTAL	**77%**	**1%**	**22%**	**100%**
Gender				
Female	38%	1%	10%	49%
Male	40%	1%	10%	51%
TOTAL	**78%**	**2%**	**20%**	**100%**

Figure 2: Staff Establishment of the USQ Distance Education Centre (Below/End)

Figure 3: Unit Team Model (Below/End)

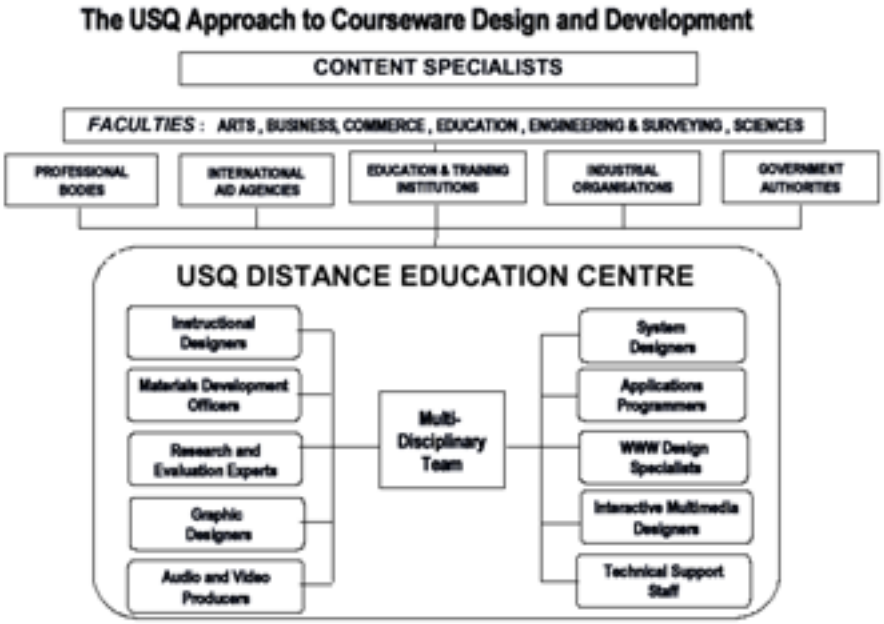
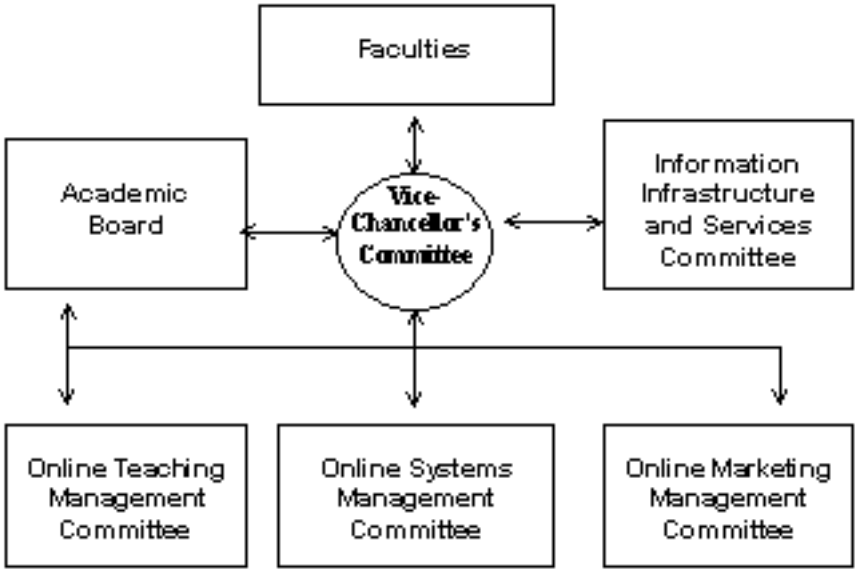


Figure 4: Management Structure of Online Initiatives (Below/End)



International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (July, 2001)

The Technological Consolidation of UNED of Spain

Lorenzo Aretio
UNESCO

Abstract

This article discusses the role of the technologies that have been utilized to advance distance teaching and learning by the National Distance Education University (Universidad Nacional de Educación a Distancia – UNED) of Spain. Following a description of UNED's historical development and organizational structure, UNED's experience with various educational media is discussed. Printed teaching materials, in the form of didactic units, were one of the first methods to be utilized when UNED began its operations in 1972. In turn, the role of radio and audio recordings, television and video recordings, telephone, videoconferencing, computer systems and computer-mediated communications are also described. UNED's pioneering projects, including the virtual classroom, virtual campus and a program for the physically handicapped, are also detailed. Recent experiments include providing access to radio and television programs on the Internet and adoption of WebCT. On the horizon for UNED are portals for cellular phones using WAP technology and gearing up for multiple applications in accordance with Universal Mobile Telecommunications Technology (UMTS).

Introduction

The National Distance Education University of Spain (UNED) possesses all of the general and genuine characteristics of public Spanish universities with respect to academic and financial economy, legal status, full teaching and research functions and its authority to award university degrees at the same official level as those of the other universities. At the same time, it is a unique institution, differentiated from other universities by: (a) the most common target students, (b) the media utilized in teacher/student relations, (c) its service area and territorial structure, and (d) one of its categories of professors, namely tutors. Today it is the public Spanish university with the greatest number of students, absorbing 10% of the Spanish university student population. It imparts credit and non-credit, both formal and non-formal, instruction throughout Spain, and in a growing number of foreign countries. Today UNED offers 20 degrees and close to 500 non-credit courses for professional development. It is possible today to enroll in one of 20 official different degree programs and approximately 500 non-formal professional development courses. UNED currently maintains

70 associated support centers in Spain and overseas. In 1999, 189,879 students were taking courses at UNED. Since the creation of UNED in 1972, a total of 45,000 students have completed studies for their first degree and 1,200 students have completed their doctoral studies.

Precedents

Prior to the establishment of UNED, Spain lagged behind other countries in terms of higher education. Recognizing the necessity to open up the structural rigidity of the existing higher education system, the General Education Law was passed in 1970. Innovative for its time, this law referred to education as a lifelong, unfinished task and emphasized, among its basic objectives, offering equality of educational opportunities to all, and an ample range of lifelong education activities without limitations other than those of capacity to study (García Aretio, 1985, 1986). Another innovative feature of this law was the goal of offering continuing study opportunities via correspondence, radio, television, and other modalities to those unable to accommodate the calendar and regular schedules of conventional higher education institutions.

In order to take advantage of provisions in the last development plan of the General Franco dictatorship, and to comply with the visionary objectives of the General Education Law, an official commission was appointed to establish distance education delivery and so increase access to university education. This commission advised institutionalizing within the educational system a method of teaching that had already been tried with success in other countries. The intent was to provide distance education through utilization of those technical media that were suitable for the university to extend its activity to sectors of the population that, for diverse reasons, faced serious barriers to participation in university studies. Among the official commission's objective were: (a) broad study of the academic and financial aspects of the project, (b) comparative analysis of what had been accomplished in other countries, and (c) organization of an effort to put into place a new institution. At that time (1971), there was talk of creating a new university called National Free Distance University (*UNILAD).*

Creation

In 1972 the Spanish government passed a law authorizing the creation, within the 4-year period until 1975, of the National Distance Education University (UNED). The government did not wait too long to make this innovative university operational. The decree of creation implemented the political will expressed in the General Education Law, calling for the birth of a unique higher education distance institution; in that same year, 1972, UNED was created. This decree

of 1972 opted for distance teaching not in a dual or mixed mode (institutions that impart both face-to-face and distance instruction), but a unique and autonomous model exclusively for the delivery of distance teaching. Rather than overload the existing universities, this new institution would possess a technical, methodological and administrative organization appropriate to distance teaching.

According to the decree of creation, parity was to be achieved in all respects with the rest of the Spanish universities. UNED faculty would come from the identical bodies as the conventional universities. The requirements to be a UNED student, contemplated in the decree of creation, were to be the same as those required for access to conventional university education. The study programs offered, degrees awarded, and the tests and examinations given to students would all be the same as those in the conventional universities. A new decree of 1974 established the legal framework for the university's functioning and granted approval of its statutes; these are still in force today. Except for the peculiarities of schedules, calendars, methods, and teaching regimen, the initial legislative norms that established the academic structures, teaching activities, and instruction for UNED are the same as for other universities.

The statutes in force today were approved in 1985. Based on the Law of University Reform of 1983, they stipulate the objectives that UNED is expected achieve in order to implement its mandate. The objectives and functions assigned to UNED are as follows:

1. To facilitate preferential access to university teaching and the continuity of the studies for all persons who are capable of pursuing higher studies and who are not able to attend university classrooms because of work, residence, finances, or similar considerations.
2. To establish and develop programs of lifelong education, and cultural and professional development.
3. To utilize the most suitable techniques and experiences for teaching at a distance as well as to try out new educational models of service to students and to other universities and institutions with which agreements of collaboration and assistance may be established.
4. To facilitate the creation of a broad and pluralistic university community founded on scientific and cultural knowledge that can serve to unify and promote the progress and solidarity of all regions and peoples of Spain.
5. To develop scientific research in all areas and levels.
6. To support and stimulate lifelong education, as well as update and promote the teaching, research and administrative personnel of the university.

Central and Peripheral Structure of UNED

The characteristic of university autonomy specified in the General Education Law of 1970 that gave birth to UNED, became a reality with the University Reform Law of 1983. This legislation indicated that regarding UNED, the general courts and government of the country assumed the competencies that this law attributes to the legislative assemblies and governments of autonomous communities. Similarly, this law affirmed that UNED was to impart instruction to all of the national territory. As a result, UNED aspired to be a university of and for all Spanish citizens, irrespective of their place of residence.

As is with the case with other public Spanish universities, UNED, therefore, has autonomy in a number of areas, including: (a) statutory and governmental autonomy; (b) academic and instructional autonomy; (c) autonomy in finance and administering its resources; and (d) autonomy to select and promote professors according to the principles of merit, capacity, and non-discrimination that apply to jobs within all state supported institutions (García Aretio, 1995).

A unique feature of the university is its robust network of associated centers that are essential for efficient application of the model. As important as these centers are from the administrative point of view, their function is of even greater relevance as support for student learning. These associated centers offer students the necessary tutorial orientation for studies, access to a text and media library, as well as opportunities to participate in different cultural activities. As well, the associated centers provide UNED students the academic and cultural environment that is part of a complete university education. More than 70 associated centers and extensions of these centers comprise a closely woven network that covers all of the Spanish territory. They fill an important role in promoting culture and learning within their respective geographical areas, as defined in the royal decree of 1995.

Students who live outside of Spain can access the educational offerings of UNED through the network of centers maintained by the university in:

- Germany (Bonn)
- Argentina (Buenos Aires and Rosario)
- Belgium (Brussels)
- Brazil (Sao Paulo)
- France (Paris)
- Mexico (Mexico City)
- Portugal (Lisbon)
- the United Kingdom (London)

- Switzerland (Bern)
- Venezuela (Caracas)
- the United States (Miami)
- Morocco (Tangier)
- Equatorial Guinea (Malabo and Bata)

From an academic point of view, the associated centers depend on the university and its government structure, and the professor/tutors are expected to follow the directives set by the corresponding departments at headquarters. In economic-administrative aspects the centers depend on their respective boards, comprised of representatives of UNED and other institutions that collaborate with the centers, as a channel for participating in the society of university life (García Aretio, 1996).

At the beginning of the 21st century, there is an effort to consolidate the autonomy of this university. To be the only university with claim to all the national territory requires an effort to fulfill one of the statutory mandates of the university, that of creating a university with a broad and pluralistic community, founded on scientific and cultural knowledge, that unifies and promotes the progress and solidarity of the regions and peoples of Spain.

Technology in the Beginnings of UNED

It has been indicated that the General Education Law of 1970 charged UNED with the goal of offering opportunities to those who cannot attend conventional universities to pursue studies, via teaching by correspondence, radio, and television. There is no doubt that this article of the General Education Law, written more than 30 years ago, was innovative. It contemplated the possibility of continuing university studies through use of innovative teaching and learning technologies. To fulfill this objective, an administrative commission was constituted in 1971 and charged with establishing within the educational system, a method of distance teaching using whatever technical media might be suitable for fulfilling that commitment. Subsequently, the UNED statutes of 1985/86 indicated that distance education presumes the application of specific teaching methodologies, integrates communication systems and resources, and utilizes print media, audio-visual, and new technologies.

Since the creation of UNED there has been recognition of the need to integrate modern technologies into the processes of teaching and learning. Since 1973, beginning with studies of law, philosophy, and letters, written teaching materials called *didactic units* have been adapted to distance technology (Davis, 1990;

Duffy & Waller, 1985; Felker, 1981; Landry, 1985; Lockwood, 1994; Race, 1998; Rowntree, 1986, 1990, 1994). In some cases this material was self sufficient and in others it was necessary to refer to specific texts that complemented or broadened the explanations referred to or presented in the didactic units (García Aretio, 1996). These units, didactic guides, distance evaluation notebooks, addenda, and so forth, have been among the print materials directed to student learning. In 1997 UNED's University of Distance Education Institute provided professors with a manual of suggestions for developing didactic units and didactic guides. The recommendations in this manual could be equally applied to the development of hypertext material (García Aretio, 1997b).

In all distance education universities, even in the information age, the book continues to be a fundamental element, progressively complemented with audiovisual and computer resources. In fact, UNED today has the largest university press, by volume and diversity of production: from books of every type (didactic materials, books of readings, journals, etc.), to ephemeral and annual publications (large circulation institutional guides to degree programs, programs of courses, etc.). In 1996, the UNED Printed Media Center (CEMIM) began the important task of improving the quality and quantity of the printed didactic materials produced by UNED. Notwithstanding all these developments, almost 30 years after the birth of UNED, there are still difficulties that prevent UNED faculty from accepting even minimal methodological criteria to adapt their course materials for distance education. Academic freedom, very respected in Spain, prevents professors at UNED (as UNED is a public university) from presenting their text in a specific manner when that is not their desire. As a consequence, despite the sound scientific quality of the UNED materials, their methodological quality varies greatly from subject to subject.

Radio and Audio

The advent of radio at the beginning of the 20th century, and its capacity to reach everyone, makes it a medium worthy of consideration to advance distance education (Grundin, 1984). In 1974 UNED created The Technical Department to assume management of services such as audio-visual materials, and distribution of teaching activities. Its initial act was to focus on daily radio programming, which UNED has offered ever since through a chain of public radio stations of the National Radio of Spain. Subsequently, the Technical Department has become the Center for Design and Production of Audio-Visual Materials (CEMAV).

Since 1974 all radio programs produced at UNED have been recorded and sent to the associated centers so that students can listen to or record them. At present, CEMAV has approximately 20,000 cassettes of recorded radiophonic programs from past years (García Aretio, 1997a). Although the majority of radio programs have been recorded and used asynchronously there have also

been some interesting experiences with UNED broadcasting some synchronous, direct and interactive programs (Norman, 1993). Admittedly, their broadcast could not be justified given their greater cost and the difficulties of having the broadcasts accommodate students' availability. Therefore, the majority of radio projects have involved asynchronous distance systems. With respect to this medium, UNED faces problems of a different kind. During its first 25 years of existence UNED had to negotiate almost annually with Spanish Radio Television to which National Radio of Spain belongs. Although the service has never been suspended, it has been subject to changes of schedule and transmission by Spanish Radio Television. Certain radio programs have been broadcast for which printed text would have been sufficient. In a university with such a large number of professors, some take advantage of this medium to the maximum, but many of them do not apply the basic criteria advised for the didactic use of this medium. Likewise, it should be emphasized that the radio time that the state broadcast service provides to the university is minimal, compared with the enormous number of UNED degrees, programs, and courses.

In addition to programs for broadcast, CEMAV has also been producing a number of audio cassettes each academic year. For many years professors have responded to a call to employ this auditory resource in their courses. Today there are some 40 collections of cassettes produced for teaching in different subject areas. Although radio is a little-used medium at UNED today, two decades ago it was believed, as Race (1998) said, that if this medium were utilized to activate learning in students, it would help significantly and at a low cost.

Television and Video

Television and video are two media that are linked together. Video was born related to television, even if it was to record, store, and reproduce television broadcasts. It also required a television receiver for its diffusion (Cabero, 1998). Many homes today have these two technological media, whose educational possibilities are undeniable (Bates, 1987; Cabero, 1994; McKenzie, Postgate & Schuphan, 1979; Race 1994, 1998). UNED has been developing television programs since the 1991/92 academic year, and in that year it maintained a periodic and experimental presence through *Telemadrid, A Saber (To Know).* During the next two years (1992/93 and 1993/94) there was a weekly collaboration with the educational program of Televisión Española (TVE) and *La Aventura del Saber (The Adventure of Knowing).*

With operation of the satellite *Hispasat* in January 1996, and the classical channel of TVE, hour-long programs *Television Educativa* (Educational Television) were broadcast by UNED Monday to Friday, and Saturday mornings. During the 1997/98 academic year, these broadcasts were moved to channel 2 of TVE, where they are now broadcast on weekends. All programs are produced entirely in UNED installations through the collaboration of professors and technical

personnel (García Aretio, 1998).

The scarce time that Spanish television provides for UNED programming means that few areas can be provided through this medium. Additionally, Televisión Española recommends that programs be of broader interest than purely teaching. There are a number of UNED professors who are interested in utilizing television as a didactic medium for communication with their students. Many more do not demonstrate that interest; it is not known whether this is due to the difficulty of finding space in the broadcasting schedule or because professors are more comfortable not using television.

The videos that UNED produces deal with specific themes related to different subjects. In some cases, there are collections that have been expanding course by course. Presently there are around 200 didactic videos that have been produced by UNED. Many have won national and international prizes.

Advanced Telephony

By necessity, conventional telephones are used in every distance institution, above all, for direct personal attention to students. Since 1996, UNED's headquarters has also provided advanced service to support communication and transfer of data among computers, as well as automatic telephone answering for access to information stored in a computer in voice form. The two most common uses of this service are for transferring general information within the university, and to provide information to students about results of face-to-face examinations.

Video Conferences

With the establishment in 1993 of the Digital Network of Integrated Telephone Services (RDSI), UNED began grouped video conferences in October of that year. Now called the Educational Videoconferencing Network (REVC) and comprised of more than 60 installations at the headquarters (during the 1998/99 academic year), the network has been extended to all associated centers. This expansion makes the REVC of UNED the largest videoconferencing teaching network in Europe.

This network permits presentations and discussions, work meetings among professors at the headquarters and associated centers, and on an exceptional basis, some "face to face" examinations. However, its most frequent use has been for colloquia or meetings between professors and professor/tutors at headquarters, and their students at associated centers (García Aretio, 1998). The difficulty with this type of service is that, in order to participate in the numerous sessions held at the end of the year, students must go to an associated center. This re-

sults in inconvenience for students who must be in a specific place at a specific time, thereby reducing the time and space flexibility. These meetings, however, offer the advantage of face-to-face interaction among students, their tutor, and across the screen with the professor at headquarters (Sevillano, Carpio & Sánchez, 1998).

Information Systems and Telematics

Although some non-credit programs, and courses related to evaluation and learning, experimented with computer assisted instruction in the past, UNED has not had much experience with this technology. With the establishment of the University Distance Education Institute *(IUED)* and between the years 1994 and 1999, a number of professors developed multimedia programs focused on specific course themes. In the final years of the 1990s, an increasing number of UNED courses included a CD-ROM.

UNED has had a central server for *video text* since 1990. Through this service, connected students have had access by computer to general information, including: (a) grades, (b) preregistration, (c) scholarships, (d) courses, (e) student assistance, and (f) employment openings. For each faculty and school there is also a server where registered students can access specific information about the subjects in which they are enrolled, receive results of their face-to-face examinations, communicate with professors through electronic mail, and so forth. (García Aretio, 1994).

Unfortunately, the explosion of the Internet has caused a progressive decline of this video text service, given its slowness and the high cost of a telephone connection. In addition to experiences with video text, UNED has initiated other means of interaction between professors and students via computers. One of these involves connecting computers with a central computer, via modems. This gives many people access in order to ask questions or express their opinions. This bulletin board system was used at UNED in some graduate level courses from 1994 to 1997, with good results.

Technological Innovations, Proposals, and Trials

Since the 1997/98 school year, all professors and administrative services at UNED's headquarters have been connected to the Internet and local networks. Since then, all UNED teaching staff have also had remote access from home to the UNED network. This access to global and local networks constitutes a major advancement for teaching and research (García Aretio, 1998). During the 1997 and 1999 school years, UNED also experimented with two types of virtual teaching: the *virtual classroom* and the *DEMOS Project*, as well as an

interesting project called *FOTEUMIDIS*.

The Virtual Classroom

The objective of UNED's virtual classroom, which began in the 1998/99 school year, was to introduce and progressively integrate multimedia and Internet applications into teaching practice at UNED. The aim of this plan was to reinforce written materials with multimedia elements through the use of CD-ROMs, and to improve professor/student communication via the Internet/Infovía. A common and personable user interface was available to each professor. This interface provided a system for student self-evaluation of learning based on a large test bank, as well as a structured and transparent system of questions and answers for all students. The application required students to register only once as a UNED web user, and asked students for information about all the courses in which they had been enrolled. The application included a database for professors to store the results of their students' self-evaluation exercises as well as a means to send electronic mail messages. The environment in which students carried out their studies corresponded with a typical desk, and contained a notepad, calendar, agenda, clock, calculator, and inbox. From their desk, students could access other graphic environments such as faculties, virtual classrooms, and associated centers. All virtual classrooms contained a series of common elements, including (a) a window for the professor; (b) screens for presenting transparencies, slides, graphics, and diagrams; and (c) a bulletin board with general information and news (García Aretio, 1998). Multimedia materials developed for the UNED virtual classroom complement the print materials that accompany the units and study guides. To introduce this project, the IUED planned a broad program of preparation for all professors who wished to participate in the initial phase in 1999. Because this year was an electoral year in UNED (elections for the senators, who elected the new rector, were held in January 1999), it was decided to postpone the launch of the Virtual Classroom until after the new team was in place.

DEMOS Project – The Virtual Campus

The objective of this second project, conducted by some departments and associated centers on a trial basis from 1996 to 1998, was to increase quality of administrative and academic support to students. Although the DEMOS Virtual Campus project was one more tool in UNED's teaching system, it was not anticipated that the entire system would re-organize itself around this new tool (Peire, et al., 1999). By entering DEMOS through their computer, students' experience of the virtual campus could be described in the following manner:

- First, they will find the Office of Information and Administration of DE-

MOS. There, the mandatory access permission will be given.

- Once the permission has been obtained, students will find a bulletin board where they will find course information.
- Students will be able to access the virtual library and asynchronous study room. They will be able to engage in self-study utilizing didactic material as in a conventional library, as well as search information such as text, images, videos, recorded courses, and so forth.
- Electronic distribution of materials takes place in the virtual bookstore.
- Students can enter virtual distributed classrooms where professors and students are connected online through terminals. While connected, students may share applications, tools, and material in a number of formats (text, programs, images, audio and video), and they may also participate in multi-point videoconferences. The professor plays the role of session director.
- Students can also visit professors' virtual offices to participate in teletutorials through personal communication (point-to-point), whether asynchronous (as electronic mail but with multimedia characteristics), or online synchronous communication.
- Finally, students can visit the café room, a form of discussion where students can maintain contact via electronic mail and create newsgroups very similar to those that exist on the Internet.

Education for the Physically Handicapped (FOTEUMIDIS)

The new teaching technologies can help people with disabilities make progress within the educational and socio-work world. Project *FOTEUMIDIS*, initiated in 1997, draws on all of UNED's media to deliver audio and video instruction through the RDSI public line (García Aretio, 1998). This university-level teaching is directed toward those affected by some form of disability or handicap. The objective is to make it possible for disabled individuals to study via *multi-video conference* through RDSI and so obtain the greatest results with the least effort. Collaborating with UNED in this project are the Ministry of Work and Social Affairs (INSERSO), Telephónica, the ONCE foundation, IBM, Alcer Murcia, and *INSALUD*.

Internet and UNED

As indicated above, UNED has been involved with the Internet since the 1996/97 school year. Specific courses, primarily in the area of non-credit instruction, have

been progressively incorporating educational methodology based on communication through the Internet. Some of the more significant advances supported by the network are highlighted here.

UNED Radio

Since 1998, UNED has offered radiophonic programming through the Internet. Until 1998, UNED programs were broadcast by National Radio of Spain, but broadcasts were difficult to access, for some, and impossible to hear for others. Conscious of the value that its programs had for students and for specific publics interested in scientific, cultural, and social matters, UNED considered it appropriate to extend these programs more broadly through the Internet. Some 1,500 hours of prerecorded programs on diverse topics have been collected at the UNED radio site. Radio UNED on the Web is configured to make it easy to quickly locate different transmitted programs. It is possible to access programs that are broadcast weekly on RNE, or to use a simple search engine to locate programs by subject, faculty, professor (author), and by keywords (Calés, 2000). It is possible to access all UNED radio programming either online, or downloaded and listened to away from the connection. This service has been in place for 3 years, and students have responded very favorably. While integrating this service into the media of UNED, no particular difficulties or problems have been observed.

Tele-UNED

The objective of this new link on UNED's homepage is threefold: (a) direct coverage of the academic and cultural happenings organized by the university; (b) online access to UNED's extensive videoteca, organized by a broad spectrum of scientific and cultural themes; and (c) provision, via the Internet, of delayed educational television programming which for some time has been broadcast on the second channel of TVE on weekends. These online video presentations provide complementary synchronous support. In the direct broadcasts now possible, student spectators or participants can interact with the principal actor, speaker, lecturer, or professor in real time through electronic mail (Calés, 2000). To date, this service has not been duly exploited, and UNED can add more personal service and media to TeleUNED. Consolidation of the different projects relative to Internet teaching culminated in 1999 with the initiation of a strong process of institutional adaptation to the world of the Internet. The new institutional governance team of UNED understood the importance of a unique virtual platform of knowledge management that would be easy for students to use and for professors to employ as they produce Web-based courses.

After numerous analyses, UNED adopted a Spanish translation of WebCT (G.

Ruipérez, 2000), the web-course tool developed at the University of British Columbia. Since October of 2000, virtual teaching has been supported on the Internet for some 20,000 students in their first courses of degree programs, a good number of students in doctoral courses, and others enrolled in non-credit courses. This platform is integrated into *CyberUNED*. With almost 200,000 students enrolled at this university, in its offering of virtual courses and teaching, UNED will soon become one of the leading universities in the world. To accomplish this objective UNED has contracted with a second Internet provider, the IRIS network, through which all the Spanish universities are connected to the Internet. The IRIS network would collapse if the 200,000 UNED students were to seek a connection. At present, these connections have been enriched by the formation of an Intranet among all the associated centers of UNED. This way, students who have difficulty connecting to the Internet from their homes or workplaces may do so at high speed through the more than 60 associated centers in Spain. At the same time, UNED is developing its own platform – *TecInfo*. As this is still in development, there is not yet enough information available to discuss it in detail.

WAP and UMTS Technology

Given its massive introduction in society, the mobile telephone is becoming an important way to access to the Internet (García Aretio, 2001). With this technology, the Internet can reach everywhere, without cables or a computer. As with the other technologies described here, UNED hopes to be at the forefront with this technology. Therefore in 2000, a mobile telephone portal based on *WAP* (Wireless Application Protocol) was created to offer services to students, including consultation about marks in specific courses, and information about the university. Recently, *WAP* technology has been used to enable tutors to leave messages for their students via mobile telephone. With this technology, UNED has become the pioneer in Europe in this field; this will be verified in the near future, as mobile telephones become the most common means of accessing the Internet, ahead of the personal computer. But given a screen that permits only six lines, a limitation imposed by *WAP* technology, the amount of information that can be transmitted to these terminals is limited. However, with the imminent emergence of the *UMTS* (Universal Mobile Telecommunication System) it will be possible to provide all types of information through high speed mobile terminals, without the limitations that the *WAP* technology now imposes (A. Ruipérez, 2000). UNED is already experimenting with this technology, in order to offer this advanced service of mobile connection to the Internet as soon as possible.

Other Innovative Proposals

- The ability to publish different programs and courses on DVD is expected soon. The first educational DVD was edited and published in 2000, and distributed by a Spanish university with tracks for audio as well as Spanish, English, and French subtitles.
- The development of administrative procedures for online registration and payment of fees through the Internet will be introduced in the 2001/2002 academic year. Preenrollment of students already has been conducted by this means for the past 2 years.
- Students soon will be able to acquire print and audio-visual materials published by the university via the Internet in the same way that they make other purchases on the Internet.

Conclusion

As one of the world's first unimodal distance universities (teaching only at a distance), UNED has been adapting to technological advances, despite difficulties imposed by huge increases in student numbers and scarce budget allocation from the government. Today UNED offers students in Spain and abroad (primarily in Iberoamerica) teaching and learning features that can be summarized as follows:

- A powerful publisher of print material (didactic units, guides for different degrees and different collections, etc.), radiophonic programs broadcast on the National Radio of Spain and over the Internet, and television broadcasts on Televisión Española, followed closely by the Internet.
- Collections of cassettes and didactic videos. The latter can be seen on the Internet.
- A powerful videoconferencing network connecting all the associated centers. These sessions can also be followed on the Internet.
- A virtual learning platform based on the WebCT environment by which more than 20,000 students are now attending (10% of UNED's total) and that progressively will be offered to all students.
- An online registration system.
- A portal for mobile telephones that uses *WAP* technology.
- Preparation for the next technological advance, UMTS.

Today, through the Internet, UNED provides broad information, elements for education, and research in the area of distance education. A compilation of all of these possibilities can be seen on the UNESCO Chair for Distance Education website, with headquarters at UNED.

Electronic Addresses of Interest

UNED, main [http://www.uned.es]

CiberUNED [http://virtual.uned.es/webct/public/home.pl]

RadioUNED [http://info.uned.es/cemav/radio.htm]

TeleUNED [http://www.teleuned.com/26_mayo/2000.htm]

Televisión educativa [http://info.uned.es/cemav/tv.htm]

Vídeos UNED [http://www.uned.es/cemav/videos.htm]

Audio UNED [http://www.uned.es/cemav/audios.htm]

Videoconferencias [http://www.uned.es/cst/]

CampusWAP [http://campuswap.com/index.html]

Publicaciones de la UNED [http://www.uned.es/publicaciones/]

Cátedra UNESCO de Educación a Distancia [http://www.uned.es/catedraunesco-ead]

Legal Documents Related to the Creation and Development of UNED

- Ley General de Educación (LGE) 14/1970 de 4 de agosto, publicada en el Boletín Oficial del Estado (BOE) de 6 de agosto de 1970.
- Decreto 1106/1971 de 6 de mayo (BOE de 1 de junio de 1971) que crea la Comisión Gestora para el establecimiento de la modalidad de enseñanza universitaria a distancia
- La Ley 22/72 de 10 de mayo (BOE 20 de mayo) por la que se aprueba el III Plan de Desarrollo Económico y Social para el cuatrieno 72/75, autoriza al Gobierno para crear dentro de ese cuatrienio, entre otras, la *Universidad Nacional de Educación a Distancia*.

- Decreto 2310/1972 de 18 de agosto (BOE de 9 de septiembre de 1972) por el que se creó la Universidad Nacional de Educación a Distancia (UNED).
- Decreto, el 3114/1974 de 25 de octubre (BOE de 14 de noviembre) se establece el marco legal mediante el que ha venido funcionando la Universidad hasta la aprobación de sus Estatutos e incluso hasta nuestros días.
- Los Estatutos de la Universidad Nacional de Educación a Distancia fueron aprobados por Real Decreto 1287/1985, de 26 de junio (BOE de 31 de julio) y complementados por el texto aprobado por Real Decreto 594/1986, de 21 de febrero (BOE de 28 de marzo).
- Ley Orgánica de Reforma Universitaria de 25 de agosto de 1983 (BOE de 1 de septiembre de 1983).
- Real Decreto 1317/1995, de 21 de julio (BOE de 10 de agosto) por el que se crea la Red Básica de Centros Asociados y perfila el régimen de convenios.

References

Bates, A.W. (1987). Learning from television. In M. Thorpe and D. Grugeon (Eds.). *Open learning for adults* (pp. 163-179). Burnt Mill: Longman.

Cabero, J. (1994). Retomando un medio: la televisión educativa. En CMIDE-SAV. *Medios de comunicación, recursos y materiales para la mejora educativa.* Sevilla: CMIDE y SAV.

Cabero, J. (1998). *Uso de los medios audiovisuales, informáticos y las nuevas tecnologías en los centros andaluces.* Sevilla: Grupo de Ivestigación Didáctica.

Calés, J. M. (2000). Un entorno multimedia para la difusión de la cultura y la educación por la Web. En *On line Educa Madrid.* Madrid: UNED.

Davis, D. J. (1990). Text comprehension: Implications for the design of self-instructional materials. In M. G. Moore (Ed.). *Contemporary issues in American distance education* (pp. 243-259). Oxford: Pergamon Press.

Duffy, T. M. & Waller, R. (1985). *Designing usable texts.* New York: Academic Press.

Felker, D. B. (1981). *Guidelines for document designers.* Washington: American Institutes for Research.

García Aretio, L. (1985). *Licenciados extremeños de la UNED.* Badajoz: UNED-Mérida.

García Aretio, L. (1986). *Educación superior a distancia. Análisis de su eficacia.* Badajoz: UNED-Mérida.

García Aretio, L. (1994). *Educación a distancia hoy.* Madrid: UNED.

García Aretio, L. (1995). Decisiones políticas para la creación y consolidación de una universidad singular: la UNED. En *Política y Educación.* Barcelona: Universitat de Barcelona

García Aretio, L. (1996). *La educación a distancia y la UNED.* Madrid: UNED.

García Aretio, L. (1997a). The Spanish UNED, a technological university. In *The new learning environment: A global perspective* (p. 71). State College: Pennsylvania State University.

García Aretio, L. (1997b). *Unidades didácticas y guías didácticas. Orientaciones para su elaboración.* Madrid: UNED.

García Aretio, L. (1998). Universidad Nacional de Educación a Distancia (UNED). En Vázquez, G. *Madrid: espacio universitario abierto,* (pp. 261-300). Madrid: Fundación Universidad Empresa.

García Aretio, L. (2001). *La educación a distancia. De la teoría a la práctica.* Madrid: Ariel.

Grundin, H. (1984). Radio. In A. W. Bates, *The role of technology in distance education* (pp. 89-98). London: Croom Helm.

Landry, F. (1985). L'imprimé un moyen d'enseignement privilégié. En Henri, F. y Kaye, A. *Le savoir à domicile.* Québec: Télé-université.

Lockwood, F.G. (1994). *Materials production in open and distance learning.* London: Paul Chapman Publishing.

McKenzie, N., Postgate, R., & Schuphan, J. (1979). *Enseñanza abierta. Sistemas de enseñanza postsecundaria a distancia.* Madrid: UNESCO.

Norman, D. (October, 1993). *Interactive radio as a component of distance education in third world countries.* National Third World Studies Conference, Omaha, NB.

Peire, J., Castro, M., López-Rey, A., Mora, C., Pérez, C., & Rodríguez, J.A. (1999). Campus virtual de la UNED: un ejemplo de aplicación de nuevas tecnologías. En *Revista Iberoamericana de Educación a Distancia (RIED) (2)*2, 165-179.

Race, P. (1994). *The open learning handbook (2nd ed.).* London: Kogan Page.

Race, P. (1998). *Interesting ways to write open learning materials.* Bristol: Technical and Educational Services Ltd.

Rowntree, D. (1986). *Preparación de cursos para estudiantes.* Barcelona: Herder.

Rowntree, D. (1990), *Teaching through self-instruction.* London: Kogan Page.

Rowntree, D. (1994). *Preparing materials for open, distance and flexible learning.* London: Kogan Page.

Ruipérez, A. (2000). Servicios Internet de información académica basados en telefonía móvil. En *On line Educa Madrid.* Madrid: UNED.

Ruipérez, G. (2000). El desafío de Internet en la enseñanza a distancia. En *On line Educa Madrid.* Madrid: UNED.

Sevillano, M.L., Carpio, J., & Sánchez, E. (1998). La videoconferencia en la UNED. En *Revista Iberoamericana de Educación a Distancia (RIED) (1)*2, 71-99.

Citation Format

Aretio, Lorenzo (July, 2001) The Technological Consolidation of UNED of Spain. *International Review of Research in Open and Distance Learning*: 2, 1.
http://www.icaap.org/iuicode?149.2.1.11

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (July, 2001)

Issues and Challenges of Providing Online Inservice Teacher Training: Korea's Experience

Insung Jung

Abstract

To meet the need for flexible and interactive teacher training, the Korean government created a Cyber Teacher Training Center (CTTC) in the summer of 1997. The CTTC project developed a software platform for managing online inservice teacher training, eleven general training courses, with plans to add more courses each year. This article examines the needs met through the introduction of online inservice teacher training and the strategies that have been employed in the process. This paper also analyzes the major impacts of online teacher training and looks at the challenges facing online inservice teacher training in the coming years.

Introduction

With the development of new information and communication technologies (ICT), online education is being used in many developed, and some developing, countries to bring wider opportunities to people in the form of flexible, open and distance learning systems (Farrell, 1999; Perraton & Postshnik, 1997). Online education is defined as an innovative form of distance education that delivers instruction to a remote audience, using computer networks as the main medium. The general purposes of online education are to: (a) increase access to education for individuals located throughout the world, (b) remove barriers of time and space, and (c) develop a cost-effective approach to providing interactive learning opportunities for adults (Harasim, Hiltz, Teles, & Turoff, 1995; Hiltz, 1994; Khan, 1997). Online inservice teacher training is a form of online education that uses computer network technologies to organize, develop, manage, and administer inservice teacher training. If online teacher training programs are well designed, they can broaden the range of teacher training opportunities and reduce the costs of providing retraining opportunities to teachers by adopting information technology, and sharing educational resources. Research and case studies show that online training via the Internet provides an opportunity to develop new learning experiences for learners by managing self-directed learning, and sharing information and ideas in a cooperative and collaborative manner (Harasim, et al., 1995; Hillman, 1999; Moller, 1998; Thompson & Chute, 1998; Trentin & Scimeca, 1999).

Online education is not yet the prevalent method of providing inservice training for the more than 340,000 teachers in Korea. However, for several years, a number of teacher training centers in the Korean provinces, and other teacher education institutions, have used the commercial Internet Service Providers' network to distribute learning materials and to encourage interaction between trainees and trainers. There are several commercial Internet Service Providers (ISP) in Korea that provide text-based online services and Internet access. Through these ISP networks, subscribers can access an online database, as well as interact and share materials with other network subscribers. They can also access the Internet from home or other places. In addition to such ISPs, with financial support from the Korean government, major initiatives have been launched to develop totally Internet-based online teacher education programs.

Since the computer network system was established and ICT was adopted in education in Korea, online teacher training has been seen to have several benefits. In addition to making teacher training more cost-effective and efficient, the major goals of online teacher training are to help teachers: (a) access training opportunities without leaving their classrooms; (b) improve their computer literacy, and interact online with their trainers and other teachers; and, (c) once a "bank" of online courses is developed, to access those courses that meet their individual needs.

Objectives of this Case Study

This study describes a Korean initiative to develop and implement online education for inservice teacher training, and includes concrete recommendations to guide educational policy makers. The key questions addressed in this article are:

- Why were technology innovations introduced into Korea's inservice teacher training?
- How have the innovations been implemented?
- How do the teachers involved in the process evaluate the innovations?
- How have innovations influenced inservice teacher training methods and policies of the training institutes?
- What recommendations can be drawn from Korea's efforts?

The methods used to conduct the case study include: (a) analysis of Korea's official documents and Web sites, (b) informal individual interviews with several providers of online inservice teacher training in Korea, and (c) analysis of a formative evaluation report conducted by a research institute. Because this is a

case study and not an evaluation, application to other contexts should be made with caution. Nevertheless, the findings of this study may be useful for other countries and teacher training institutes seeking to integrate computer network technologies into inservice teacher training programs.

Background

In 1987, the Korean government developed an action plan for the large-scale introduction of computers into primary and secondary schools. With financial support from Korea Telecom, the Ministry of Education (MOE) between 1989 and 1996 invested about $53 million (US) in establishing computer systems and networks in schools. By 1996, every school in Korea was equipped with an average of 33 computers, and in 1997, the government initiated a comprehensive 6-year strategic plan to establish an advanced educational infrastructure. Since 1997, the Korean government has made major efforts to place two multimedia computer labs in each school, to establish a multimedia network in each classroom and to provide a computer for each teacher.

Tables 1 and 2 show the numbers of students and teachers per computer in Korean schools in 1997 (Ministry of Education [MOE] & Korea Multimedia Education Center [KMEC], 1998). Contrary to what most would expect, the ratio of students to computers is much lower in primary schools than in the secondary schools (Table 1). There are two major reasons for this. First, the government distributed computers to the primary schools ahead of secondary schools because primary school students are not under pressure to take the university entrance examination and had more time to "play with computers." Underlying this decision was the bias that computers are not for serious study, but for play. Second, it was thought that younger students could learn to use computers faster and more easily than older pupils. Thus, IT experts recommended that the government provide computers to the primary schools first and to secondary schools later.

Table 2 shows that, as of 1997, roughly one out of three teachers had a computer. By 2002, every teacher will have his or her own computer, and every school will have at least two multimedia computer labs with 30 to 50 networked computers per lab (depending on the number of students in a class).

By the end of 1997, about 20% of Korean schools had established LAN systems and were linked to the Internet. In 1998, responding to schools' concerns regarding high costs of Internet connections, the government introduced a line item in budgets to cover the costs of these fees, either by paying a one-time up-front charge for a dedicated line or a monthly portion of a school's telephone bill. More than 50% of schools subscribe to text-based PC online services from a local or national PC network company, although many are migrating to full

Table 1: Number of Students per Computer (1997)

School Level	No. of Students per Computer
Primary	18.8
Middle	20.9
High	27.5
Vocational	7.2

Table 2: Number of Teachers per Computer (1997)

School Level	No. of Teachers per Computer
Primary	2.8
Middle	3.5
High	3.3
Vocational	3.8

Internet access, often being offered by the PC network company. By the end of 2002, all Korean schools will have Internet connections using high-speed lines such as ADSL or ISDN.

Implementation: Needs and Strategies

Using existing infrastructure in schools

With the growth of computer network infrastructure in schools, and policy support from the government, administrators and teachers have begun advocating online or distance teacher training using the advanced technologies already available in schools and training centers.

Each of the 16 provincial offices of education in Korea provides inservice programs through teacher training centers, and in collaboration with colleges and universities in nearby provinces. Several of these centers adopted the text-based computer network as a teaching and communication tool along with conventional face-to-face training methods. This required little investment since the network companies conducted the initial development of text-based teacher training materials in order to attract subscribers from teacher groups, and the technology was already in the schools.

Nine of the teacher training centers have used the PC network to distribute text-based course materials, announce important messages, and allow participants to interact with others on specific issues. These networks have also been used to encourage interaction between trainers and learners in 79 general and specialized training courses that were recommended to all secondary school teachers. The network has been used to supplement to conventional teacher training in most of the online programs, although little tutorial support from instructors was provided. However, some courses use the PC network as their main training medium, and these courses make greater interactivity with course instructors available to learners.

Teacher training centers operated by the provincial offices of education have adopted the text-based PC network using telephone lines because it is fast, economical, and utilizes schools' existing computer and network infrastructure. However, until recently, most centers have ignored the fact that schools usually have only a few telephone lines for all staff members and cannot assign separate telephone lines for teacher training. In addition, until 1998, schools were required to pay transmission fees. As a result, even though schools had computer and network systems that could be used for online training, those systems were not fully used because of a lack of telephone lines and transmission fees.

Only a limited number of schools, those with connection to a dedicated high-speed educational network system, encourage their teachers to use the school infrastructure for online training. Rather, most schools request that teachers use the school network only for administrative and direct instructional purposes. Teachers are encouraged to use the PC network at home to download training materials and to communicate with other teachers during their training. Teachers have thus become relatively heavy users of the text-based PC network using their home telephone lines. One commercial PC network company's internal report indicates that teachers are the second largest group of network users.

One lesson that can be learned from this experience is that in order to maximize the use of the school computer network system, financial support must be secured for both telephone lines and transmission costs. Fortunately, in 1998 the Korean government and the Provincial Offices of Education began to provide $1 million (US) for school transmission fees, with the allocation increasing to $3.4 million (US) in 1999 (MOE & KMEC, 1998).

Improving teachers' computer literacy

Since 1988, the Ministry of Education and the Provincial Offices of Education have provided inservice to enable teachers to use educational technologies in the classroom. Between 1988 and 1998, all primary and secondary teachers received 30 to 180 hours of training in ICT. In the early years, the training focussed on understanding computer technology, and acquiring skills in programming and developing computer-assisted instruction. Later, the focus shifted to emphasizing the educational use of computers and the network system in schools. However, this training consisted mainly of large group, face-to-face lectures with limited time for hands-on practice. Many teachers who were trained in the use of technology in teaching reported a lack of confidence in their ability to introduce computers and the Internet into their classrooms. They complained that most of the training time was spent in delivering information and not enough opportunities were provided for practice (KMEC, 1998a).

Online teacher training using the PC network was expected to provide teachers with the opportunity to actually use ICT for their own learning and thus, to improve the computer literacy of teachers. Is online teacher training really contributing to teachers' computer literacy? Is it promoting the use of technology in teaching and learning? Do teachers who use the PC network or Internet for their own learning develop computer literacy more effectively than others who receive only conventional classroom training in technology use? Even though no systematic study has been conducted to answer these questions, the following findings suggest that online teacher training has been effective in improving the computer literacy of teachers (KMEC, 1998a).

1. Many teachers who used the local PC network for their training later joined a voluntary online teachers' club, exchanged ideas and materials with other teachers and used online materials in their own teaching. Since the teachers' use of the computer network has increased, most of the PC network companies in Korea now provide online teachers' clubs. In a teacher's club, participants communicate with other teachers who have similar interests, and they share teaching materials and information. It appears that teachers who have participated in online training continue to use the network for purposes other than training.

2. Since 1991, hundreds of voluntary study groups have formed to promote computer use in schools. The Korean government provided initial operational funds to encourage voluntary study groups in schools. At least 50% of the teachers in these groups have taken one or more online training courses. Participants in online training appear to lead their schools' use of technology more actively than non-participants.

3. Those teachers who took an online course in the past tend to enroll in other online courses, and perform better in the courses than novice users

of online education (Jung & Choi, 1999). In general, the computer literacy skills obtained during online training tend to be applied to the next iteration of technology.

Establishing Cyber Teacher Training Center

A recent evaluation of inservice teacher training reported that as Internet use grows and expands in schools, there will be a growing need for flexible teacher training in the use of the technology, and quality training programs that allow the active involvement of teachers in their learning process (KMEC, 1998a). This report noted that most teacher training programs are delivered in a large classroom environment, with little interaction between instructors and teachers, or among teachers. It also indicated that teachers preferred online training since it provides a more flexible learning environment and allows them to be involved in more meaningful interaction without barriers of either time or space. The study recommended introduction of online teacher training programs using the Internet as a means to improve overall inservice teacher training.

To meet the need for the flexible and interactive teacher training outlined in the evaluation report, the MOE and the Ministry of Information and Communication jointly funded a project to create a Cyber Teacher Training Center (CTTC) [http://edunet.kmec.net] within the Korea Multimedia Education Center (KMEC) in the summer of 1997. KMEC supports implementation of online education in primary and secondary schools and provides online inservice teacher training. Using government funds, KMEC conducted various activities such as: (a) researching the current use of technology in schools; (b) implementing technology initiatives; (c) developing online learning materials for teachers, students and parents; (d) supporting schools in creating their homepages; and (e) providing a comprehensive educational Internet service called EduNet. In April 1999, KMEC and another government-supported institute, Korea Research Information Center, were united as the Korea Education and Research Information Services

The project to create CTTC developed a software platform for managing online teacher training, and 11 general education courses with more courses to be added each year. These courses, which target secondary school teachers, are now available through KMEC's EduNet and include titles such as "Computers and the Information Society," "Educational Reform," "Future Society and Education," "Environment and Education," and "Review of National Morality."

Most of the online training courses offered by the CTTC that have scheduled start dates are developed as self-directed and self-paced Web-based learning programs and last from a few hours to several months, depending on how the course is designed. The facilitator of each course is encouraged to provide online support and motivation to teachers, give task-oriented feedback and evaluate

the teachers' performance. Group discussions among the learners also are encouraged, with some courses requiring participation in one or two face-to-face tutoring sessions. Although teachers are sometimes evaluated on their participation in online discussions and are required to submit a report, all the courses include a final examination in a regular classroom. The final examination results are directly related to promotion.

Training centers in provincial education offices are encouraged to use CTTC's online programs free of charge and provide them to teachers within their respective provinces. Training centers may revise the online programs to meet their own purposes, or add other learning support services. Since early 1999, three provincial offices and the Korea National University of Education have used the online programs, although more centers are expected to use them in the future.

Formative Evaluation of Cyber Teacher Training Center

Teacher reactions and suggestions

A formative evaluation (KMEC, 1998b) was conducted to test the management platform of the Cyber Teacher Training Center, to obtain the learners' views, and to explore ways of improving the programs. The following is a description of the results of this evaluation.

1. Of the 680 teachers enrolled in 11 online courses, 54% responded positively to the online training courses.
2. Those who responded negatively cited a lack of appropriate instructional design strategies that allowed learners to use various features of the Internet such as online conferencing, e-mail and hyperlinks with other databases.
3. Approximately 43% of teachers used the Internet in their schools and 42% used it in the computer laboratory at the Provincial Office of Education or KMEC because of their high-speed connections and no transmission fees. Only 15% of the teachers studied at home.
4. More than 70% of respondents indicated that they preferred online training to the conventional method because of its flexibility and attractiveness.
5. Teachers commented negatively on the method of testing in their online training courses. They indicated that it was inappropriate to administer tests for online courses in a regular classroom, and 30% recommended an online test instead.

6. Lack of interaction between instructors and teachers, and among teachers, was reportedly due to instructors' time constraints and lack of online facilitating skills.

7. Most of the instructors in the online training courses were recognized and busy scholars in the specific content areas and were unavailable for frequent learning support. Teachers indicated that instructors' failure to respond, or delay in responding, to teachers' questions was one of the major problems with the online training courses.

8. Most instructors lacked the necessary skills to facilitate participants' online interaction. Well-organized online discussions with relevant topics can help learners acquire high-level skills such as problem-solving and knowledge construction, and stimulate active learner-learner interaction. Without prior training in online facilitating skills, many of those instructing online teacher training courses could not organize online discussions effectively and thus failed to provide interactive learning environments.

9. These results show the possibilities of Internet-based courses in providing a flexible learning environment, but also suggest several areas for improvement including instructional design, online facilitation and high-speed connectivity.

Factors affecting effectiveness

How might online teacher training programs be improved? The results of this evaluation suggest several points for the improvement of online teacher training programs. First, it is important to integrate instructional design considerations into the development and implementation processes of online training courses. Second, early training sessions should be provided to help instructors acquire effective online facilitating skills. Third, high-speed connectivity is important in promoting active use of the Internet in teaching and learning.

Another study (Jung & Choi, 1999) of two online training courses in the private sector confirms these points. Jung and Choi identify several factors that affect the educational effectiveness of online courses. In particular, good design strategies that incorporate various Internet features and encourage active interaction with the instructors and other learners in an organized way are closely related to the quality of online courses. Use of these strategies may also lead to greater perceived learning, high levels of learner satisfaction with the courses and greater information literacy gains.

Training costs

KMEC provides a common platform for developing and managing online teacher training courses, along with a sample of courses that can be revised easily and integrated into other training activities by individual training centers. In turn, online courses developed by training centers may be linked to the KMEC's EduNet and shared with other training centers. Although at this stage there is no concrete data comparing the relative cost-benefit of online versus conventional teacher training, sharing training programs among training centers is likely to reduce training costs in the long run.

An internal evaluation report prepared by the Distance Education Team in the Samsung Human Resources Development Center in Korea recommends a number of strategies to reduce training costs using the Internet. Some of the strategies recommended by the Samsung team include sharing courseware or databases with other training institutes, adopting student-led interaction, and increasing the number of times training with courseware is used. According to the report, if an Internet-based training course is used twice a year, for 3 years, with at least 400 trainees per year, then the cost of online training courses would be reduced by 10% to 15% as compared to conventional delivery formats.

Impacts

Teachers' increased interest in online training and the government's financial and policy assistance have motivated provincial training centers and other institutions to adopt online teacher training.

Adding more online teacher training courses

In addition to teacher training centers, some universities have begun to offer online teacher training courses. During the winter of 1998, over 40 teachers were enrolled in the Open Cyber University's online courses, and the Sookmyung Cyber Education Center had 100 teachers enrolled in its Web-based training programs for general English experts, TESOL experts and music therapists. In 1999, this center added additional online programs for child education experts and nutrition counselors. More online education providers are expected to offer Internet courses for teachers in the near future.

In the winter of 1998, the Ministry of Education sent an official notice to the 16 provincial teacher training centers announcing that 145 volumes of teacher training materials had been digitized by KMEC and were accessible via the EduNet or commercial PC network. These materials were intended for use by individual teachers, in face-to-face courses, or as resources for online courses offered by

the centers. Because teachers now have greater autonomy in selecting courses, many training institutions are preparing Web-based courses for teachers. It is likely that a more competitive teacher training market will emerge.

Raising instructional design and quality issues

The KMEC-designed online training courses were revised based on the teachers' evaluations. Some of the changes included: (a) adding more authentic cases, (b) requiring the active involvement of participants in online discussion groups, and (c) emphasizing online facilitating skills during instructor training seminars.

As a result of teachers requesting more individualized learning experiences in online training courses, some courses now offer learners the option to develop their own learning objectives and to select course content based on those objectives. The standardized format of the online teacher training courses must be adapted so that each course can meet the different learning needs of individual teachers.

Changes in teacher training policies and financing strategies

During implementation of online teacher training, it became apparent that there are a number of policies that function as barriers or impediments to online delivery. The policy that requires a certain number hours of classroom attendance for course credit, and the use of a norm-referenced grading system are examples of such barriers. In order that that new modes of education be integrated into the teacher education system, these barriers must be removed. For example, the current norm-referenced grading system within a specific training class consisting of 50 teachers may not be suitable for a online training course which is delivered to more than several hundred teachers. In fact, the norm-referenced test has been criticized by many educators because it has not adequately provided evidence that each teacher has achieved course objectives and shown teaching performance improvement. A criterion-referenced grading system must be integrated into the current evaluation system of online inservice teacher training courses since the teachers are encouraged to develop their own learning objectives and to select course content based on their individual objectives.

The evaluation studies also indicated that the government should provide incentives for teacher training institutions to restructure their programs and to include online teaching as part of their future initiatives. The government is expected to revise its teacher training policies to reflect the above considerations and to permit various forms of online education for teacher training.

Future Challenges

Without careful design of instruction, appropriate learner support services and continuous staff development and evaluation, the potential benefits of ICTs may not be realized. Many studies show that online education produce learning outcomes equal or greater to those of conventional face-to-face education if it employs appropriate techniques and skills in the design and implementation of its media-mediated learning programs (Carter, 1996; Jung & Choi, 1999; Russell, 1998; Thompson, 1996; Verduin & Clark, 1991).

Improving quality of teacher training

While Korea has explored some strategies to improve the quality of online in-service teacher education, as discussed here, it must continue to explore more sophisticated means of improving quality and effectiveness of online education. Future studies should address questions in the areas of instructional design, active learner involvement, motivation, and learner support.

Some of these questions have been answered. For example, in comparing two different instructional design strategies for Web-based training courses for corporate employees in Korea, Jung and Leem (1999) reported that a Web-based course which adopted design strategies to provide specific guidelines for self-directed learning appeared to be more effective than a course which provided a more open-paced problem-based learning environment. The Web-based course, which presented content in small chunks, provided specific guidelines to help learners manage their daily learning schedule and provided opportunities for self-examination through various types of checklists. The completion rate for this course was 93%, and the average grade was 85%. In another Web-based course, each learner was asked to solve authentic problems individually, using various online resources. Later, students collaborated with other learners to improve individual solutions. The completion rate for this course was 72%, and the average grade was 62%. It was determined that a course that required active online discussion and individual research for Web resources without specific guidelines was somewhat inappropriate in a corporate training context in Korea. But with teachers, these results may not be applicable.

Yet another example is a study that explored motivational strategies for online education. Gunawardena and Zittle (1997) reported that *social presence* – the degree to which a person is perceived as a real person in the media-mediated learning environment created by instructors – was a strong predictor of learner satisfaction, and thus, motivation, in a computer conference.

There has been little empirical research exploring the effects of specific design strategies on students' learning and motivation. Future research should examine effective design strategies to develop quality online teacher training courses in

a variety of learning contexts.

Reducing training costs

Cost reduction is frequently cited as an objective to be served through the introduction of ICT in education. Declining ICT costs have made computer-aided and online instruction increasingly feasible. Moreover, the cost savings of distance education using advanced technologies are much greater than in the past (Wolff, 1999). Nonetheless, costs are still significant in most countries and investment tradeoffs must be made. In fact, not much research has been conducted to assess cost-effectiveness of Internet-based online education. Even in the studies of cost-effectiveness of online education, costs of development or costs born by students are often excluded (Bakia, 2000), and "many are incomplete or use competing methodologies, making them difficult to compare" (p. 51).

Examining the costs of shifting from print-based courses to online delivery, Inglis (1999) showed that online delivery was less economical, when measured on a cost per student basis, than print-based delivery for four different intake levels (50/100/150/200 students). The distribution costs (such as ISP charges and individual support) for online courses represented a major component of overall costs. It is likely that the costs of mounting subjects online will be considerably higher, rather than lower, than the estimates given in this paper. The results of this study, in part, reflect the fact that in traditional print-based distance education most of the economies of scale that are obtainable in the design, development and delivery stages have already been obtained. Several strategies to balance costs with benefits in online education are suggested.

Whalen and Wright (1999) report that Web-based training has higher fixed costs than classroom based training but these higher course development costs are offset by lower variable costs in course delivery. In general, Web-based training is more cost-effective than classroom teaching mainly due to the reduction in course delivery time and the potential to deliver courses to a larger number of students in Web-based training. Because of the cost of having a live instructor and the greater student salary costs due to the extra time required to deliver the course, asynchronous teaching on the Web was more cost-effective than synchronous teaching on the Web. Also, the online education platform costs affect cost per course due to the different license fees and upgrading costs across the platforms. The amount of multimedia content in the courses was an additional significant factor in costs.

A preliminary report of cost-effectiveness of online courses at the Korea National Open University (Jung & Leem, 2000) shows that the development and delivery costs for online education decrease over time (cost per online course was $12,768 [US] in 1998 and $7,902 [US] in 1999). When compared with a

traditional distance education course which used TV and textbook, an online course had higher completion rate (93% in the online course versus 55% in the traditional course) and thus lower cost per completer. The students in the two different courses show significant differences in learning achievement and technology literacy level (Jung & Leem, 2000).

While the studies reviewed above provide some ideas about cost-effectiveness of Internet-based online education, we still need rigorous, experimental studies in various contexts to make a firm conclusion on cost-effectiveness of online education.

Enhancing self-directed learning skills of teachers

It is often assumed that adult learners can successfully complete an instructional program if the program is well designed and taught effectively. But distance teaching experience in many countries reveals that the successful completion of an online program requires adult learners to possess self-directed learning skills. Based on research evidence, Capper and Fletcher (1996) found that adult students most likely to drop out of distance education courses are field-dependent – that is, more influenced by the surrounding environment – and have an external locus of control, lacking self-regulation in their learning. In other words, distance education is easier for those who have self-directed or self-regulated learning skills (Butler & Winne, 1995; Moore & Kearsley, 1996; Thompson, 1984).

A variety of studies introduced strategies for supporting distance learners to complete their programs: providing academic, social and administrative support services through study centers, encouraging study group activities, allowing students' own pacing of study and assignment, and providing opportunities for synchronous and asynchronous interaction using various technologies (Candy, 1991; Capper & Fletcher, 1996; Sewart, Keegan & Holmberg, 1983). It is also suggested that organized sessions to facilitate self-directed or self-regulated learning, along with a long-term vision, are necessary to help learners develop and strengthen competencies such as an understanding of the concepts of online learning, how these differ from the traditional concepts of education and the ability to manage and regulate their online learning processes. Needed is a system to enhance teachers' self-directed learning skills that are necessary to successfully complete online training programs. Since development of self-regulated learning skills takes time and effort, offering a required one-credit course on self-directed learning at a very early stage of online education could perhaps increase both completion rates and the quality of learning for inservice teachers.

Conclusions and Recommendations

Online teacher training is seen to have several benefits: (a) teachers can access inservice training without leaving their classrooms; (b) teachers can improve their computer literacy; (c) teachers are better able to interact with their trainers and other teachers online; and (d) once a database of online courses has been developed, teachers can access those courses that meet their individual needs. Although sufficient data to support this is not yet available, online teacher training also shows a possibility of being more cost-effective and efficient.

Online media eliminate the spatial limitations and time constraints of more conventional teacher training methods, removing the need for the learner to be present at a training site at a designated time. If designed and used properly, information and communications technology has the potential to make teacher training more effective, affordable and flexible. Korea's experience with inservice online teacher training suggests several strategies for improving the quality of teacher training, reducing training costs and developing appropriate training policies. Strategies for improving the quality of online teacher training include:

- Applying a systems approach to training program design
- Encouraging trainer-trainee and trainee-trainee interaction
- Building a regular monitoring and evaluation system
- Providing learner training for self-directed or self-regulated learning
- Investing in trainer training

Strategies for reducing training costs without diminishing quality include:

- Sharing online databases with other training institutes
- Building appropriate partnerships between the public and private sectors
- Encouraging use of already established infrastructure for training

Strategies for developing adequate legal and policy foundation include:

- Removing such barriers for online teacher training as requirements regarding classroom attendance and the use of a norm-referenced grading system
- Providing incentives for teacher training institutions to restructure their programs and to include online teaching as part of their future initiatives

References

Bakia, M. (2000, January/February). The costs of ICT use in higher education. *TechKnowLogia 2*(1) 49-52). Retrieved: May 30, 2001: [http://www.techknowlogia.org/]

Butler, D. & Winne, P. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research, 65*(3), 245-281.

Candy, P. C. (1991). *Self-direction in lifelong learning.* San Francisco: Jossey-Bass.

Capper, J. & Fletcher, D. (1996). *Effectiveness and cost-effectiveness of print-based correspondence study.* Alexandria: Institute for Defense.

Carter, V. (1996). Do media influence learning: Revisiting the debate in the context of distance education. *Open Learning, 11*(3), 31-40.

Farrell, G. M. (1999). Introduction. In G. M. Farrell, (Ed.) *The development of virtual education: A global perspective* (pp. 1-12). London: The Commonwealth of Learning.

Gunawardena, C.N. & Zittle, F.J. (1997). Social presence as a predictor of satisfaction within a computer-mediated conference environment. *American Journal of Distance Education, 11*(3), 8-26.

Harasim, L., Hiltz, S., Teles, L., & Turoff, M. (1995). *Learning networks: A field guide to teaching and learning online.* Cambridge: MIT Press.

Hillman, D.A. (1999). A new method for analyzing patterns of interaction. *American Journal of Distance Education, 13*(2), 37-47.

Hiltz, S. R. (1994). *The virtual classroom.* New Jersey: Ablex Publishing Corporation.

Inglis, A. (1999). Is online delivery less costly than print and is it meaningful to ask? *Distance Education, 20*(2), 220-239.

Jung, I. S., & Choi, S. H. (1999). A study on factors that affect on effectiveness of online open and distance training in a large corporate setting. *Korea Journal of Educational Research, 37*(1), 369-388.

Jung, I.S. & Leem, J.H. (1999). Design strategies for developing web-based training courses in a Korean corporate context. *International Journal of Educational Technology, 1*(1), 107-121.

Khan, B. (1997). *Web-based instruction.* New York: Education Technology Publications.

KMEC (1998a). *Educational informatization evaluation report: Inservice teacher training evaluation.* Internal report: Korea Multimedia Education Center.

KMEC (1998b). *Establishing a cyber teacher training center.* Internal report: Korea Multimedia Education Center.

MOE & KMEC (1998). *Educational informatization white book.* Internal report: Ministry of Education & Korea Multimedia Education Center.

Moller, L. (1998). Designing communities of learners for asynchronous distance education. *Educational Technology Research and Development, 46*(4), 115-122.

Moore, M. G. & Kearsley, G. (1996). *Distance education: A systems view.* Belmont: Wadsworth Publishing Company.

Perraton, H. & Potashnik, M. (1997). *Teacher education at a distance.* Washington, DC: World Bank.

Russell, T. (1998). *The No Significant Difference Phenomenon as reported in 248 research reports, summaries, and papers.* Raleigh: North Carolina State University.

Sewart, D., Keegan, D. & Holmberg, B. (Eds.). (1983). *Distance Education: International perspectives.* London: Croom Helm.

Thompson, G. (1984). The cognitive style of field dependence as an explanatory construct in distance education drop-out. *Distance Education, 5*(2), 286-293.

Thompson, M. M. (1996). Distance delivery of graduate-level teacher education: Beyond parity claims. *Journal of Continuing Higher Education, 44*(3), 29-34.

Thompson, M.M. & Chute, A.G. (1998). A vision for distance education: networked learning environments. *Open Learning, 13*(2), 4-11.

Trentin, G. & Scimeca, S. (1999). The roles of tutors and experts in designing online education courses. *Distance Education,20*(1), 144-161.

Verduin, J.R. & Clark, T.A. (1991). *Distance education: The foundations of effective practice.* San Franscisco: Jossey-Bass.

Whalen, T. & Wright, D. (1999). Methodology for cost-benefit analysis of web-based tele-learning: Case study of the Bell Online Institute. *American Journal of Distance Education, 13*(1), 24-44.

Citation Format

Jung, Insung (July, 2001) Issues and Challenges of Providing Online Inservice Teacher Training: Korea's Experience. *International Review of Research in Open and Distance Learning*: 2, 1. http://www.icaap.org/iuicode?149.2.1.5

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (July, 2001)

Interactive Television in Schools: An Australian Study of the Tensions of Educational Technology and Change

Terry Evans

Elizabeth Stacey

Karen Tregenza

Abstract

This paper outlines some key issues that arose from several projects that investigated the use of interactive television in schooling. In this paper we draw on these projects, to illustrate and discuss how a (then) new form of distance education – satellite-based, narrowcast ITV – was designated for use in primary (elementary) and secondary (high school) classroom settings, how it was implemented, and how it collapsed as an endeavour. Issues raised by students, teachers and administrators are related to each to illustrate how ITV slowly declined over several years, despite its usefulness for some and strong support from those involved.

Introduction

The origins, changes and use of interactive television (ITV) in the school system in the State of Victoria, Australia have been studied by the authors for over 8 years through 3 different research projects. Two projects were funded by the Australian Research Council (ARC) and one by Deakin University[1]. They provided a perspective on the interrelationships between changes to government policy, changes to an educational technology and the consequences for schools (see Evans, Stacey & Tregenza, 1999a, 1999b, 1999c, 1999d, 2000a, 2000b; Evans & Tregenza, 1993, 1996a, 1996b). In this article we draw on these projects, especially on the final and largest study, to illustrate and discuss how a (then) new form of distance education – satellite-based, 'narrowcast' ITV – was designated for use in primary (elementary) and secondary (high school) classroom settings, how it was implemented, and how it collapsed as an endeavour. The issues raised by students, teachers and administrators are counterposed with each other to show how a potential innovation gradually sank with hardly a ripple. The ways in which the authors were drawn into the politics of the sinking are discussed.

Context

Victoria is the second most populous (about four million people) and second smallest in area (about the size of Britain) of the Australian states. It has a significant rural population and some isolated communities. The first correspondence schooling in Australia commenced in Victoria, and schooling through distance education continues until today, although it is the other mainland states and the Northern Territory, with their far more remote and vast spaces, which retain a stronger profile in schooling at a distance, particularly through the Schools of the Air. The use of satellite, cable and, increasingly, digitised forms of ITV broadcasting and "narrowcasting" has become an important feature of distance schooling in countries where geography, demography and/or climate make it difficult to provide efficient traditional schooling across the range of curricula required of schools. Canada and Scandinavia are two other examples of ITV being significant in schooling (Haughey & Roberts, 1996; Meisalo, 1996). In Australia, Victoria's SOFNet (Schools of the Future Network) is arguably the most widespread system-wide ITV provision of any similar school system in the world (Aliani, 1995).

The origins of the use of ITV in the school sector in Victoria go back to 1992. The Labor (centre-left) government's Directorate of School Education (DSE) provided two professional development courses for teachers through 88 post-primary and Technical and Further Education colleges in regional and rural areas using satellite transmitted interactive television (ITV). Programs consisted of live one-way television transmission with the interaction sustained by live telephone link, or delayed fax. ITV was a marked change from the usual approach to the professional development of teachers in Victoria which was (and mostly is) usually completed either during school hours, professional development days or during evenings, weekends and holidays. The potential time and cost reduction of using ITV, especially for country teachers and schools, was seen as substantial.

In 1993 the Labor Government lost office in a landslide election to a Liberal – National Party (centre-right) coalition. The new government had a strong reform agenda which was congruent in style and intended outcomes with many, especially right-leaning, Western governments. Schooling was an important area for reform for this Government. Its goals were to reduce costs, reduce the influence of the unions, increase accountability measures, and refocus the curricula and the testing and assessment systems. Perhaps contradictorily, the new government also sought to centralise political and bureaucratic control over schools, whilst simultaneously devolving more responsibilities to them (including budgets).

The Coalition Government's policy for school reform was entitled *Schools of the Future* and it served as a counterpoint to the less rosy actions it was taking. Within its first months the stage was set for massive staff reductions (in

teaching, support and regional administrative positions) together with school closures and amalgamations. These cuts to the education budget were said to be necessary to help reduce state debt, and to provide the capacity to reorganise schools and equip them with new technology, hence, build the *Schools of the Future*. As part of this future, the Minister of Education decided that ITV would be expanded into a statewide network for all government schools, with non-government schools being invited to join. Schools were provided with a satellite receiving dish, decoder and wiring to one room. It was decreed that the system would now be titled 'SOFNet', which stood for 'Schools of the Future Network'.

Significantly, SOFNet programs were to be vastly expanded to have a central role in providing teaching and support for key curriculum areas, and also for the dissemination of 'corporate' information, alongside its original professional development brief. In an unrelated part of the *Schools of the Future* policy, the Government issued directives that at least one Language Other Than English (LOTE) be offered in primary schools, and at least two in secondary schools. It also required a boost in the level of science and technology studies, and a revised Victorian Certificate of Education (VCE – Year/Grade 11 and 12 assessment) was introduced. As there were considerable shortages of teachers qualified to teach in the LOTE, science and technology areas, especially in rural and remote schools, SOFNet was marshalled to support these directives. Hence, its mandate to offer teaching and support for these key curriculum areas came to dominate the transmission times and program resources although other programs were produced on particular subjects, such as on welfare and career matters.

By 1997, the Department of Education (the Coalition Government renamed the DSE the DoE – in Australia it is common for new governments to rename their departments, despite the costs and disruption involved) was reporting that 600 hours of programs were broadcast, 2,500 schools participated and an estimated 100,000 students learned another language via SOFNet (Victorian Department of Education, 1997). The main program series were Science and Technology Education in Primary Schools (STEPS) and Primary Access to Languages via Satellite (PALS). These two programs dominated the transmissions, especially PALS as it had different transmissions for the languages it covered: Italian, Indonesian, Mandarin, Japanese, French and German. Similar secondary programs, SALS (Secondary Access to Languages via Satellite), were also developed.

Until 1998 students from anywhere in Victoria, and from a few ITV-connected schools in South Australia and New South Wales, were able to participate in each program live-to-air. They talked by phone with the teacher (presenter) in the studio. Somewhat contentiously, as is explained later, after 1998 the opportunities to interact were ceased or greatly curtailed to the extent that SOFNet became more of a video distribution network for schools to record their own video-cassettes of the programs.

Alongside the programs delivered by SOFNet, participating schools received comprehensive materials comprising a list of resources required for each program, the expected student outcomes, a brief summary of the program format, and detailed descriptions of the activities to be undertaken. The interactive programs were either weekly or fortnightly, and of 30 minutes or 1 hour duration, depending on curriculum area and the year level. Typically, teachers were expected to prepare for each program, and to have their students complete work and activities before and/or afterwards. By 2000 there was an increasing use of e-mail and of a SOFNet Web site to complement and enhance the programs.

From the outset when ITV was first seen as a professional development medium for teachers in rural and remote schools, the intention was that other members of the community could use the facilities outside of schools' transmission times. Therefore, some community, professional and government organisations used the ITV system for either special individual programs, or even series. Examples are programs on matters of public health for community health staff, or on mandatory reporting of child-abuse for teachers, child-care workers, and health professionals. ITV was also used for special schools programs. A good example is the "Communicating over the Catchment" programs that were transmitted annually for 3 years. The programs were a form of student conference around conservation and environmental issues, principally focused on the Murray-Darling River basin. Each year it was developed and broadcast live from Melbourne Zoo with support from the Murray-Darling Basin Commission. The program consisted of 2, 1 hour programs about conservation issues, using students' activities and school locations. It provided students with the capacity to interact live with zoo experts via telephone, fax, e-mail or Web Chat.

Research Plan

As was noted in the introduction, this article draws mainly on an ARC Large Grant research project conducted by the authors from early 1998 to late 2000. The research aims included:

- To investigate, record and analyse, the use of ITV in primary and secondary schools, especially in terms of the development of interactive and dialogic approaches to teaching and learning.
- To study the processes through which teachers and students adopt, and adapt to, the interactive and dialogic elements of ITV.
- The research used qualitative research methods to develop case studies of the implementation and use of ITV in selected schools. The criteria for selection in 1998 and 1999 included being a regular, 'live' SOFNet user, although some of the case-study sites did use a mixture of both live and

taped programs. The 2000 fieldwork focused on the use of videotaped programs, although covering live programs (usually professional development) where offered.[2]

The case studies involved the use of several different methods, from the collection, collation and analysis of documents, through interviewing of key informants, to observations of ITV lessons in schools, meetings and ITV production sites. Using the transcriptions of observations and interviews, together with the other material collected, the data were reviewed to identify key themes that emerged, and organised using the *Non-numerical Unstructured Data Indexing, Searching and Theorising* (NUDIST) qualitative data analysis software.

The first phase of the research in 1998 involved the selection of seven primary schools, five Victorian and two interstate primary schools, each being from either a country, regional or metropolitan region. Two were non-government schools. Each primary school ITV case study was conducted simultaneously and, where possible, covered the STEPS and PALS programs. Throughout the year teachers were invited to discuss the children's learning through ITV, as well as their own experiences of teaching with, and alongside, ITV. Typically, the ITV broadcasts were only part of the timetable for the particular curriculum area and the teachers worked with the children 'off-air' in other timetabled sessions. Selections of these lessons were also observed in addition to the actual ITV broadcast sessions that were watched, either live by the class, or taped and played back at another time.

The second phase of the research in 1999 involved six Victorian and one interstate secondary school. The curriculum areas selected for study at these schools again were chosen from those offered to secondary schools via ITV. In addition to the specific focus on the case studies, a sample was also made of other uses of ITV in the schools and by the Department of Education.

The research also extended into 2000, principally because the shift to video use was occurring and this was seen to be of significance. This involved follow-up work in the schools covered in 1998 and 1999, plus one new primary school and two new secondary school case studies which became involved in using SOFNet. We studied a total of 17 schools using SOFNet out of 98 registered 'users'.

Research Overview

A total of 123 SOFNet participants were interviewed for this research project. This included: (a) 25 teachers; (b) 95 students ranging from Grade 1 to Year 11 (individual and group interviews); (c) two program developers/presenters and (d) one Department of Education manager. Over 60 site-visits were made for classroom observations and other fieldwork, together with visits to pre and/or post program classroom sessions, production sites and so forth. It was during

the school visits that teachers raised many administrative issues that inhibited or limited their use of SOFNet. The most prevalent factors were program scheduling and school timetables that dictated whether SOFNet was adopted in schools. These factors consequently posed problems in conducting the research, especially around scheduling observations of SOFNet classes.

A major factor contributing to schools' difficulties in adopting SOFNet was the insufficient period of notice of program schedules and content and the flexibility of schools' approaches to ITV affected each SOFNet program's effectiveness. If a program could not be scheduled easily into a school timetable or there was inflexibility in the manner and timing of the school's viewing of the program, classroom teachers could not always access the live and taped broadcasts to suit the children's learning, and could not customise the programs to fit their circumstances. This was particularly a problem in the secondary schools where the timetables were more rigid and often led to programs being taped for later use. In secondary schools, programming schedules are required well before the next year's timetable is set. In primary schools, program content details are required well before the term's curriculum is planned so that not only can the SOFNet programs be scheduled, but also so they can be integrated into the curriculum in a meaningful way. The teachers' use of the program notes in their curriculum planning depended on their receiving this information well ahead to allow long term planning. The normal SOFNet scheduled procedures (a fortnightly program schedule publicised in the Education Department's newspaper, *Education Times*) were inadequate in these respects, often resulting in the teacher's deciding not to participate.

Even the normal schedule procedures were not always adhered to, consequently program information and materials arrived so late as to render the schools' use of programs ineffective. For example, information and materials for the interactive Horizons programs for gifted students were received either the day before, or on the day the program was to be broadcast. On occasion, some programs were never publicised at all. While other programs provided information 2 weeks in advance, teachers felt this too was inadequate. Teachers thought that, as had happened in 2000, delivering resources electronically would increase the notice. However, it seemed that the time saved by online distribution of information about schedules and special programs was used by the program administrators to ease their schedules. As they no longer had to allow for possible postal delays, schools received notices even later! In some instances, special programs were so poorly publicised that schools were not even aware that they existed until the research team contacted them to see if they intended using the program. Due to the research team's regular contacts with the program-makers and administrators, it was often the case that the team would be providing advanced notice of forthcoming SOFNet programs, content and timing. This had the effect of influencing the nature of the research and potentially its outcomes. It was clear that, in some instances, schools were able to be observed only because they chose to view a program on the basis of information we provided in the course

of establishing if they were likely to use that forthcoming program.

As noted previously, ITV broadcast sessions and pre and/or post lessons were observed by the research team. When two or more case study schools were using the same program live, often doing the pre/post activities immediately before and after broadcasts, the team endeavoured to cover all the sites so that comparisons could be made later by the researchers. Generally, however, single observations were made and recorded by either hand-written or laptop written notes which were then fully written later and subsequently coded as described below.

Overview of the findings

The researchers offered to provide a confidential summary of findings to each school that was tailored for them. In addition, similar tailored summaries were offered to program makers and the managerial team for SOFNet. As a result the research team was also invited to present a summary to some of the key government bureaucrats responsible for educational technologies (Evans et al., 2000a). During the course of these presentations the key issues involved in the operation of SOFNet were discussed, as were the issues involved if it were to continue. We present an overview of two main issues, interaction and the shift to video, before outlining additional points we conveyed to the participants. Although our research was not an evaluation, it yielded some findings that served a similar purpose. It was considered that the sharing of such findings with the research participants was a way of ensuring that they benefited from the research as well as the researchers and the scholarly and educational communities more generally.

Interaction

The interactive elements of the SOFNet programs were valued as central to the use of ITV by the teachers and children, and to the program makers and SOFNet management. In order to manage the numbers of live-to-air interactions, typically a few schools would be nominated to interact for a particular program. This would be done in advance so that the teachers could make the necessary arrangements for children to use a phone in an adjoining office or a mobile phone away from the classroom to prevent acoustic feedback. The interactive elements took many forms. They could be live-to-air question and answer sessions between children and the program presenters, for example in a LOTE area where matters of pronunciation were important. Or they could be tasks for the children to do which they would then fax to the program makers and discuss with them by phone. All schools would be encouraged to interact 'off line' so, for example, comments on other schools faxed work, or on e-mail

queries, and so forth, would be provided on-air in the next program. The intention being that to mention a school and a child on air would encourage the interactive participation in the program.

When schools were able to participate, interaction became an important part of the learning process for the students and an important professional tool for the teachers. For students, interactive points in the programs were particularly motivational and provided a pacing mechanism for their learning. The interactive elements encouraged all students to enter into a dialogic process within the class. Students generally focused intensely on the ITV interaction and the motivation of preparing a response improves the importance and quality of the shared experience. In both secondary and primary classrooms it was a motivational highlight for the children to talk to the presenters and to be an audible part of the satellite transmission or to fax questions or class work during or after the program and to have it acknowledged by the presenters subsequently.

For teachers, particularly in rural schools, it was a chance to see how other teachers and children interpreted the lessons and to see from another teacher's viewpoint if they were proceeding appropriately. In languages particularly, the program served as a model for correct pronunciation to teachers. These were not qualified LOTE teachers, indeed, with few exceptions, the teachers also had no prior experience in either speaking the particular language. Some of the teachers we observed had developed a considerable facility in the LOTE being taught and this was all due to them using the ITV programs and resources over a few years. A few had also decided to undertake further study in the particular language mainly because they had become intrinsically interested in it, not merely to enhance their skills.

The interactive elements of SOFNet helped create a sense of community amongst the participating schools. There were instances of teachers contacting other teachers they had 'met' through SOFNet programs. This new community or network was particularly valued by rural schools who see themselves as isolated from the mutual benefits that suburban schools enjoy by working together on educational, sporting and cultural activities. The opportunity to have a window on other schools was also sustained by the program makers who often used schools as locations to shoot particular scenes for programs. Hence, interaction and dialogue becomes located socially and geographically for the persons involved and is not merely about squirting stimuli-responses back and forth via cable or satellite.

The regular interactive broadcasting of the programs provided momentum for keeping pace with the sequence of the syllabus and not letting other factors interfere with planning and timetabling. Teachers found that, as the interaction declined, especially by 2000, it became easier to skip programs and then fall behind the necessary pace to cover the required learning in a term.

A common comment made in the students' interviews was that they liked watch-

ing and hearing other children interact. They participated in a form of vicarious interaction themselves when others were involved. Our classroom observations bore this out, as it was often noted that the students' attention was more focused on the program when interaction was occurring, than when it was not. Of course, when their school was nominated to interact live the excitement was palpable in the primary schools, and even secondary students exhibited heightened interest. The most common recommendation made by secondary and primary students was the involvement of school students in all programs, both through location shoots in schools and especially through interactive elements in programs. A Grade 6 metropolitan student noted that, '(i)t's easier for us to learn when they do it with other students...because they ask questions and they do the same things we would do if we were there.' Even secondary students responded positively to the interactive element because they could ask questions on the spot and the answers had the credibility of seeming honest. They showed a cynicism about mainstream broadcast television saying that with ITV they didn't use 'media manipulation' in answering as the presenter 'always gave them what he knew or thought, not what people wanted to hear.'

Video-recorded programs

Due to the administrative problems and the timetabling difficulties which larger schools experienced, it was very difficult to sustain even a modest number of schools using the programs in the interactive way that they were designed. Instead of addressing these problems, SOFNet as an interactive classroom curriculum provider was put into a slow glide toward oblivion. During late 1999 and into 2000 there was a gradual reduction in both interactive segments and school location shoots, also live programs were removed and replaced with tapes of previous programs. By 2000 plans were afoot to turn the live SOFNet programs into taped programs that would be transmitted for schools to record. However, even during the shift away from live and interactive programs, where the difficulties of administration might be expected to be greater, the administration was seen by the teachers to be as inefficient. Teachers complained that particularly the STEPS program notes had continued to be too late for effective planning (arriving in the last week of the preceding term). Though PALS materials did arrive on time, the program did not always match the notes received which meant that the essence of the lesson could be lost because the teacher and students could not follow the content as they had no vocabulary to consult. Teachers were frustrated that they could not plan their curriculum adequately, budget for materials for Science activities and, in the case of the Horizon programs, the lateness of detail meant no preparation could be done at all and the lessons could not be integrated into the school program in any meaningful way.

Contrary to what teachers had been led to believe would be the case, in the video programs STEPS did not incorporate students' work and had little video

footage in schools or with promised student involvement in other forms replacing the interactive elements. Though the PALS programs allowed for flexible timing and review as anticipated, the teachers thought the quality of the programs on video had deteriorated and was repetitive of earlier programs with the teachers having to edit them for class use. Students had lost interest and were bored with the programs with the interactive element removed, as without the network of communicating schools and presenters, the activities seemed lacking in authentic 'real world' purpose. Teachers thought that few newcomers to SOFNet would persist with the programs in their new format.

These difficulties were of less concern in the secondary schools, as they had often used some or all the programs by video recording as a way of overcoming timetabling difficulties. A new series of science programs called TREK was designed with no interactive elements and was well received by students. However, the interactive Horizons programs, despite their lower production values than the TREK programs, seemed to provide an immediacy and a currency in its curriculum elements which the students responded to with enthusiasm. The secondary students expected a Web presence for programs such as these and were keen to follow-up particular programs researching via a designed Website with links to other useful and relevant sites. Secondary school students recognised the potential of e-mailing questions to the expert guests and program presenters as perhaps being more efficient than phone interaction.

The programs had met criteria for effective television and video (Bates, 1984; Crooks, 1990; McMillan, 1994) including clear communication of the purpose and intent of each program; a familiar program structure presented by enthusiastic and plausible presenters who personalise the medium for the student audience; as well as designed active engagement of the students in their learning, such as through the interactive activities, and appeared to be providing a resource with localised content and presenters that was a welcome addition to the secondary curriculum.

Summary of points additional to those above as they were communicated to the participants

Positive experiences

- An improved quality of both the STEPS and LOTE programs over their years of production was noted.
- Accompanying written resources of great benefit to designing an integrated curriculum particularly in the primary sector.
- Many teachers only achieved their LOTE language skills through the SOFNet programs and they acknowledged the value of the PALS program as a means of such professional development.

- SOFNet programs were particularly useful to the rural and remote schools who had less access to active learning resources like excursions to museums, galleries etc.
- The students commented on the stimulation of learning through ITV. They often found the SOFNet programs more interesting than their traditional classroom lessons.
- The pace and visual impact of the live television programs typically captured the students' attention to a degree that their teachers found difficult to sustain themselves.
- Interactive questioning of expert guests who provided them with feedback was valued by all students whatever the content of the program.

Both teachers and students spoke of the medium catering to visual and aural learners. Poorer readers and younger children who do not read as competently can learn more effectively from this visual medium.

Secondary students, who were able to reflect more articulately about their learning through SOFNet, had perceived that they learned well from a visual medium. Varying the medium and process or style of learning caters to a range of students' learning styles compared with a text based secondary curriculum.

Both primary and secondary students valued the active learning which often accompanied SOFNet programs and if they were involved in small group active learning as part of the program they learned effectively.

Negative experiences

- Many of the negative comments were about the first (pre-SOFNet) programs. Many of the schools contacted, who no longer used ITV, cited one of the main reasons as the poor quality of the programs.
- In both primary and secondary classrooms students seemed to find the pace of the PALS and SALS programs too fast and the level of vocabulary introduction too difficult for them. Though the teachers spoke about the motivating aspect of the programs, the students talked of not understanding anything other than the occasional word. The immersion method of continually speaking the language being learned seemed to be too difficult for the both primary and secondary students and the primary teachers often had to translate for their students. Though these problems were responded to after teacher feedback; this continued to be a problem for many students.
- Worksheets supporting the SALS (secondary) programs were considered repetitive and uninteresting by the students.

The demands of the 'crowded curriculum' also affected the adoption of SOFNet, particularly in the primary schools.

Assessment – there was no formal assessment of student performance after PALS, SALS or STEPS in any of the schools though teachers were aware of students' capabilities in an informal way. However, there did seem to be an overall view that after a few years of language learning via ITV, progress was made and when they reached high school the outcomes were obvious in students' initial competence in language classes. However when questioned most children professed to knowing little and being unable to hold a real conversation with a native (fast) speaker.

By presenting our research to the participants it enabled them to recognise that there were no absolute answers to the question of whether SOFNet was viable and effective or not. The answer rather depended on the viewpoint which one adopted to 'read' the results. For the schools, typically they recognised the positives and wanted someone to fix the negatives or as many of them as possible. Their view was that they wanted SOFNet to continue and be improved. The program makers usually took a positive view too, although their perception of some of the negatives was rather different because they were responsible for them. However, their solutions to the negatives often abraded with some of the positives, especially those concerned with the value of interactivity. The managers viewed it differently again and were more inclined to fix the negatives by abandoning SOFNet entirely. This view had emerged previously in our project as we explain below.

Concluding comment

The research demonstrated that if one took a qualitative 'insider's' view of the experience of SOFNet, that is an active-user school's view, then the conclusion would be that ITV was a viable and effective medium for use in schools. This would be especially the case in primary schools, even more so for remote or rural schools. However, the difficulties the researchers had in selecting schools to observe, demonstrated that for most schools SOFNet was barely a consideration. For some it was used as a resource, but not as an interactive medium. Very few actually used it in the way it was intended.

We identified during the research that the management in the Department of Education was becoming concerned about the low level of use of SOFNet and the negative responses from schools. This became a big concern for those who were involved in running SOFNet because they could see their operation under threat. They began to compile their own figures of registrations, use etc. However, our own research did not confirm their figures, or at least their interpretation of them. For example, by contacting registered schools we found that many did so

merely to get the materials and to tape the programs, much of which was not used. The Department's own evaluation then presented another view that was essentially negative in terms of the viability and feasibility, even if the programs were seen to be generally of high quality.

In essence our research was showing that for the primary schools at least, there was some really good use being made of SOFNet in the few schools that used it. The issue was were these schools just aberrations or was there something to understand from how they used it so successfully? As some of these primary schools were small rural primary schools the government was nervous about reducing their provision, not only on the grounds of equity, but also on the grounds that the social, economic and welfare decline in rural and regional areas was becoming (and remains) a matter of voters' concern.

As for the immediate future, SOFNet is currently in the midst of its fifth name change to *Schools' Television* hence removing any reference to the now defunct *Schools of the Future*. Interactive television as an innovative classroom technology and as a regular curriculum provision medium no longer exists and attempts are being made to utilise the network in other ways. The managers are attempting to generate more interest and greater usage of the network by other government departments and agencies; and the Director of Schools has committed to presenting a monthly interactive program for school principals commencing March 2001. A new producer is to be hired and the department's web-site redeveloped over the coming months to better reflect the current state of the World Wide Web.

As we complete this article it is unclear what will finally happen to SOFNet. Certainly, it has been further diminished and is losing even the schools which were committed users. Our research showed that, for those schools who made a commitment, there was a strong benefit for them and they were able to build a real strength around the use of SOFNet. It is also clear that for many schools the difficulties of working with SOFNet's scheduling, for example, was a hurdle they were not prepared to leap. This has contributed to a view in the schooling community that SOFNet is not workable and so it is never considered for use. It is probably this reality which will lead to the demise of SOFNet. However, it is a moot point to know whether, if SOFNet had been implemented differently, particularly with respect to its administration shortfalls, more schools would have used it and there may have been a stronger schooling community commitment to SOFNet.

References

Aliani, R. (1995). Primary and secondary access to languages via satellite (PALS & SALS) projects. In *Planning, practice and participation: Conference papers of the Second AFMLTA National Primary LOTE Conference*, Melbourne: Modern Language Teachers Association of Victoria Inc.

Bates, A.W. (1984). *Broadcasting in education*. London: Constable.

Crooks, B. (1990, March). *The potential of non-broadcast television technologies for learning and the implications for educational television design and research*. Broadcasting Research in the Nineties Conference, Tel Aviv, Israel.

Evans, T. D., Stacey, E. & Tregenza, K. (1999a, May). *Investigating teaching and learning in schools through interactive television*. A paper presented at the Computers in Education Conference, Melbourne, Victoria.

Evans, T. D., Stacey, E. & Tregenza, K. (1999b, June). *An investigation of the development of dialogic approaches to teaching and learning in schools through ITV*. Refereed paper presented at Ed-Media, the Association for Advancement of Computing in Education conference, Seattle, WA.

Evans, T. D., Stacey, E. & Tregenza, K. (1999c). Interactive television in primary schools: teachers' approaches to enhancing classroom based learning. In *Collected papers from the 14th Biennial Forum of the Open and Distance Learning Association of Australia. Open, Flexible and Distance Learning: Challenges for the new Millennium*, (pp.111-118). Deakin University: Geelong.

Evans, T. D., Stacey, E. & Tregenza, K. (1999d, November). Interactive television in primary schools: Children's experiences of learning with SOFNet. *Australian Association of Research in Education conference*, Melbourne.

Evans, T. D., Stacey, E. & Tregenza, K. (2000a). *Selective summary and recommendations on the use of SOFNet in schools during the period 1998-early 2000*. A report prepared for the Victorian Government Department of Employment Education and Training senior staff.

Evans, T. D., Stacey, E. & Tregenza, K. (2000b, December). *Close encounters in distance education: Research issues from case-study research on interactive television in schools*. Paper presented at the Research in Distance Education Conference, Deakin University, Geelong.

Evans, T. D. & Tregenza, K. (1993). *Interactive television for teachers' professional development: Some preliminary findings*. A paper presented at the Research in Distance Education 1993 seminar, Deakin University.

Evans, T.D. & Tregenza, K. (1996a, May). *Issues from three case-studies of*

the use of interactive television in Victoria, Australia. A paper presented at the Canadian Association of Distance Education conference, University of Moncton.

Evans, T.D. & Tregenza, K. (1996b, November). *Schools and SOFNet: Findings from a case-study project on the use of interactive television in three Victorian Schools*. A paper presented at the Australian Association for Research in Education Conference, Singapore.

Haughey, M. & Roberts, J. (1996). Canadian policy and practice in open and distance schooling. In T.D. Evans, & D.E. Nation, (Eds.), *Opening education: Policies and practices from open and distance education* (pp. 63-76). London: Routledge,.

McMillan, R. (1994). Some keys to unlocking learning with television. In M.S. Parer (Ed.), *Unlocking open learning, Centre for Distance Learning, Distance Education Centre*, (pp.107-119). Monash University: Churchill.

Meisalo, V. (Ed.). (1996). *The integration of remote classrooms*. Helsinki, FI: Dept. of Teacher Education, University of Helsinki.

Victorian Department of Education (1997). *What is SOFNet?*: *Victorian Department of Education satellite TV* (Video). Department of Education, Melbourne, Victoria.

Endnotes

1. **1993** Australian Research Council funded project, *An investigation of teachers' professional development by satellite broadcast interactive television in rural schools*. Terry Evans was the Chief Investigator on the project with Karen Tregenza as the Research Associate. 1995 – 96 Deakin University funded project, Two case studies of the impact of interactive television (ITV) on school cultures and practices. Terry Evans was the Chief Investigator on the project with Karen Tregenza as the Research Associate. 1998 – 2000 Australian Research Council funded project, An investigation of the development of dialogic approaches to teaching and learning in schools through ITV. Terry Evans and Elizabeth Stacey were the Chief Investigators on the project with Karen Tregenza as the Research Associate.

2. The implementation of the research and its analysis has been discussed by the authors previously (Evans, Stacey & Tregenza, 2000b).

Citation Format

Evans, Terry , Stacey, Elizabeth & Tregenza, Karen (July, 2001) Interactive Television in Schools: An Australian Study of the Tensions of Educational Technology and Change. *International Review of Research in Open and Distance Learning*: 2, 1.
http://www.icaap.org/iuicode?149.2.1.6

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (2001)

Learning Objects: Resources For Distance Education Worldwide

Stephen Downes

Abstract

This article discusses the topic of learning objects in three parts. First, it identifies a need for learning objects and describes their essential components based on this need. Second, drawing on concepts from recent developments in computer science, it describes learning objects from a theoretical perspective. Finally, it describes learning objects in practice, first as they are created or generated by content authors, and second, as they are displayed or used by students and other client groups.

The Need for and Nature of Learning Objects

Some Assumptions and a Premise

Before launching directly into a discussion of learning objects, it is important to examine some assumptions and a premise. The first assumption is that there are thousands of colleges and universities, each of which teaches, for example, a course in introductory trigonometry. Each such trigonometry course in each of these institutions describes, for example, the sine wave function. Moreover, because the properties of sine wave functions remains constant from institution to institution, we can assume that each institution's description of sine wave functions is more or less the same as other institutions'. What we have, then, are thousands of similar descriptions of sine wave functions. Now suppose that each of these institutions decided to put its "Introductory Trigonometry" course online. This is no stretch; the International Data Corporation estimates that 84% of four-year colleges will offer courses online by 2002 (Council for Higher Education Accreditation, 1999). The result will be thousands of similar descriptions of sine wave functions available online.

Now for the premise: the world does not need thousands of similar descriptions of sine wave functions available online. Rather, what the world needs is one, or maybe a dozen at most, descriptions of sine wave functions available online. The reasons are manifest. If some educational content, such as a description of sine wave functions, is available online, then it is available worldwide. Even if only one such piece of educational content were created, it could be accessed by

each of the thousands of educational institutions teaching the same material. Moreover, educational content is not inexpensive to produce. Even a plain web page, authored by a mathematics professor, can cost hundreds of dollars. Include graphics and a little animation and the price is double. Add an interactive exercise and the price is quadrupled.

Suppose that just one description of the sine wave function is produced. A high quality and fully interactive piece of learning material could be produced for, perhaps, $1,000. If 1,000 institutions share this one item, the cost is $1 per institution. But if each of a thousand institutions produces a similar item, then each institution must pay $1,000, with a resulting total expenditure of $1,000,000. For one lesson. In one course.

The economics are relentless. It makes no financial sense to spend millions of dollars producing multiple versions of similar learning objects when single versions of the same objects could be shared at a much lower cost per institution. There will be sharing, because no institution producing its own materials on its own could compete with institutions sharing learning materials.

Courses? No, Not Courses

If we accept the premise that institutions will share learning materials, then we need to ask, what will they share? The answer that intuitively offers itself is – courses.

Many sources of online learning materials, for example Telecampus [http://courses.telecampus.edu/], or the Web of Asynchronous Learning Networks [http://www.aln.org/], list only courses. These are good listings; they are divided into subject areas, with each subject page containing a list of similar courses offered by different institutions. These lists of courses are directed at potential consumers of learning material, that is, students. Students are typically motivated by an interest in a topic (Downes, 2000) and select courses from the list of offerings in that topic. Moreover, students are typically *offered* learning materials in course-sized units, and attempt to complete degree of diploma programs defined as sets of related courses.

Why, then, would institutions not share these courses? To a certain degree, they already do so. Most colleges and universities define course articulation policies, whereby a course completed at one institution is accepted for credit at another institution. A good example is the Baccalaureate Core Course Equivalency defined by Oregon State University for courses at thirteen regional community colleges [http://www.orst.edu/Dept/admindb/arttable/scr1140_arttab.htm].

Course articulations are the result of complex negotiations between teams of

academics. Consider, for example, the information contained in the Illinois Mathematics and Computer Science Articulation Guide [http://www.imacc.org/articulation/]. To count as equivalent credit for, say, a trigonometry course, a candidate course must require certain prerequisites and contain material covering a certain set of topics.

Course sharing between institutions is difficult to define and maintain. One reason is the regional nature of course articulations – it is notable that Oregon State University has made no attempt to articulate courses offered by, say, community colleges in Florida. The detailed topic-by-topic definition or articulation agreements are also a challenge. It is unlikely that *any* course could be shared by any significant number of institutions in different states or different nations.

This disparity is also reflected in online course listings. Returning to the Telecampus guide we find twenty separate history courses listed [http://courses.telecampus.edu/subjects.cfm?category=12]. No two courses share the same name. And though a number of courses focus on the same region and time period, no two courses share the same contents. This is true to a degree more or less across all subjects and across all institutions. Although courses may share elements in common, it is rare to find two courses from two institutions that share the same, and only the same, set of elements.

Thus, courses themselves are *not* suitable candidates for sharing. Yet the dominant form of online educational today is the course. So it should come as no surprise that there is very little sharing of educational resources, even online resources, despite the tremendous cost savings. Despite what the world needs, what the world is getting is 1,000 different versions of "Introductory Trigonometry". It makes no sense, and the current system will have to change.

Sharing the Old Way

Whether at the K-12 or college level, today's classroom is already an example of extensive resource sharing. While it is likely that neither the producers nor the consumers of these resources would describe the transactions as "sharing", if we define *sharing* as one centrally produced resource used by many, then these classes are sharing resources. The clearest example of resource sharing the old way in today's classrooms occurs through the use of textbooks. These resources bear all the hallmarks of sharing: they are centrally produced and obtained as needed by classroom instructors around the world. In many cases, the information in textbooks is so commonly used the work becomes standard.

However, textbooks are just one type of item among many that are shared by classes around the world. No K-12 school is complete without a set of wall maps in geography classes, periodic tables of the elements in science classes, and sets of large block letters for the early years. A rich and useful set of

classroom displays is distributed by organizations as varied as astronomical societies [http://www.aspsky.org/catalog/class.html], museums, and publishing companies. In the area of multimedia, teachers employ a wide variety of centrally produced materials including filmstrips and videos, CD-ROMs and other software, presentation graphics and even complete learning resources, such as are produced by Plato [http://www.plato.com].

It is important to review the old ways of sharing resources not only to show that resource sharing is an established fact in today's classrooms, but also to point to some of the elements of resource sharing already in place. For it is reasonable to expect that many of the elements of resource sharing the old way will be replicated in an online environment. For one thing, as mentioned, various publishers and content producers produce resources centrally and distribute them to classes around the world. And while many of these resources are distributed free of charge, the majority of shared resources in classrooms are purchased from their respective producers or intermediaries. Textbook publishing and sales, especially, is a lucrative industry. The National Association of College Stores estimates U.S./Canadian college store sales to be $8.959 billion for the 1998-99 academic year (NACS, 2000).

Second, for the most part, the resources distributed in this manner are not entire classes, but rather, components of classes. This is most clearly the case for classroom aids such as wall maps and posters. But even more comprehensive materials such as textbooks are used only in part, as part of a class. The vast majority of course syllabi require that students obtain more than one textbook. Courses frequently use only parts of textbooks; entire chapters are omitted as being beyond the scope and purpose of the course. Moreover, students frequently use parts of books (or parts of journals) in their research and reading. That's why most university libraries come equipped with photocopiers.

Contemporary Sharing

Though most educational institutions offer only complete courses online, many other agencies have started offering smaller, more portable learning materials. These materials fall short of what we will later define as *learning objects*, but they offer some insight as to the direction and potential of online resources. Immediately we see a division of the territory into, first, the learning resources themselves, and second, lists (or portals) of learning resources. In some few cases (usually where the institution has a wealth of content) these services are combined.

In Canada, the leading learning resources portal is probably Canada's SchoolNet [http://www.schoolnet.ca/]. Follow the link from the home page into "Learning Resources" and select a topic area. A list of resources will be displayed, each

with a short description and a link to an external website. SchoolNet also provides metadata information for each site and provides an "advanced search" using metadata [http://www.schoolnet.ca/home/e/search/advanced_e.asp]. Each resource in the "curriculum" area is approved by a professional "pagemaster" [http://www.schoolnet.ca/home/e/pagemasters/]. For the most part, however, SchoolNet lists and links to institutional home pages, and not to learning resources per se. Teachers using the SchoolNet service must still search through these sites in order to locate suitable materials.

There is a U.S.-based site [http://www.eoe.org/] maintained by the Educational Object Economy Foundation and providing direct links to learning resources themselves. In addition, Merlot [http://www.merlot.org/] currently lists more than 2,000 learning applications that can be accessed via the WWW. These applications are specific materials on specific topics. For example, Merlot lists items such as "Chaucer" [http://icg.fas.Harvard.edu/\char126\relaxchaucer/index.html], "The Great 1906 Earthquake and Fire" [http://www.sfmuseum.org/1906/06.html], and RSPT Expansion: Perturbation Theory [http://www.bgu.ac.il/\char126\relaxsergeev/perturb.htm]. These are examples of materials that have been sorted into category and subcategory, and contributed by educators from around the world.

Educators attempting to use Merlot's resources, though, will still experience frustration. While the topic hierarchy is more detailed than SchoolNet's, and although much more focused resources are listed, educators must still spend quite a bit of time browsing for materials. Moreover, there appears to be no resource metadata and the search mechanism provided on the Merlot site is no better than standard web search engines.

As we can see from this discussion of articulation, there is a need for a mechanism to connect online learning resources with detailed course objectives. This much more advanced form of resource listing forms the basis for the selection and categorization of resources in MCI WorldCom's MarcoPolo project [http://www.wcom.com/marcopolo] (see also Downes, 2000, July/August). MarcoPolo is a compilation of teaching resources from six educational institutions that provide free Internet content for K-12 education. What the six partners have in common, and what makes this an important and interesting development in online learning, is an adherence to national curriculum and evaluation standards in the subject areas. Material is categorized by grade level, and individual items are matched to individual learning topics. Despite its strengths, however, MarcoPolo is a closed project; only the six member institutions contribute content. There is no centralized search facility and no metadata listings for the resources. The only curricula supported are United States school curricula, so the resource is not useful in a global marketplace.

Other resources are available, but these three sites typify the contemporary art of shared learning resources. There is much to be done to make these resources widely useful. Much better systems of categorization and searching, and more

robust mechanisms for updating and submissions are required. Learning resources need to be tied more closely to learning objectives, but in such a way as not to be tied to a specific curriculum. An even greater weakness appears when we look at the collective set of learning resources (or applications, as Merlot calls them) offered by these three sites. It is nearly impossible to identify consistency in format, scope, methodology, educational level or presentations. Some resources include lesson plans, but many others do not. Some are authored in Java, others in HTML, and others in a hybrid mixture known only to the author. Some involve 10 minutes of student time, others would occupy an entire day. And there is no structured means for an instructor to know which is which.

Creating Content and The Cost of Online Learning

It may be argued that university courses are fundamentally different from K-12 courses. While there is a great deal of commonality between grade 1 English from school to school, university courses are individual entities in their own right. Each time a course is offered by a university professor, it is created anew, adding a new interpretation or a new reading of familiar material. While this argument may be true enough, it is important to look at the cost of creating courses, and especially online courses, in this manner. Creating an online course from scratch is a long, labour intensive process. Costs can vary from $4,000 (all figures in Canadian dollars) to $100,000.

To cite a typical example, Bates (2000) estimates that a course consumes 30 days of a subject expert's time, plus an additional seven days for an Internet specialist, plus additional expenses for copyright review, academic approval, and administration. A budget for course development, adapted from Bates' Distance Education and Technology (DET) unit (p. 138), is presented in Table 1.

Bates' estimate is conservative. He assumes an experienced course author and HTML specialist. He does not include any instructional design costs. Course design is straightforward and does not involve the development of any interactive media or course-specific Java programming. All of these would add significantly to the $24,000 total cost.

Delivery costs on Bates' model amount to an additional $13,161, as depicted in Table 2 (adapted from Bates, p. 138).

Almost all online course developers use the design model Bates describes. It involves a course being developed from scratch, using nothing more than a traditional university course or a good textbook as a guide. The course author typically authors all the content, including examples and demonstrations,

Table 1: Sample Course Development Budget

Subject Experts	30 days @ $400 / day	12,000
Internet Specialist	7 days @ $300 / day	2,100
Graphics and Interface Design	4 days @ $300 / day	1,200
Copyright Clearance		700
Total Direct DET Costs		16,000
DET overheads	25% of 16,000	4,000
Faculty of Education Approval		4,000
TOTAL		24,000

Table 2: Sample Course Delivery Budget

Library		1,000
Server costs		300
Tutoring	40 students @ $220	8,800
Registration	$14 x 29	406
Administration	$28.86 x 40	1,155
Printed materials and postage		1,500
TOTAL		13,161

quizzes and tests. Because of the cost of development, there is little use of course specific software or multimedia. The course is then offered to a small number of students over a limited time, resulting in course fees that are comparable, if not greater than, traditional university course fees.

We can do so much better than this. We need to design online courses – even university courses – in such a way as to reduce these costs without diminishing the value of a university education. We need to do this by extracting what these courses have *in common* and by making these common elements available online.

Let me begin by presenting some examples. Consider the Teacher's Guide to the Holocaust [http://fcit.coedu.usf.edu/holocaust/]. This site consists

of dozens of resources on the Holocaust that may be used and reused by any teacher approaching the subject. Each of the class activities (see [http://fcit.coedu.usf.edu/holocaust/activity/activity.htm] for links to lesson plans and activities) could be treated as an individual learning object. The Holocaust is a very large subject – much larger than sine waves – and is appropriately divided into many components. But it is far easier, and results in far greater quality, to assemble a lesson or series of lessons from these materials, than to create something from scratch.

Or consider "Hamlet." There is not, of course, one single description of Hamlet. However, there is only one text of the play "Hamlet" and it is not a stretch to envision a definitive online multimedia edition. Such an edition would not only contain the text, it would also contain video clips, audio clips, commentary from selected sources, pop-up glossaries, and more. I have actually seen a CD-ROM version of "Hamlet" presented this way; all that is needed is online distribution. It is not a stretch to imagine a multimedia company spending $1,000,000 on such a production. Assume that "Hamlet" is taught in 10,000 schools, colleges or universities around the world (hardly a liberal estimate). Assume 20 students per class (an underestimate, to be sure!). At $5 per student, the company would make the $1,000,000 investment back in 1 year! The economics are very good, and this excellent resource would be cheaper than even the book alone. A course specializing in "Hamlet" would employ the digital "Hamlet" as a central resource, and incorporate as well essays, discussions and articles from scholars around the world. There is no reason why an academic journal cannot contribute a learning object, in the form of an article, or even a set of articles.

A description of the sine wave, or an account of the Holocaust, or a reading of "Hamlet" – these become "a piece of learning material" when they are able to meet a learning objective. Of course by *description of a sine wave* we refer to more than merely a page or two of text plus an illustration. That is not what happens in the classroom; students are given a variety of examples, asked to calculate their own examples, are tested on their understanding, and so forth. A better phrasing, perhaps, is . *lesson on sine wave functions*.

Learning Objects from a Theoretical Perspective

Course Construction and Rapid Application Design (RAD)

Courses developed along the Bates model are expensive because of two major (and related) design features. First, all course material is created from scratch, and second, this material is applied only to the limited number of students taking this particular course. In order to lower costs, therefore, a course development program must enable educators to avoid creating everything from scratch, and to allow created course content to be applied to a much larger number of students.

From a certain perspective, an online course is nothing more than just another application, and software engineers have long since learned that it is inefficient to design applications from scratch. Educators need to apply design techniques learned long ago by the software industry, and in particular, they need to learn a concept called Rapid Application Design (RAD).

Rapid Application Design is a process which allows software engineers to develop products more quickly and of higher quality. RAD involves several components, including a greater emphasis on client consulting, prototyping, and more informal communications (see [http://sysdev.ucdavis.edu/WEBADM/document/rad_toc.htm] for more information). But of interest here is the engineers' re-use of software components within the context of a CASE (computer-aided software engineering) environment. The application of RAD for software development allows a designer to select and apply a set of predefined subroutines from a menu or selection within a programming environment. A good example of this sort of environment is Microsoft's Visual Basic [http://msdn.microsoft.com/vbasic/], a programming environment that lets an engineer design a page or flow of logic by dragging program elements from a toolbox.

Similar methodologies exist for a wide variety of creative or constructive tasks. A professional chef, for example, will carefully design a kitchen environment so that when he is called upon to create crepes suzette, the essential ingredients – including pre-mixed recipe ingredients – are readily available. Auto mechanics also work in a dedicated environment and have at hand every tool and component they may need to fix anything from a Lada to a Lamborghini.

Online course developers, pressed for time and unable to sustain $24,000 development costs, will begin to employ similar methodologies. An online course, viewed as a piece of software, may be seen as a collection of reusable subroutines and applications. An online course, viewed as a collection of learning objectives, may be seen as a collection of reusable learning materials. The heart – and essence – of a learning object economy is the merging of these two concepts, of viewing reusable learning materials as reusable subroutines and applications. Educators in the corporate and software communities have known about this concept for some time. As Wayne Wieseler, an author working with Cisco Systems, writes, "reusable content in the form of objects stored in a database has become the Holy Grail in the e-learning and knowledge management communities" (Wieseler, 1999, p. 4).

Object-Oriented Design

To delve more deeply into the construction and organization of learning objects, it is necessary to introduce another concept from computer programming, object-oriented design (e.g., Montlick, 1999). The idea behind object-oriented design is that prototypical entities, once defined, are then cloned and used by a

piece of software as needed. Suppose, for example, as a programmer you needed to store information about "students." You would first design a prototypical student and define for it properties common to all students. Many aspects of the prototypical student would be undefined, however, such as the student's name, age, or telephone number. These unknowns would be given placeholder values (or 'defaults') until they are defined.

When a program needs to work with a student, it refers to the prototype and *clones* a copy of the prototype in the computer's memory (it is actually called cloning in computer science – in perl the prototype is cloned and *blessed* to reserve its place in memory). The newly cloned prototype is given a name, and then values or attributes are assigned to it. For example:

```
Clone_object: type=student id=New_student

New_student -> name = ‘‘Fred Smith’’

New_student -> age = ‘‘32’’

New_student -> phone = ‘‘555-1212’’
```

Where object-oriented design gets interesting – and useful – is in the methodology used to *construct* object prototypes. For clearly, an entity like Fred is a complex entity. Fred is an animal, so he has animal properties, such as age, height or weight. Fred is human, so he has human properties, such as a birthday, eye colour, and hair colour. Fred is a Canadian, so he has properties common to all Canadians, such as a social insurance number and a postal code (were Fred American, he would have a social security number and a zip code). Fred is a student, so he has student-specific properties, such as a student number or a list of classes. Were Fred an instructor, he would have instructor-specific properties as well, such as a parking spot.

When we define a student prototype for the first time, it makes no sense to define for this prototype alone each and all of these properties. This would mean that we must define similar sets of properties for all the people involved in an educational setting: students, instructors, cafeteria workers and groundskeepers. Rather, what happens in object-oriented design is that the most basic prototype is constructed first – in this case, a generic *animal* prototype. Then, the next more detailed prototype, a *human* is defined. The human prototype "inherits" the animal prototype; that is, we say that all the properties an animal can have, a human can have as well. Thus, when we create the human prototype, we need only create those properties and behaviours that are unique to humans.

And so this defining continues on up the hierarchy. When we create a student prototype, we define a student as inheriting all the properties of a human, or

all those properties of a Canadian, and define only those properties that are unique to students. Thus programmers can quickly and efficiently create a new type of entity – a special class of students, for example, or a new nationality – by inheriting the necessary properties from more generic entities.

Object prototypes also define prototypical actions or behaviours for their clones. For example, a behaviour we might expect from a student is to register for a course. The student prototype has this behaviour predefined as a function; when a clone is created, it comes complete with this behaviour. Hence, we can make our clone do things by referring to these predefined functions (or, in computer terminology, *methods*). To have Fred Smith register in a course, for example, we would execute a command that looks something like this:

```
New_student -> register_in_a_course(course_id = ‘‘3212’’)
```

The course into which Fred is registering is itself another object. In our management system, a course prototype has been defined, and at some point, a specific course has been created using that prototype. When the function "register_in_a_course" is executed in Fred, the Fred-object communicates with the course-object and executes a related function in the course object, "add_student_to_course."

Objects may interact – or more generally, be *related* to each other, in many ways. The most useful and common form of interaction is the *containing* interaction. Just as Fred may contain various other objects (such as a heart or a liver, most obviously, but also $4.95 in change, a 6 inch ruler and a pager), one object may in general contain one or more other objects. A course may contain students, for example. Or a course may contain units or modules. A unit may contain a test. Each of these items is an object, defined from a prototype, which may interact with other objects in predefined ways. In a course which contains both a unit test and a grade book, for example, the unit test could interact with the grade book. What would happen is that Fred (the 'student' object) would interact with the test (the 'test' object'), which in turn would interact with the grade book (a 'grade book' object).

Open Standards

A third major concept drawn from the world of computing science – and especially from the recent emergence of Internet technologies – is the use of *open standards* in course construction. An open standard is similar to a language understood and used by everyone. Just as, for example, the meanings of such terms as *Paris*, *the capital of France*, and *European* are understood by almost all speakers of English, so also in an open standard are the meanings of terms and definitions widely understood and shared. The open standard with which most online educators are familiar is Hypertext Markup Language, or HTML.

This language is a shared vocabulary for all people wishing to read or write Internet documents. The term ¡h1¿ is commonly understood as a header tag; the term ¡I¿ denotes italics.

Open standards may be contrasted with *proprietary*, or *closed* standards. Consider a document written in an older version of MS Word, for example. This word processing program used a special set of notation to define italics, bold face, and a wide variety of other features. Because other software manufacturers did not know these standards, only people using MS Word could read a document written in MS Word.[1]

The purpose of open standards is to allow engineers from various software or hardware companies develop devices and programs that operate in harmony. A document saved in an open standard could be read, printed or transmitted by any number of programs and devices.

The IMS protocols and SCORM

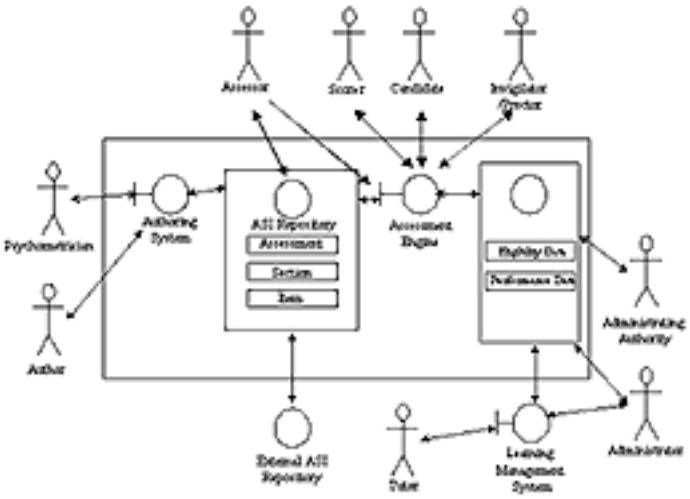
The IMS (Instructional Management Systems) Project is a consortium of educational institutions, software companies and publishers. The Project's objective is to "promote the widespread adoption of specifications that will allow distributed learning environments and content from multiple authors to work together (in technical parlance, "interoperate")" (IMS Global Learning Consortium, 2000). By *distributed learning environments and content*, the authors mean different sets of learning materials, authored in different programming languages using different programs and located on different computers around the world.

This is an elusive goal. It amounts to enabling content produced using Blackboard [http://www.blackboard.com/] and stored on a computer in Istanbul (an interactive atlas, perhaps) to be used in a course authored in WebCT [http://www.webct.com/] and located in Long Island, New York. The term *used* means, in this context, that the two elements – the atlas and the course – could interact with each other. The atlas, for example, might report to the course how long a give student spent studying cloud formations, and the course might instruct the atlas to display the appropriate university logo and links to discussion boards.

In order for this to work, the atlas in Turkey and the course in the United States must define similar objects in a similar manner. For example, both programs must understand what is meant by 'course', or 'institution', or even 'logo'. Thus there is a need to obtain a common definition of the objects and properties used by the two separate systems. Thus, the core of the IMS specification involves the definition of prototype objects, or more accurately, descriptions of prototype objects, since they would be defined differently using different computer

languages. The IMS Enterprise Information Model (IMS Global Learning Consortium, 1999) for example, defines a 'Person Data Object', a 'Group Data Object', and a 'Membership Data Object'. In a similar manner, objects must interact with each other in predefined ways. If one program is expecting a grade as a digit and calls it 'grade', and the other sends it as a word and calls it 'score', then the two programs are unable to interact. A document like the Question & Test Interoperability Information Model Specification (IMS Global Learning Consortium, 2000c) defines the manner in which various components of a testing system interact with other elements of a wider instructional management system. Figure 1, from IMS Global Learning Consortium (2000c), is illustrative of the interactions being considered.

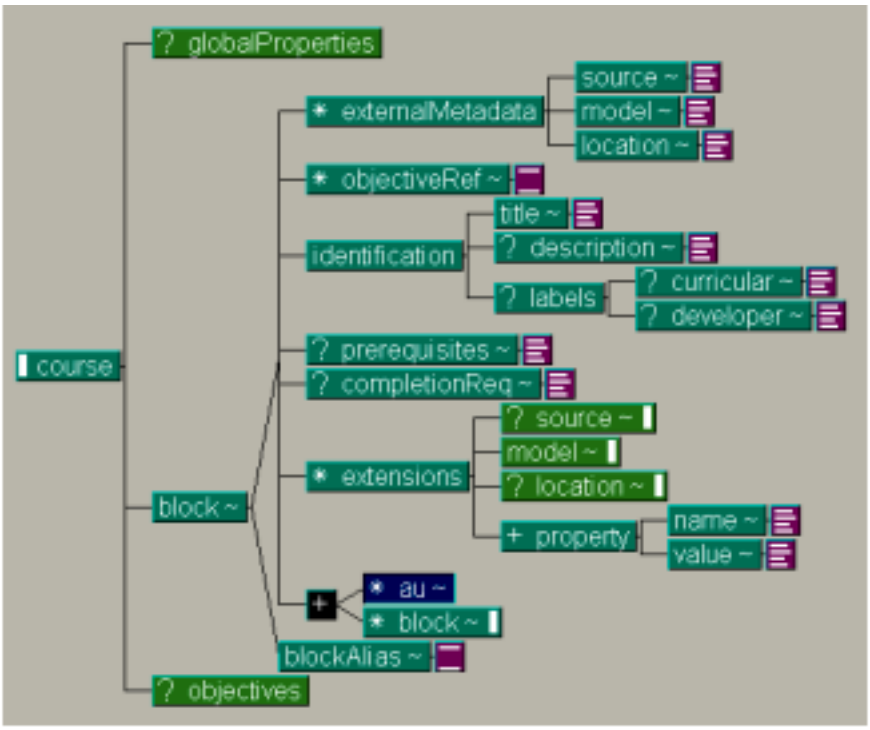
Figure 1: Assessment System Components



This diagram depicts the types of objects which interact. The little stick figures are person-objects, and it is worth noting that no fewer than nine separate types of person-objects are defined. The circles represent *key components*, each of which is an independent piece of software (e.g., the authoring system, or the assessment engine). More detailed implementations of this basic structure are defined by more specific projects. One major project of this type is Advanced Distribute Learning's Sharable Courseware Object Reference Model, SCORM (Advanced Distributed Learning Initiative, 2001). This document describes in detail the object hierarchy in a course and how objects' methods (which are, recall, predefined functions) are defined.

Figure 2 depicts a sample hierarchy from SCORM, displaying only the 'Global Properties' node.

Figure 2: SCORM's Global Properties node



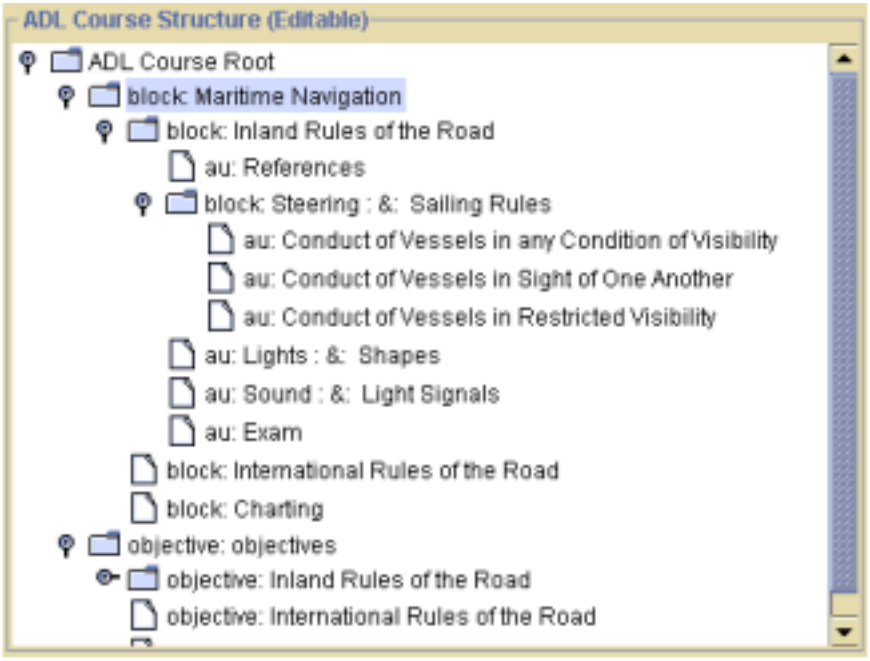
from Advanced Distributed Learning Initiative (2000, p. 34)

The *globalProperties* node contains or references information about the course as a whole, such as prerequisites and course identification. It also provides information describing the general approach used during the design of the course. Drilling more deeply into the course itself, SCORM defines the course components. In an example course structure from SCORM (Advanced Distributed Learning Initiative, 2000) Figure 3 depicts course components and relationships.

(from Advanced Distributed Learning Initiative, 2000, p. 33)

This diagram defines some of the major components of a Maritime Navigation course. Note how the typical course components, such as references, exams, and lesson objectives are each included as distinct components. Each of these elements is an object in its own right; the course as a whole – also an object – contains these discrete objects. As we can see, the IMS Protocols, and specific implementations, such as SCORM, define in detail the potential structure of an online course. In IMS and SCORM, a course – and the elements surrounding a course, such as students, grade books, and prerequisites – are depicted as interacting and inter-related objects.

Figure 3: Sample Course Structure (SCORM)



A Common Language

Thus far we have considered only what may be called the *semantics* of a learning object economy. We have looked at what things (or objects) there are, what they do, what we call them and how we define the meanings of our words. As yet, we have not considered how such a system might be distributed and interoperable. We have not shown just how a computer system in Turkey might send information to a program running in the United States. In order for these two systems to communicate, it is important not only that they be talking about the same things but also that they have a common *language*.

The common language adopted by IMS and SCORM – and being adopted by database programmers, librarians and designers around the world – is the eXtensible Markup Language, or XML, developed by the World Wide Web Consortium (1997a). XML is a means of representing documents according to their internal structure. Thus, for example, a book containing chapters and verses might be represented in XML as follows:

```
<tome name=‘‘Bible’’>
<book name=‘‘Genesis’’>
<chapter name=‘‘1’’>
```

```
<verse name=‘‘1’’>
In the beginning God created the heaven and the earth.
</verse>
<verse name=‘‘2’’>
And the earth was without form, and void; and darkness was upon the face of the deep.
 And the Spirit of God moved upon the face of the waters.
</verse>
...
</chapter>
...
</book>
...
</tome>
(The Bible, n.d.)
In a similar manner, a course containing units, modules and exercises may also be represente
...
<course>
<block id=‘‘B1’’>
 <identification>
<title>Maritime Navigation</title>
 <labels>
<curricular>UNIT</curricular>
 </labels>
</identification>
 <block id=‘‘B2’’>
<identification>
 <title>Inland Rules of the Road</title>
<labels>
 <curricular>MODULE</curricular>
</labels>
 </identification>
<au id=‘‘A1’’>
 <identification>
<title>References</title>
 </identification>
<launch>
 <location>/Courses/Course01/Lesson01/au01.html</location>
</launch>
 </au>
<block id=‘‘B3’’>
 <identification>
<title>Steering \&\#38; Sailing Rules</title>
 <labels>
<curricular>MODULE</curricular>
 </labels>
</identification>
```

. . .

(Advanced Distributed Learning Initiative, 2000, p. 103-104).

XML has two useful features in the context of the current discussion. First, it is structured. An object hierarchy may be defined such that one object may contain other objects, and such that any given object may be assigned any number of properties. Thus, XML is capable of representing an object hierarchy as defined above. All the components of our online course object economy may be described in XML, even non-digital objects such as students, classrooms and books. Second, XML is machine-readable (and machine-writeable, which amounts to the same thing). This means that a computer program can produce a properly formatted XML document using information stored in, for example, a database. It also means that another, different, computer program can read that file and assign the proper values to the proper variables in its own internal representation system.

XML is to structured information what HTML is to structured documents. Each provides a means of distributing content to other systems no matter where they are located and no matter what program they are running. Thus, a piece of learning material, no matter where it is located, may be seamlessly integrated into an online course, provided that the XML tags are employed consistently, that is, provided the semantics are the same.

In an XML document, a schema establishes the semantics of a system of tags.[2] For example, the Dublin Core [http://dublincore.org/] establishes a schema for referring to printed documents. Any XML document which describes a book (and which uses Dublin Core) would use XML tags (and hence, assign corresponding properties to a corresponding book object) defined by the Dublin Core (1999) Metadata Element Set.

Authoring Learning Objects

Authoring Learning Objects – Data

While most guides and references currently discuss online course authoring, the proper reference point is the authoring of learning objects, where a learning object is an element of a course as described above. As we have seen, a learning object may be one of any number of items: a map, a web page, an interactive application, an online video – any element that might be contained inside a course. There are two major facets to authoring learning objects. The first is the *content* of the learning object itself; the second is the *metadata* describing the learning object. We might think of authoring learning objects as akin to

authoring pieces of a puzzle, in which case the content is the image or picture on the surface of the piece, while the metadata is the shape of the piece itself, which allows it to fit snugly with the other pieces.

Today, the most common medium for content is hypertext markup language (HTML). Course authors are able to employ a variety of authoring tools such as Microsoft's FrontPage [http://www.Microsoft.com/frontpage/] or Macromedia's Dreamweaver [http://www.macromedia.com/software/dreamweaver/]. These tools make it possible to create quite sophisticated pages, especially FrontPage, which through a series of extensions allows authors to embed interactive applications into the page. The problem with these HTML pages is that they're not portable, especially not FrontPage generated files, which must interact with a Microsoft server. A web page designed for one course at one university will contain course and university specific information such as the name of the course, the name of the university, and even a colour scheme. To be used or adapted by another course, the pages need to be redesigned. Moreover, HTML pages, especially pages designed using FrontPage, do not display well in multiple formats. A separate version must be created if, perhaps, the page needs to be delivered over wireless access protocol (WAP; see the WAP portal [http://www.wap.com/] for more information), or if it is input as data for analysis by a Javascript or CGI process. HTML, as it is currently implemented by these products, combines content and presentation information, thus narrowly limiting its portability.

In order to be portable, a document's content must be, first, structured, and second, separated from presentation information. This goal is accomplished by XML, which uses tags to structure information and which refers presentation information to a separate document entirely – an XSL file (World Wide Web Consortium, 1997b).

A significant step in the right direction is to create course materials *not* in HTML, but rather, in a structured markup language such as XML. A good example of this is the approach taken by British Columbia's Open Learning Agency, which creates its courses in SGML (Standard Generalized Markup Language), a tagged language very similar to XML (Paille, G., Norman, S., Klassen, P. & Maxwell, J., 1999). By organizing content in this way, print versions, web versions or even wireless versions may all be produced from the same base document in a matter of seconds. Structural elements such as tables of contents and page numbers are generated on the fly, while course or institution specific information is defined in the template. In addition, specialized documents, such as course outlines, may be generated from the same source (e.g., see [http://www.openschool.nc.ca/outlines/] for the Open Learning Agency: Open School Courses and Resources outlines).

SGML documents may be generated and edited using any common SGML editor. One example is Auto-Graphics' Smart Editorial System (SES) [http://www.auto-graphics.com/publishing/SGML.html]. But the implementation – at least as used by OLA – is not portable. The course documents are undif-

ferentiated wholes, so they would have to be adapted by other institutions *as a unit*. In any case, it is not reasonable to employ one language for all parts of an online course. What we are more likely to see, and are beginning to see already, is a set of different languages for different parts. IMS is slowly drafting these specifications and now has four sets: meta-data, enterprise, content packaging, and question-and-test (IMS Global Learning Consortium (2001). Related sets of specifications are being defined by the World Wide Web Consortium, such as Math Mark-Up Language (MML) [http://www.w3.org/Math/] and the Synchronized Multimedia Integration Language (SMIL) [http://www.w3.org/AudioVideo/].

Rather than use a single tool, such as an XML or SGML editor, course authors will begin to use tools designed for specific purposes. Already, we have seen some of these developed, one of the most popular being Half-Baked Software's Hot Potatoes, a tool for designing online quizzes [http://web.uvic.ca/hrd/halfbaked/]. It is not hard to image a suite of standards-compliant applications emerging into the marketplace: one for drafting course outlines, one for creating individual lessons (LessonBuilder [http://www.innovamultimedia.com/lbuilder.htm] for example), another for authoring slide shows, another for creating case studies, and so on. For example, the University of Bristol's TML (Tutorial Markup Language) (Brickley, n.d.a), described a common authoring language for online tutorials and quizzes. The purpose of TML is to "designed to separate the semantic content of a question from its screen layout or formatting" (Brickley) and in so doing, provides a structural framework for tutorial content (the boxes are not part of the document, and are placed there for clarity).

```
-------------------------------------------------------------------
|<!DOCTYPE TML PUBLIC "-//ETS//DTD TML 4.0//EN//" [ ] >           |
|<TML>                                                            |
| <-- Arbitary normal HTML -->                                    |
| |-------------------------------------------------------------| |
| |<TUTORIAL>                                                   | |
| |<QUESTION ATTEMPTS=3 NAME=Capitals TYPE=Multiple-Choice>     | |
| | |-----------------------------------------------------------| |
| | |<p>The text of the question.It consists of HTML text</p>| | |
| | |<CHOICES>                                                | | |
| | | |-----------------------------------------  |            | | |
| | | |<CHOICE CORRECT>This is a correct choice |            | | |
| | | |<CHOICE>This is an incorrect choice      |            | | |
| | | |    .                                    |            | | |
| | | |    .                                    |            | | |
| | | |-----------------------------------------  |            | | |
| | |</CHOICES>                                               | | |
| | |<SCORE>                                                  | | |
| | | |-----------------------------------------  |            | | |
```

```
| | | |<GAIN CORRECT ATTEMPT=1 VALUE=3>          |            | | |
| | | |<GAIN CORRECT ATTEMPT=2 VALUE=1>          |            | | |
| | | |<LOSE HINT VALUE=1>                       |            | | |
| | | |    .                                     |            | | |
| | | |    .                                     |            | | |
| | | |------------------------------------------|            | | |
| | |</SCORE>                                                | | |
| | |<HINTS>                                                 | | |
| | | |------------------------------------------|            | | |
| | | |<HINT>This is a hint                      |            | | |
| | | |<HINT>This is another hint                |            | | |
| | | |    .                                     |            | | |
| | | |    .                                     |            | | |
| | | |------------------------------------------|            | | |
| | |</HINTS>                                                | | |
| | |<RESPONSES>                                             | | |
| | | |------------------------------------------|            | | |
| | | |<WHEN CORRECT><B>That's right!</B>        |            | | |
| | | |<WHEN OPTION=d>You were close that time   |            | | |
| | | |<WHEN INCORRECT>Sorry, that was wrong     |            | | |
| | | |    .                                     |            | | |
| | | |    .                                     |            | | |
| | | |------------------------------------------|            | | |
| | |</RESPONSES>                                            | | |
| | |--------------------------------------------------------- | |
| |</QUESTION>                                               | |
| |<QUESTION ATTEMPTS=3 NAME=Protocols>                      | |
| |    .                                                     | |
| |    .                                                     | |
| |                                                          | |
| |</QUESTION>                                               | |
| |----------------------------------------------------------| |
|</TUTORIAL>                                                   |
|</TML>                                                        |
|--------------------------------------------------------------|
```

(Brickley, n.d.b)

What is interesting about the TML project is that software have been developed both for authoring and for displaying TML documents [http://www.ilrt.bris.ac.uk/netquest/about/soft/]. Demonstrations available online, such as Crisp and May's Chemistry tutorial,[3] show how a TML file would be rendered as a series of HTML pages viewed by the student.

Authoring Learning Objects – Multimedia

The model for most of the learning materials described above – authored by a subject matter expert, presented in text (even with supporting graphics and animation) – is the book, or at the very least, the course manual or course guide. More and more non-textual resources are appearing every day, however. Video clips, small applets, interactive animations, simulations – these are authored using a wide variety of programs ranging from video editing software to Java editors to Macromedia's Director. Many of these are available online, such as the animated slide show, "Deepest Impacts: A Species Demise E.L.E." [http://www.to-scorpio.com/link3e.htm]. They are developed and distributed because, as J. Bradford DeLong, a developer of several economics animations, writes, "I think that there is a reasonable chance that [they] are – or could become – a vast improvement over the textbook presentation" (DeLong, 1998, para. 3).

Many more resources are not available online. Schools face continual pressure to purchase a wide variety of educational CD-ROMs and teaching software.[4] Thus even online courses present challenges for students and instructors as various software applications need to be purchased, delivered and installed into students' computers. With the emergence of Applications Service Providers (ASP – not to be confused with Microsoft's Active Server Pages) the distribution of software via CD-ROM and floppy disk will slowly evaporate. Application Service Providers are online services that automatically deliver and install software on an as needed basis to client computers (Seymour, 1999, June 28).

Designing Learning Objects – Data or Multimedia

In the previous sections, I have described the mechanics of creating learning objects. Before continuing with the technical description of course components it is important to look at the *content* of learning objects. While there will be, no doubt, much debate regarding the instructional design of learning objects, in practice designers have opted for a performance-based or competency-based theory of design. For example, Cisco System's RIO (Reusable Information Objects) project is explicitly performance based. Drawing on work by Ruth Clark (see [http://www.clarktraining.com/seminars.html] for outlines) RIO "views all training as a means to enable a worker to successfully complete a task." (Wieseler, 1999, p. 9). The process follows three steps:

1. Identify the job task
2. Identify the skills and knowledge necessary to complete the task
3. Develop training in modular chunks that are organized to support the task

Learning, with this model, is outcome-based rather than content-based. It focuses on what people want (or need) to do, rather than on what there is to know. Suppose, for example, Cisco introduced a new product. A traditional approach to training would be to list the product's features, to develop the course based on this features list, and to test students on their recall of the features. A performance-based approach, by contrast, would begin by assessing customer requirements. These requirements would then be matched with product capabilities. Students would be tested on their ability to recommend the product in appropriate situations (Wieseler, 1999).

Most educational institutions would find a definition of learning objects based on specific tasks to be somewhat limiting. However much work has been done regarding the definition of learning *outcomes* in general, and a wider definition of learning objects would be tied to these outcomes. Specifically, the content of a learning object would be derived from a discussion of a course's (or a lesson's) learning objectives, where the achievement of these outcomes can be measured in terms of students' performance. In sum, the overall content of a learning object would be similar in scope and nature to the content of a typical lesson. Many lesson-planning aids exist; the template depicted in Figure 4, from Ohio Schoolnet (n.d.b), is typical.

Figure 4: Lesson Planning Template (from Ohio Schoolnet)

Ohio Schoolnet's template is notable because an instructor may click on any given component to view a detailed description. A learning object authoring environment would employ a very similar interface, while clicking on the component area would enable an editing screen for that component. Thus, for example, if the author clicked on "Learning Objectives", she would be greeted with a list of learning objects appropriate for that course, from which she would select one or more. Or if she clicked on "Tools and Resources" a list of suitable online resources would be displayed.

Authoring Learning Objects – Metadata

For any object, text-based or multimedia, an associated set of metadata needs to be created. The type of object determines the content of the metadata. For example, an image might have a property labeled *photographer*, and a piece of text might have properties labeled *editor* or *publisher*. Whatever the properties, the authoring of metadata itself will be straightforward for most course designers. Because metadata files are machine-writable, authors will simply access a form into which they enter the appropriate metadata information. The form, generated either by a web page or by a specific piece of application software, will send field information to a metadata page editor.

The process of converting form data to XML data is very simple. Here is the code, in perl (assuming forms data has been saved in a standard hash file %FORM):

```
while (($fk,$fv) = each %FORM) {
$output .= ‘‘<$fk>$fv</$fk>$backslash$n’’;
}
print $output;
```

More complex metadata editors will include mechanisms for parsing and displaying existing metadata documents. They will also include forms for a wide variety of resources; the list of fields in these forms are defined by schemas, as discussed above. Sophisticated metadata editors will not define the fields for different types of forms internally. Rather, they will access schemas from various sources around the Internet. A list of available schemas for online learning is provided on the IMS website [http://www.imsproject.org/metadata/mdbest01.html]. The editor will retrieve the titles of these schemas from a central index, and once the author selects a title, will read the specifications and create the form accordingly.[5]

What is significant is that all of this occurs behind the scenes. All the author needs to know is what *type* of metadata is being created, and that type is defined by the type of object being described. As a side note, it is worth noting that

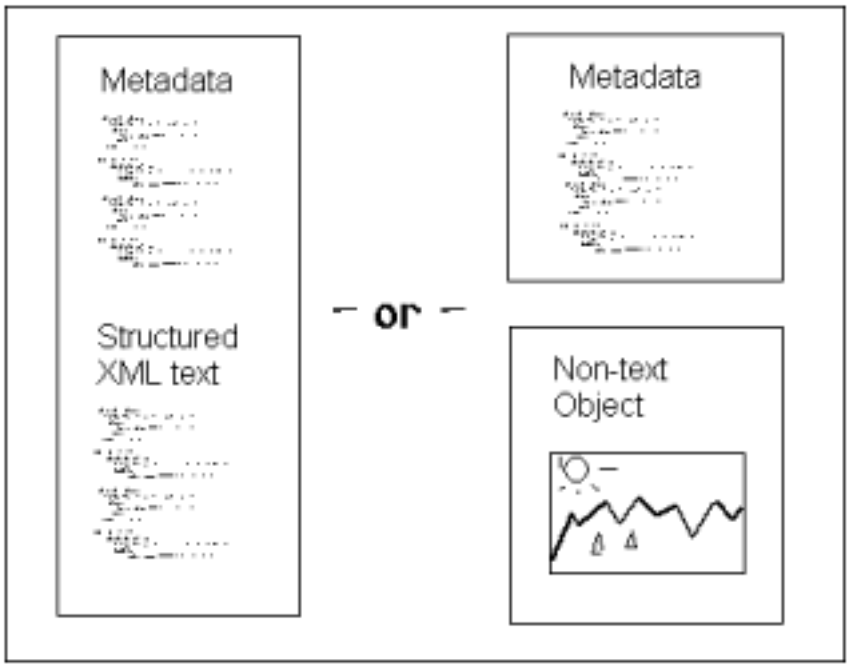
schemas for a wide variety of entities, and not just course components, are being defined in this way (see [http://www.schema.net/] for more information).

In the case of multimedia objects, many editors will have metadata generators built in. This is already the case with some Microsoft products, such as MS-Word, which saves MS Word files in a (Microsoft specific) XML format. Such products will save users the time and trouble of typing the same information over and over (such as their name, institution, and the date).

Authoring Complex Objects

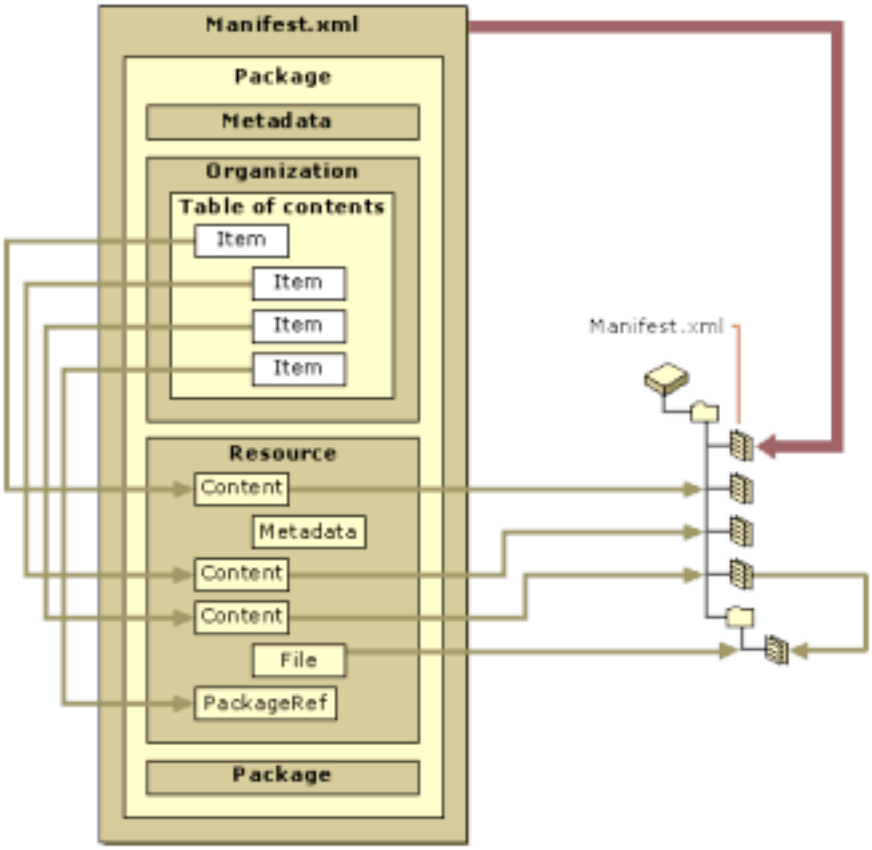
By now you should have the following picture of a learning object (Figure 5) in your mind:

Figure 5: Learning Object depicted



Each of these objects is created and stored in a database. The contents of this database are available to course authors. Some databases may be available over the Internet, while other databases will be available only internally. In order to create a more complex entity, like a lesson, a number of these entities are collected together in what is called a package (IMS Global Learning Consortium, 2000b). A package is a structured representation of a set of independent objects. Microsoft's LMS concept (Figure 6) provides us with a good illustration.

Figure 6: LMS Conceptual Model



(from Microsoft LRN Toolkit, see [http://www.microsoft.com/eLearn/] for more information)

The *manifest* is similar to the shipping label for the package, detailing the contents of the package. The table of contents is an ordered representation of the titles of each item. The metadata for items themselves may be actually contained in the package, or pointed to by a line in the page. Similarly, resources themselves may be contained in the package, or pointed to by a line in the package (obviously, non-textual resources, such as images, must be pointed to).

Again, the package is described in XML. However, it is unlikely that course authors will write this file by hand, or even that they will ever view the file directly. Course authors will generate this file by interacting with it through a program such as Microsoft's LMS (hopefully *not* LMS, because it forces users into a Microsoft-only environment, thus defeating the interoperability require-

ment described above).

How would this work? At this point, much of what follows is speculation, since the required systems have yet to be constructed. Using an authoring tool, an author will select (from a drop-down list) a packaged-sized entity, for example, "Lesson." The authoring tool will retrieve the schema for "Lessons" either from a local database or – better – from a central schema resource online. The schema defines the fields that must be filled out (filling some automatically, especially if the lesson is part of a large project). Additionally, since the object in question is a *package*, the program knows that it will be composed of other objects: an interactive display, for example, a movie, or some other resource. These options are presented to the author: the author selects "insert" and then selects the type of object to be inserted.

At this point, in traditional course authoring, the author would start to write content for the new component. And this will still be an option – if the author selects "new" the appropriate authoring tool will be opened and the author can create a new resource, as described above. But many authors will select from a list of available resources. If the author is authoring a lesson, the course authoring system already has some significant information. It knows, for example, what the topic of the course is, what the grade level is, what the geographic region is, and more. These would all have been defined when the course was created, and these values are inherited by any object that forms a part of the course.

If, then, the author wishes to add a resource, the authoring system has the information it needs to conduct a highly selective search of resources. The system may search a local database, but more likely, it will search an online learning objects repository. Such a repository won't actually *contain* these resources – they will be distributed on websites around the world – but it will contain information *about* those resources. Specifically, it will contain those objects' *metadata*.

The authoring system consults the repository and runs a search. The results of the search are provided in a menu for the course author. Some of these results are approved by standards bodies, and some are not. Some are defined by grade level and even learning objective, as defined by, say, the Western Canada Protocols, and some are not. Some are available for free, while others will require that royalties be paid. The author can instruct the authoring tool to accept only resources approved by a certain standards body or meeting a certain learning objective, or falling within a certain price range. The author at this point may preview the material, or she may decide to insert it into the course. At this point, the metadata – not the object itself – is inserted into the course package. The author moves on to the next item in the lesson, and in a very short time – hours, not days – completes the lesson, and eventually, the course.

Displaying Learning Objects

Learning Object Repositories

Consider the impact of a resource like Martindale's Health Science Guide, a resource center listing 60,000 teaching files and 129,000 medical cases [http://www-sci.lib.uci.edu/HSG/Medical.html]. Such a resource, if made available to medical schools around the world, would greatly facilitate the creation of courses in medicine and could provide a sustaining source of revenue for the Martindale Centre.

The core of a learning object repository is the central database containing the tens or hundreds of thousands of individual objects. Such databases will be multi-functional; online courses constitute only one of the end uses to which these objects will be put (other uses might include online journals and magazines, personal websites, knowledge management applications, and more). Often, these databases will be working databases for separate enterprises entirely. For example, a government may place all legislation, regulations, procedures manuals and tables into a database. This information would be accessed by an array of applications and end users, including lawyers, real estate agents and the press. The very same set of resources would also be made available to online courses. Attached to each object in the database will be a metadata file, as described above. This file will include subject-specific information, but also, information applicable to online learning (such as grade level, subject area, and more). The cost structure for materials retrieval will also be included in the metadata.

A system of learning objects repositories around the world (it is very unlikely that there will be one) will access this metadata to form its own, compiled, set of resources. The online learning repository will retrieve only that metadata relevant to online learning. It is this, filtered, metadata that will be accessed by online learning systems. Such a system may seem far-fetched but is already being implemented in online journalism. Content producers, such as Reuters, provide their material to content syndicators, such as I-syndicate [http://www.isyndicate.com/], Individual.com [http://www.individual.com/], or Netscape Netcenter [http://my.netscape.com/]. These sites retrieve the content – in the form of Rich Site Summary (RSS) or other XML-type files, process it for display, and relay it to individual users. Individual users, playing the role of newspaper editors, can create customized daily newsfeeds that appear on a web page or in their email every day.

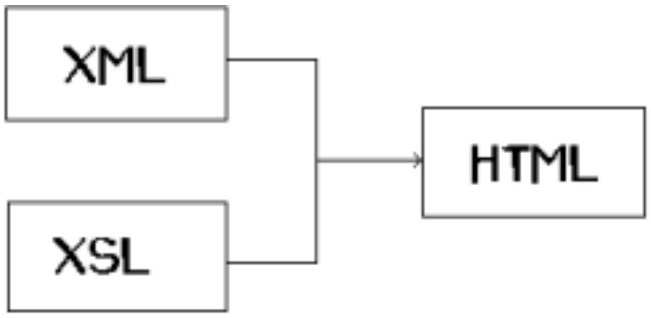
Existing learning portals, such as Learn2.com, HungryMinds, Learn.com, Fatbrain, and SmartPlanet, are beginning to move toward this model of content delivery (Barron, 2000; Karrer, 2000). Topic specific business-to-business learning portals are providing customized learning from within the context of learning

management systems. TrainingTek.Com, for example, allows course designers to select learning objects from a menu of options within the context of their learning management system [http://trainingtek.com/]. A similar resource was recently launched by Internet and publishing giant, America OnLine (2001).

Displaying Learning Objects

Because learning objects are distributed as XML files, they may be displayed using a wide variety of hardware and software combinations. The simplest and most straightforward implementation of this is through the conjoining of XML files with related style sheets defined in XSL (extensible Stylesheet Language), as mentioned above. For example, an XML file and an XSL file merge to create an HTML file, as depicted in Figure 7.

Figure 7: XML and XSL merge to create HTML



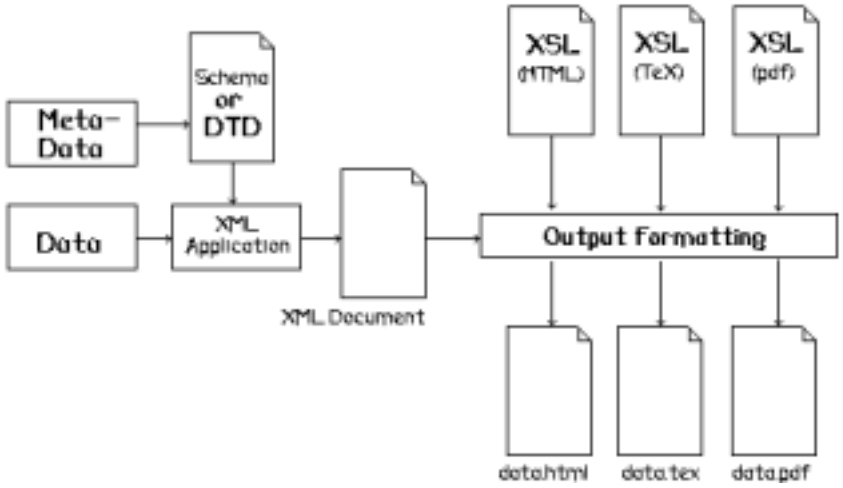
In this simple example, each element in an XML file is associated with an output format (defining such things as font styles and sizes or background colours) in the XSL file. The XSL file describes these elements in standard CSS (Cascading Style Sheet) (World Wide Web Consortium, 2001). Thus combining the XML and XSL definitions yields an HTML output understood by web browsers. Because style and substance are separated, the same XML data may be output in a variety of formats. Figure 8 depicts this process.

(adapted from Bourda & Hélier, 2000)

The learning object itself is composed of data and metadata (left), stored in a database. An XML application interprets the data through a schema, which defines the properties that will be displayed in the resulting XML document. This document is sent to output formatting, which will use one XSL file to produce an HTML page, another XSL file to produce a LATEX page, and yet a third XSL file to produce a printable PDF page.

This model provides tremendous flexibility. For a given set of data, one set of

Figure 8: Preparation of XML data and examples of output formatting



metadata may produce an XML file useful for online students while another may produce an XML document useful for real estate agents, depending on which schema is used. In addition, any given XML document may be output in a variety of formats, depending which XSL file is used. One XSL file may define the format used by the University of Chicago while another may define the document template used at the University of Toronto. One style sheet may be used for online viewing, while another may define the print version of the document. Indeed, an XML file, merged with other XML and XSL sources, may be displayed in a highly customized or personalized format. Proposed, for example, is an agent-based learning system that recognizes individual users and formats pages accordingly. This agent would alter not only display preferences, but would also amend content according to previously established user preference (Suzuki & Yamamoto, 2000).

In traditional education, learning objects would be distributed in the context of a course; that is to say, an online course would consist of an ordered collection of related learning objects unified by some set of common learning objectives or course-wide assessment techniques, such as a final essay. Learning objects would also be used in a wide variety of non-traditional educational scenarios.

No matter how learning objects are distributed, their method of access will be similar in every event. By clicking on a link (or making a similar selection), a student will from his or her desktop browser send a request to the object, which will be delivered as an XML file. The request will also refer the distributor to another XML file, which will contain user specifics, such as their name, institution, and course. On the distributor end, the learning object will be

packaged and send to the client. In many cases, the package will be a simple XML file, though often, the XML file will be compiled on the fly in response to the user data sent with the request. The distributor will also note the request in its logs, update its billing or license data, and if requested, send notification to the student's employer or educational institution.

The object, when retrieved, is then fed to a viewer. The viewer may be included in standard web browsers (as, for example, graphics are today) or may require a separate viewer. Viewers may be defined (and even available) through the institution's web site. Most likely, specialized viewers will be downloaded and installed on an as-needed basis as java applets are today. Different viewers will be used for different types of output device. This, just as graphics today may be viewed on a screen, send via fax, printed on pager or sent as an email attachment, so also different viewers for each type of learning object will be available for different distribution mechanisms.

The Learning Object Economy: A Polemic

We can be visionary. We can imagine a proliferation of cottage industries involved in the production of learning objects. Standards bodies, reviewers and other filter mechanisms will become important. Because a payment scheme is built-in, the model becomes sustainable. But because each individual object view is so inexpensive, online learning becomes affordable.

Yet what about traditional university education, where professors see their courses as unique creations which re-make the field of enquiry each time they are taught?[6]

This approach is the core of traditional liberal arts education. It is this very aspect of online learning which pits computer-assisted learning, such as is envisioned in a learning object economy, against traditional face-to-face professorial learning. Let me grant that this sort of reexamination of the material is necessary and desirable. But let me question whether this process at the same time serves as an effective teaching methodology.

To put the question in as sharp a light as possible: do first-year engineering students need a *brand-new* Shakespeare course, or will the interpretation developed last year (or 2 years ago, or in Saskatchewan) do the job? And moreover: is it fair to require that students, whose primary goal is at best a surface understanding of "Hamlet" to *pay* for the development of a *brand-new* interpretation, when last year's, or Saskatchewan's, would have done just fine?

I agree that hand-rolled bread, carefully prepared by a master chef, is superior in quality to a standard loaf purchased at a supermarket. But to a person who is merely hungry – rather than a connoisseur – the obligation to purchase *only* hand-rolled bread is more than just an imposition, it amounts to a denial of

basic sustenance for many.

The question is: *could* we teach first-year English using "Hamlet" modules? *Could* we reduce the cost of such learning by an order of magnitude? Are the endless creations of professors *necessary* for the eventual goal of cultural literacy? Is it reasonable to *deny* such an education to many (especially in less developed nations) in order to generate each course anew each year in each university classroom?

I apologize for this liberal use of italics, but I am trying to emphasize how it looks from the other side of the equation. And I'm trying to express the sort of thinking when such object-based courses are inevitably accredited. How will the hand-craft institutions justify their art? Granted, we need reinterpretations of Shakespeare, but do we need a thousand such reinterpretations a year?

There is very much a tension, between those who create the knowledge, and who jealously guard their monopoly over its propagation and distribution, and those who must consume that knowledge to get a job, to build a life, to partake fully in society. My personal belief is that arts and humanities professors – even those who teach senior courses – will have to redefine their approach or be priced out of existence. Probably history, not argument, will show whether this belief is well founded.

References

Advanced Distributed Learning Initiative. (2000). Sharable Courseware Object Reference Model (SCORM) (version 1.0). Retrieved May 30, 2001: [http://www.adlnet.org/Scorm/docs/SCORM_2.pdf]

Advanced Distributed Learning Initiative. (2001). Sharable Courseware Object Reference Model (SCORM) (version 1.1). Retrieved May 30, 2001: [http://www.adlnet.org/Scorm/downloads.cfm]

America Online. (2001). AOL-at-School. Retrieved May 30, 2001: [http://school.aol.com/teachers/index.adp]

Bates, A. W. (2000). Managing technological change. San Fransisco: Jossey-Bass.

Barron, T. (May, 2000). A portrait of learning portals. ASTD Learning Circuits. Retrieved May 30, 2001: [http://www.learningcircuits.com/may2000/barron.html]

Bourda, Y. & Hélier, M. (2000). What metadata and XML can do for learning objects. Webnet Journal, 2(1), p. 29.

Brickley, D. (n.d.a). TML language specification. Institute for Learning and Research Technology: University of Bristol. Retrieved May 30, 2001: [http://www.ilrt.bris.ac.uk/netquest/about/lang/]

Brickley, D. (n.d.b). Tutorial markup language (TML). Institute for Learning and Research Technology: University of Bristol. Retrieved May 30, 2001: [http://www.ilrt.bris.ac.uk/netquest/liveserver/TML_INSTALL/doc/tml_user.html]

Council for Higher Education Accreditation. (1999). Distance learning in higher education, CHEA update number 2. Retrieved May 1, 2001: [http://www.chea.org/Commentary/distance-learning-2.cfm]

DeLong, J. B. (1998). Multimedia. Retrieved May 30, 2001: [http://econ161.berkeley.edu/multimedia/Multimedia.html]

Downes, S. (2000). Hungry minds: A commentary on educational portals. Online Journal of Distance Learning Administration, 3(1). Retrieved May 1, 2001: [http://www.westga.edu/\char126\relaxdistance/downes31.html]

Downes, S. (2000, July/August). MarcoPolo. The Technology Source. Retrieved May 1, 2001: [http://horizon.unc.edu/TS/default.asp?show=article\&id=792]

Dublin Core Metadata Initiative. (1999). Dublin Core metadata element set (version 1.1: reference description). Retrieved May 30, 2001: [http://dublincore.org/documents/1999/07/02/dces/]

IMS Global Learning Consortium. (1999). IMS enterprise information model (version 1.01). Retrieved May 30, 2001: [http://www.imsproject.org/enterprise/eninfo03.html]

IMS Global Learning Consortium. (2000a). About IMS. Retrieved May 30, 2001: [http://www.imsproject.org/aboutims.html]

IMS Global Learning Consortium. (2000b). IMS content packaging: Packaging information model (version .92 – public draft specification). Retrieved May 30, 2001: [http://www.imsproject.org/content/cpinfo02.html]

IMS Global Learning Consortium. (2000c). IMS Question & Test Interoperability Information Model Specification (version 1.0 – final specification). Retrieved May 30, 2001: [http://www.imsproject.org/question/qtinfo01.html]

IMS Global Learning Consortium. (2001). Specifications. Retrieved May 30, 2001: [http://www.imsproject.org/specifications.html]

Karrer, A. (May, 2000). Building a learning portal. ASTD Learning Circuits, May, 2000. Retrieved May 30, 2001: [http://www.learningcircuits.com/may2000/may2000_ttools.html]

Montlick, T. (1999). What is object-oriented software? Software Design Consultants. Retrieved May 30, 2001: [http://www.catalog.com/softinfo/objects.html]

National Association of College Stores. (2000). College Store industry financial report 2000 edition. NACS: Oberlin, OH.

Ohio Schoolnet, (n.d.). Lesson planning template. Retrieved May 30, 2001: [http://tlcf.osn.state.oh.us/blueprint/index.html]

Paille, G., Norman, S., Klassen, P. and Maxwell, J. (1999). The effect of using structured documents (SGML) in instructional design. In NAWeb Conference Proceedings.

Seymour, J. (1999, June 28). How Application Service Providers will change your life. The Street.Com. Retrieved May 30. 2001: [http://www.thestreet.com/comment/techsavvy/759956.html]

Suzuki, J. & Yamamoto, Y. (2000). Building a next-generation infrastructure for agent-based distance learning. Manuscript submitted for publication. Retrieved May 30, 2001: [http://www.yy.cs.keio.ac.jp/\char126\relaxsuzuki/project/pub/ijceell.pdf.zip]

The Bible (n.d.). Genesis. Retrieved May 30, 2001: [http://www.genesis.net.au/\char126\relaxbible/kjv/genesis/]

Wieseler, W. (1999). RIO: A standards-based approach for reusable information objects. Cisco Systems White Paper. Retrieved May 30, 2001: [http://www.coursenet.com/media/pdf/RIO_Whitepaper_techlearn.do.pdf]

World Wide Web Consortium (1997a). Extensible Markup Language (XML). Retrieved May 30, 2001: [http://www.w3.org/XML/]

World Wide Web Consortium, (1997b). Extensible Stylesheet Language (XSL). Retrieved May 30, 2001: [http://www.w3.org/Style/XSL/]

World Wide Web Consortium, (2001). Cascading style sheets. Retrieved May 30, 2001: [http://www.w3.org/Style/CSS/]

Endnotes

1. Of course, this is not strictly true; with Microsoft's cooperation, vendors could create translation engines which would 'import' MS Word documents – but always with a loss of formatting.

2. World Wide Web Consortium. XML Schema Part 0: Primer. W3C Working Draft, 07 April, 2000. Retrieved May 30, 2001: [http://www.w3.org/TR/xmlschema-0/]. Schemas are more recent implementations of the (perhaps) more familiar DTD (Document Type Definitions).

3. Crisp, Joel, and May, Paul. This is an example tutorial for Chemistry. Web site. Undated. Retrieved May 30, 2001: [http://www.ilrt.bris.ac.uk/netquest/liveserver/cgi-bin/tml.pl/netquest/liveserver/qbanks/demos/paul/chemtute/chemtute.tmlo?Intro=/netquest/about/demos/]

4. As a designer for a Grade 12 mathematics course in Manitoba, Canada I had to deal with the fact that some specific calculator software was actually embedded into the western protocols mathematics curriculum. See Western Canadian Protocol, The Common Curriculum Framework for 10-12 Mathematics. June, 1996, p. 99. Retrieved May 30, 2001: [http://www.wcp.ca/math/10-12/cluster/applied.pdf]

5. See, for example, Liljegren, Jonas. RDF Schema editor. Retrieved May 30, 2001: [http://paranormal.se/perl/proj/rdf/schema_editor/]. Liljegren's schema editor retrieves schemas and, on the basis of the retrieved schema, generates a form for inputting new objects.

6. My thanks to Terry Butler for this phrasing and for motivating the polemic which follows.

Citation Format

Downes, Stephen (2001) Learning Objects: Resources For Distance Education Worldwide. *International Review of Research in Open and Distance Learning*: 2, 1.
http://www.icaap.org/iuicode?149.2.1.2

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (2001)

A Critique Of Stephen Downes' Article, "Learning Objects": A Middle Eastern Perspective

Osama Shata
Athabasca University

Introduction

The discipline of computing is definitely influencing and shaping almost every aspect of our life, including education. One decade ago, the WWW was not critical to education. However, nowadays, it has become an integral part of the learning process. A huge number of educational institutes have some form of online courses. This number is increasing tremendously. The quality of an online course depends heavily on the learning material's content and the tools (including images, sound, video, animation) used to accompany the explanation of that learning material. Also, to cope with the rapid advances in the field, the contents of each course must be reviewed within short revision cycles. In addition, the continuous change in many disciplines has broadened the synergy and the overlapping between courses. Moreover, courses must be stored efficiently using computer software that facilitates fast retrieval of their contents. All of the above has made it necessary to seek greater efficiency via: (a) approaches that hasten course design and development, (b) techniques that facilitate sharability between courses, and (c) tools that support reusability of course's components and templates for publishing on the WWW.

These requirements (templates, sharability, reusability, learning objects, computer software, the WWW, and efficient storage) suggest that a promising solution would be to migrate to a database platform that facilitates short cycle development, sharing and reusing of learning material, and publishing to multiple formats. In his article on learning objects in this issue of *IRRODL*, Downes quotes Wieseler (1999): "Reusable content in the form of objects stored in a database has become the Holy Grail in the e-learning and knowledge management communities."

Use of learning objects is a relatively new technique for designing and implementing learning materials, which enables reusability and sharability between several institutions around the world that offer courses on the WWW. It is relevant to e-learning offered through traditional or distance education institutions. For example, researchers at Athabasca University, a world leader in offering courses at distance, are working on a project that is related to learning objects named SCARO (Sharable Curriculum And Reusable Objects system).

Researchers from the University of Alberta (a reputable traditional university) are collaborating with national and international researchers on another project that also addresses learning objects: Campus Alberta Repository of Educational Objects (CAREO) [http://www.careo.org/].

In his article, Downes first describes this need for learning objects and identifies their essential components based on this need. He then draws on concepts from recent developments in computer science, describing learning objects from a theoretical perspective. Finally, he describes learning objects in practice, including creation or generation by content authors, and discusses how they are displayed or used by students and other client groups.

In the first part of his article, Downes deals with "the need for and nature of learning objects" (Downes, 2001). He also explains and clarifies the advantages of creating and using learning objects, as well as discussing the nature of learning objects. He provides some examples and emphasizes that learning objects are not at the level of courses but rather at lower levels such as units or more primitive components such as video clips/images. (A unit is part of a course that may be completed by the learner in one session). I believe that the author could have used more detailed examples to clarify the differences between the various levels of learning objects, as well as at which level it is more desirable to make use of learning objects (this could depend on the application). However, Downes does address this point in his references.

When dealing with learning objects from a theoretical perspective, Downes introduces concepts such as *object-oriented design*. However, he has not clearly explained whether the use of this concept would mean that using an object-oriented database is essential, or if the concept was mentioned only because reusability, one of the main goals of creating learning objects, is enabled through object-oriented design. Would relational, or object-relational databases be used for the purpose of creating objects repositories? Finally, Downes provides useful information about open standards and XML in the context of the article.

In the third part of this article, Downes deals with creating/developing and displaying learning objects in practice. Although the author has made some effort to draw a complete scenario for developing and displaying learning objects, I find this scenario to be incomplete, particularly when it comes to using open source products (other than XML, HTML, etc.). In addition, I believe that this article would benefit from more detailed discussion of the creation of objects repositories and how untraditional learning objects (such as video clips, audio, etc.) may be represented in those repositories. (I understand that the technology needed for creating and using learning objects efficiently is still evolving, especially when it comes to using open source media).

I find that the author has surveyed the topic of learning objects in a comprehensive manner. The article does not introduce new or revolutionary ideas. In addition, the author has referenced a comprehensive, suitable, related, and rep-

utable list of resources. Learning objects, if adopted on a large scale worldwide, can have their positive impacts on e-learning.

Learning Objects: Creation, Development, and Usage in the Middle East

I will now comment on the feasibility and practicality of developing and using learning objects in the Middle East (ME). I will conclude my review with a discussion of some of the weaknesses of learning objects.

Feasibility and Practicality

The use of learning objects is focused on sharing and reusing learning materials via the Internet. In his article, Downes assumes that learning objects will be stored in central repositories and copies of the metadata will be available on other distributed computers close to users. Learning objects are to be developed using open source products. The infrastructure for using learning objects would require:

- Computers connected to the Internet. These are already available in all countries in the Middle East, especially in scientific and research institutions. High-speed connections are also available.
- E-mail. This is necessary in order for researchers to share information and to facilitate collaboration on shared work at distance. This is available on a wide scale in the Middle East.
- Web Sites. Having Web sites contributes positively to the development and usage of learning objects. However, many institutions in the Middle East have their web sites and the number is increasing tremendously. Accessing an Intranet is needed; this is available to collaborated institutions as long as they have access to the Internet.
- Learning objects repositories. These may be implemented using the same database products that are already available in other parts in the world.

In addition, many of the institutions in the Middle East use courses and curricula that have many aspects in common to those used in North America and Europe (e.g., in mathematics, computing, arts, etc.). For example, the Centre for Middle Eastern Studies of the University of Texas at Austin [http://menic.utexas.edu/menic/] lists a comprehensive set of links to related sites in the Middle East. Many Middle Eastern countries have information technology (IT) colleges and

faculties that deliver computer science and IT courses and curricula. Their graduates are well capable of using the products and the technology needed for developing learning objects (see [http://www.uaeu.ac.ae/outreach/mesite/education.html] and [http://www.cisco.com/warp/public/3/middle_east/education_UAEUniversity.html] for examples).

The Middle East has the necessary expertise to contribute to developing learning objects. One of the reputable companies in the domain of providing Internet and business class services internationally, CISCO [http://www.cisco.com/warp/public/3/middle_east/education.html], has devoted part of its web site to the Middle East region. CISCO also has a monthly "Cisco Middle East News" newsletter that shows that many of the products and technology adopted in North America and Europe are also used and adopted in the Middle East. This provides a common platform for joint research.

From this description, one may conclude that it is feasible for researchers and organizations in the Middle East to contribute to the usage and development of learning objects.

Weaknesses

The challenges to be encountered in implementing and using learning objects in the Middle East are very much the same as those in other parts in the world. One of the main challenges is that all the parties involved must agree on standards. For example, when it comes to metadata, what standards may be used? Will it be IMS? Dublin Core? Other standards? A second major challenge is the fundamental issue of the language used. The local languages in the Middle East are not English.

References

Downes, S. (2001). Learning objects. *International Review of Research in Open and Distance Learning 2*(1). Available:

http://www.irrodl.org/content/v2.1/downes.html

Wieseler, W. (1999). *RIO: A standards-based approach for reusable information objects*. Cisco Systems White Paper. Retrieved June 26, 2001:

http://www.coursenet.com/media/pdf/RIO_Whitepaper_techlearn.do.pdf

Citation Format

Shata, Osama (2001) A Critique Of Stephen Downes' Article, "Learning Objects": A Middle Eastern Perspective. *International Review of Research in Open and Distance Learning*: 2, 1. http://www.icaap.org/iuicode?149.2.1.3

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (July, 2001)

A Critique of Stephen Downes' Article, "Learning Objects": A Chinese Perspective

Fuhua (Oscar) Lin

This paper by Stephen Downes recommends a way of sharing online teaching/course materials to accelerate course development and make education more cost-effective. His paper is a review of basic information about learning objects (LOs) and includes examples that illustrate such technical terms as XML and TML.

Main Contributions

Downes makes three main contributions in his article:

1. A definition of learning objects, together with an explanation of why we need learning objects (LOs). Some persuasive examples, using analytic data, are cited to support the need.
2. Presentation of theoretical aspects of object-oriented design and open standards.
3. An elementary discussion of how to author, design, and display learning objects.

Shortcomings

The paper does not identify several important issues such as: (a) the level of granularity of learning objects, (b) selection and integration of learning objects in an appropriate way to form higher level units of study, (c) training of professors in the use of learning objects, (d) appropriate use of metadata to facilitate composition of higher level units, and (e) the potential of computer agents to facilitate the dynamic composition of personalized lessons. An unorganized aggregate of learning objects simply does not constitute a course. In order to create a properly designed final course, student and instructor interaction must be built in.

To utilize learning objects requires application of *educational systems re-engineering*, in which many human factors, as well as organizational and managerial issues,

will arise. For example, there is currently a shortage of appropriate design methodologies for LOs-based electronic learning environments. Without an appropriate design and development methodology it is difficult to estimate the cost of creating high quality metadata for each object as well as the cost of storing and managing the objects themselves. The author skips over the logistics involved in the implementation of LOs but it is exactly at that level that theoretical and practical work needs to be accomplished. Additionally, with the rapid evolution of technology there is danger that LOs that have been created at great cost for some subjects can quickly become outdated.

The LO model reinforces the notion that course development now needs to follow a systems development methodology and needs to governed by something like a systems development life cycle. It is quite clear that courses are much more than a collection of learning objects. Edubox [http://edubox.nl/] from the Open University (Netherlands) is a clear demonstration of this.

In summary, more than learning objects alone are needed in the creation of an electronic learning environment. Some technical issues, (e.g., instructional design theory and agent-based learning system design) must also be addressed in order to implement learning objects on a large scale.

Another dimension that is not addressed in the paper is the implications of learning objects from a wider international perspective. I will focus on that perspective for the remainder of my review.

An International Perspective on Learning Objects

Learning object technology is not just another North American fad. In Europe, ARIADNE, PROMETEUS, and CEN/ISS are conducting research, and international cooperation and application related to learning objects. For example, ARIADNE is a research and technology development (RTD) project pertaining to the "Telematics for Education and Training" sector of the 4th Framework Program for Research and Development of the European Union. The project focuses on the development of tools and methodologies for producing, managing and reusing computer-based pedagogical elements and telematics-supported training curricula. Validation of the project's concepts is currently taking place in various academic and corporate sites across Europe.

The International Standardization Organization (ISO) has set up a JTC1/SC36 committee, charged to develop International Information Technology Standards in the areas of Learning, Education, and Training [http://jtc1sc36.org/].

In China, the Ministry of Education of PRC has formulated Distance Learning Technology Standards (DLTS) (using XML technology), similar to IEEE LTCS. The objectives of this work are to avoid waste of effort and money due to

redundancy and low quality and to facilitate international communication and cooperation.

Advantages of learning objects for distance education in the global market

Learning objects are not only a technology but also a vision in which the creation of instruction can be automated. LOs computer programs can be devised to inspect, select, and assemble in order to instantiate instructional designs. Grasping the potential of LOs, many institutions of higher education have invested in campus-wide instructional systems based on LO approach to courseware design and delivery. A growing number of international virtual universities and courses are becoming available.

Most applications of LOs are distributed as XML files that can be translated into various languages of the world, such as English, Chinese, French, and so forth and displayed using a wide variety of hardware and software combination. A global LOs market is being formed, similar to supply chains in global manufacturing. In the future, more and more international virtual universities and courses will become available. As soon as China enters into the World Trade Organization (WTO), some universities outside China will enter into the education market in China and Chinese universities may offer courses to students overseas.

Weaknesses of learning objects for distance education outside North America.

Online course materials written in one language will not be easily usable internationally because they have to be translated into other languages first. Downes points out that when they use LOs, course developers do not need to prepare all course materials from scratch; hence they can produce courses more economically. This will be the case in the long run, but not in the short run. There will be tremendous start-up costs in generating an international inventory of viable LOs.

Practicalities of learning objects for distance education in the global market

We can have a standard among universities and colleges sharing the same learning objects. At first this standard can be implemented only within a very limited number of units. For example, Downes mentions a project within six universities. With the successful implementation of standard LOs, resultant heightened understanding of instructional design process, the appropriate ontology, and the construction of distributed (agent-based) learning systems, more universities and colleges in the world will become involved in the implementation effort.

Impracticalities of learning objects for distance education in the global market

In my view, more attention has to be given to management issues for LOs to catch on. Course materials will be created by many authors in different places around the world, and in different languages. Development of a learning object ontology, creation of metadata for describing objects, development of a system of management, distribution, the translation process, and integration into higher-level units will incur tremendous start-up costs even if they are small relative to the ongoing costs of education and then compared to the long-term savings.

The feasibility of learning objects design may vary from course to course. For instance, the core common elements of an engineering course can be more easily defined and accepted than that of a humanities course. For subjects such as history or philosophy, we need to consider other important factors in selecting LOs, such as, political systems, economic benefits, culture exclusion and protection. In conclusion, much effort is required in order for learning object technology to become practical on a global scale.

Citation Format

Lin, Fuhua (Oscar) (July, 2001) A Critique of Stephen Downes' Article, "Learning Objects": A Chinese Perspective. *International Review of Research in Open and Distance Learning*: 2, 1. http://www.icaap.org/iuicode?149.2.1.8

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (July, 2001)

A Critique of Stephen Downes' Article, "Learning Objects": A Perspective from Bahrain

Muain Jamlan

With the availability of technology, hardware and software, learning objects become fundamental to the learning process and change the way in which learning materials are designed. The vast development of technology forces both teacher and learner to modify their roles. Teachers become facilitators while learners became active and responsible for selecting modes and styles of learning. Assuming this attitude of implementing technology in the learning process and seeking new methods of facilitating learning, universities and colleges have to adopt new techniques. One of these new techniques is the use of learning objects. Although learning objects are considered products of technology developed in the USA, Japan, and European countries, universities in the Middle East have also been influenced by this development. While there are differences in the quantity and quality of these technologies available in Middle East countries, computer applications, especially those that deploy the Internet, have now become available. Educational authorities in Middle East countries are now turning to the availability of learning objects. Let me clarify some of the issues Downes discusses in his article on learning objects, Vol. 2, No. 1 of the *International Review of Research in Open and Distance Learning*.

Targeting general courses taught in universities

Downes discusses the example of general courses taught in all universities, and how universities teaching similar courses can use learning objects. Distance learning universities in the Middle East can adopt this idea by unifying their efforts to teach the same course through the same technology. Unfortunately, distance learning universities and other institutions in the area offer different courses and are not always aware of the courses taught by others. Let us then share the same courses, work on generalizing them, and offer them in universities if possible. This will save time, effort and cost.

Using similar learning objects technology

Technology is costly in the Middle East; not every country in the area can afford expensive technology. Sharing technology between distance learning institutions can be a cost-effective way to respond to the increasing demand for learning

opportunities. In the Middle East many technologies can be shared, including television broadcasting via satellite, computer technology and so on. Some distance learning universities still use the book and older technologies, whereas others are trying to catch up with newer technologies. If institutions decided to work together, technologies could be shared among these institutions easily.

Less Cost

Not all Middle East countries can afford new technologies, and each distance learning institution has to apply the technologies it can afford. In the meantime sharing technologies can minimize cost. Some rich Middle East countries can afford technology easily, as financial support is available, whereas in some other unlucky ones technology is hardly available. Sharing learning objects and other technologies among rich and poor countries would help distance learning institutions to fulfill needs. Costs of online learning may also vary from one country to another. Distance learning institutions in the Middle East have the same mission. But because their approaches and applications vary, it would be difficult for them to adopt the same policies, terminologies and learning objects.

Although some distance learning institutions are utilizing multimedia and learning objects to deliver web-based courses, many institutions are still dependant upon the older technologies and traditional ways of learning. Moving to new technologies for some institutions represents a formidable cost. I agree with Downes that through unification of their efforts to teach common courses, and share the same technology (including learning objects), costs can be minimized.

Citation Format

Jamlan, Muain (July, 2001) A Critique of Stephen Downes' Article, "Learning Objects": A Perspective from Bahrain. *International Review of Research in Open and Distance Learning*: 2, 1. http://www.icaap.org/iuicode?149.2.1.12

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (July, 2001)

Patterns of Interaction in a Computer Conference Transcript

Patrick Fahy

Gail Crawford

Mohamed Ally

Abstract

An analysis of the interaction patterns in an online conference from a distance education graduate course was conducted, using an approach that focused on the transcript's interactional and structural features. A new tool for transcript analysis, the TAT (Transcript Analysis Tool), was used to analyze interactional features, while structural elements suggested by social network theory were examined. Analysis of the patterns of interaction in the conference showed interaction was variable, and that while all participants were engaged, intensity and persistence of participation were unequal among individual participants in several ways. The TAT showed the proportions of five major types of sentences in the transcript, corresponding to different modes of interaction (questions, statements, reflections, engaging comments, and quotations/citations). The findings showed that the TAT seemed to relate usefully to other work in this area, and that social network principles were valuable in the analysis of conference interaction.

Introduction

Text-based computer conferencing often provides the primary means for interaction and the search for consensus or new knowledge in distance education (Collins & Berge, 1996; Morris, Mitchell & Bell, 1999). Computer – mediated communications (CMC) researchers have studied a variety of outcomes and processes, including the dynamics at work among students (Henri, 1992); overall and personal interaction (Fulford & Zhang, 1993); the creation and testing of meaning and new knowledge (Anderson & Garrison, 1995; Zhu, 1996); the impact of modeling, coaching and scaffolding on the learning of new behaviours (Collins, 1996; Jonassen, 1999); integrated thinking (Gibson, 1996); negotiation of meaning and co-creation of knowledge through social interchange (Gunawardena, Lowe & Anderson, 1997; Kanuka & Anderson, 1998); and social presence (Rourke, Anderson, Garrison & Archer, 1999).

Despite this research record in transcript analysis, however, substantial gaps persist in our understanding of online interaction, both in relation to what transpires interactionally in conferences, and what factors contribute to a successful online experience from the participant's point of view. For researchers, these gaps indicate lack of a theoretically adequate account of learner-learner interaction in online situations (Anderson & Garrison, 1995), and, for practitioners, the need for a model for managing online communications effectively. Redressing such omissions may at least partially require rethinking the methods of enquiry typically employed in transcript research. The increasing availability of tools for interaction may be expected to drive increased use of methods which employ them. Practitioners and researchers must be able to describe online interaction more than impressionistically, and measure effects more than anecdotally.

In this study we employed a new tool, the TAT, and techniques from social network theory applicable to transcripts to address problems of description and measurement in online interaction. The exploratory study attempted to address analytic issues by considering both content and structure in a computer conference transcript, focusing on the network exchange patterns observed in a conference transcript (Ridley & Avery, 1979). The study shares Henri's (1992) view that a conference transcript is "a gold mine of information concerning the psycho-social dynamics" among the participants (p. 118). Pertinent to the study were the patterns of interpersonal exchange which develop over time in network transactions and which both characterize and apparently motivate network membership and participation (Ridley & Avery, 1979). Understanding these patterns may enable instructors to address some fundamental gaps in our knowledge of online communications; focus on patterns and structures may also encourage a different perspective on the interaction process itself.

Theoretical context

The study was exploratory in that it made extended use for the first time of a new analytic tool, the TAT (Transcript Analysis Tool). Reasons for offering this new tool (described in detail in Attachment A) are discussed below. We analyzed the content of an online computer conference using the TAT, and viewed structural patterns in relation to selected elements of network theory. We hypothesized that analysis of both the patterns of exchange and the content might provide a richer assessment of the resulting interaction.

We defined *interaction* as "the *totality* of interconnected and mutually-responsive messages" (Gunawardena et al., 1997, p. 407; emphasis supplied). We see in this definition the wisdom of a holistic approach to transcript analysis – what Gunawardena et al. call the "entire gestalt" (p. 407) of the communicative situation. Viewed in this way, the communicative whole (content and structure) might well be greater than the sum of the individual postings.

A *social network* was defined as those individuals with whom a person is in some sort of regular, sustained contact (Ridley & Avery, 1979). People normally belong to different social networks, reflecting personal and situational differences such as gender, age, place of residence, education, occupation, income, opportunity, and physical mobility. Social networks contain and are sustained both by content (ideas, opinions, information), and by the purely (or mainly) social interaction opportunities they offer. Social networks link likeminded people, allowing information and viewpoints to move among them. The computer conference in this study was regarded for theoretical purposes as a specialized social network.

Networks have long been known to be influential in human communications and interaction (Ridley & Avery [1979, p. 224] describe the literature on networks as "vast"), which explains why networks for interpersonal interaction and exchange feature prominently in distance study (Collins & Berge, 1996; Fulford & Zhang, 1993; Garrison, 1989; Haughey & Anderson, 1998). It seems plausible that by using some of the tools other disciplines have developed to understand the social structure of recurrent interaction, the study of online communication could provide greater understanding of the relational forms which emerge from uses of online computer conferences for learning (Burt, 1983).

Because of the growth in the number and variety of online networks in distance teaching, greater understanding of electronic communication is increasingly timely, even urgent. Another reason for concern with network processes is the fact that the *exchange patterns* – the recurrent transactions which begin to characterize the interaction among specific members or subgroups – may not be positive in all cases. Exchange patterns can and do range from benevolent to openly hostile (Ridley & Avery, 1979), and may, in the worst cases, include serious problems such as addictive behaviour, rudeness and asocial interaction, and other forms of abuse of the medium or its related technologies (Abrami & Bures, 1996; Collins, 1996; "One-third of workday," 2000). In the best cases, the exchange patterns reveal a partnership attitude among the participants in the learning process (Ridley & Avery, 1979), but it is by no means uncommon for examination of network exchanges to reveal evidence of dislike and varying degrees of antagonism (Wellman, 1982).

The network concepts chosen for examination in this study were the structural and interactional exchange patterns observed in a transcript of a graduate distance education course. Structural features of interest in the investigation included the physical dimensions of the network, and the potential and actual levels of interaction revealed by the following (Ridley & Avery, 1979):

- The size (number of members) and potential complexity of the network.
- The density (the ratio of the actual numbers of links to the possible total) and intensity (responsiveness and attentiveness of members to each other).

Interactional features found in an analysis of the postings which comprise the conference transcript include:

- The kinds of content exchanged in the interaction (an indication of the members' perceptions of the learning element of the social relationship).
- The exchange flow or the *directedness* of the resulting interaction (an indication of the degree to which exchanges were symmetrical or asymmetrical; equal, unequal, or complementary).

Design of the study

Before embarking on an analysis of the interactional and structural elements of the transcript, the problem arose of choosing a tool and procedure for analyzing transcript content. In a previous paper (Fahy, 2001a), problems with past transcript analysis approaches were examined. To explain our proposed solution, the TAT, we summarize these briefly here.

1. Reliability. Transcript studies often omit entirely any mention of reliability (Gibson, 1996; Rourke, et al., 1999), or admit that reliability was achieved only by resorting to inefficient strategies such as collaborative coding (Kanuka & Anderson, 1998). If a classification system for analysis of transcripts is to be useful for various purposes to practitioners of online communication, reliability is essential. Reports of reliability permit users to assess the probable accuracy or the additional resources needed to achieve accuracy with various systems. In this study, a combination of intra- and inter-rater reliability tests was used (described below) to arrive at an estimate of the instrument's reliability for content analysis.
2. Lack of discriminant capability of instruments. Some previously used analytic approaches and tools have been acknowledged by their developers as failing to discriminate adequately among the types of statements appearing in transcripts. A major problem was that large portions of the transcript were coded into a very few interaction categories (Gunawardena et al., 1997; Kanuka & Anderson, 1998; Zhu, 1996), with the result that the transcript's communicative richness may not have been fully revealed.
3. Excessive numbers of coding categories. Somewhat ironically, given the previous point, it has also been common for coding instruments to employ numerous categories (up to 20 coding categories have been encountered, and the average among 5 popular instruments was 14). Users are thus forced to make very fine discriminations in using the instrument – finer than may be reliably replicated by others (Cookson & Chang, 1995; Fahy, 2001a; Rourke, et al., 1999). Overly-complex tools make unreasonable

demands on users. If fewer categories are used, and these focus on the most important and common types of interactions engaged in by the conference participants, it may be easier for coders to make classification decisions, and for readers to interpret the results.

4. The definition of *meaning*. Many transcript postings obviously contain more than one unit of meaning (Gunawardena et al., 1997; Henri, 1992). Attempts to find and code the meaning of whole postings falter at this point, or result in the invention of new constructs of doubtful provenance such as "speech segments" (Gibson, 1996) or "units of meaning" (Henri, 1992).

In this study, we deliberately separated the unit of meaning from the unit of analysis. In choosing sentence types for analysis with the TAT, we sought to focus on the text, including the context in the form of the structural elements provided in the conferencing format. Focus on the types of sentences and structural features of conferences was motivated by an obvious (to us) fact about online communication: transcripts are made up of text, organized by the writer (or speaker) into sentences. The resulting message is then intentionally placed (posted) by its creator at a particular point within the conference structure, related by its placement to the ongoing online discussion. The process makes the sentences and paragraphs, their placement, and the interrelation of these and other elements of the resulting transcript potentially important indicators of and contributors to the meaning of the exchange.

Questions

Two questions were posed for exploration in this study:

- What interactional and structural exchange patterns characterized the interaction in the transcript?
- What (if anything) do the patterns suggest about the nature of interpersonal communications and interaction in this conference?

The conference and the transcript

The transcript used in the study was generated by 13 students and an instructor (one of the authors), all experienced users of computer conferencing in academic settings. The 15-week graduate course in which the interaction occurred was an elective within Athabasca University's Master of Distance Education program, and was offered entirely at a distance. Interaction was achieved by e-mail, file

exchange for submission of and feedback on assignments and projects, a course Website, and computer conferencing. The complete 53,671-word conference transcript (44,599 words posted by students) was coded by one of the authors, while the other authors coded portions for comparison and the validation trials (below).

The instructor moderated the conference, and provided conference starter messages in each unit, in the form of three initial questions or topics, to which participants could respond. Participation in the conference was worth 10% of the course mark; full marks were awarded if a student posted a minimum of two contributions in each of the seven course units (a total of 14 postings). At the start, students were advised that conference transcripts would be archived and would later be used in research. Students could request that any of their postings be removed from the conference or revised at any time prior to archiving of the conference at course-end. (No requests for editing or removal of posts were received.)

The instructor attempted to model diligent conference participation, accounting for 106 of 462 total postings (23%), and 9,072 of 53,671 total words (17%). (Standards for interpreting this level of involvement are elusive. Shank [2001] suggests an instructor should make a minimum of 10% of conference postings, by which criterion the instructor in this course was highly present.)

The TAT

Our review of previous studies, and experience with other transcript analysis tools, led us to adapt Zhu's (1996) analytic model (Fahy, et al., 2000; Fahy, 2001a), resulting in the Transcript Analysis Tool (TAT). Three trials were conducted by the course authors, using the TAT in various applications. Trial 1, which achieved 86% agreement, was an intra-rater (code-recode) design conducted by one of the authors. In this trial, ten days elapsed between the initial coding and subsequent recoding. The agreement rate was calculated as the simple proportion of agreement from coding to recoding. Trials 2 and 3 involved all three authors. In these cases, agreement was calculated both by the ratio of concordant ratings, and by application of Cohen's *kappa* to selected trials. (*Kappa* is a chance-corrected measure of agreement, where 1.0 indicates perfect agreement) (Agreement observer, 2000; University of Colorado, 1999).

By the measure of concordant codings, agreement rates among the three raters of 60% (trial 1) and 71% (trial 2) were achieved. On another trial coding, *kappa* values of 0.45 and 0.65 for pairs of raters on two separate samples were achieved. (Chuang, 2001, suggests these could be seen as evidence of moderate and substantial agreement, respectively, although he adds that this is only a "rough guide" to interpretation of *kappa* values). The participants in the agree-

ment trials concluded that proficiency increased rapidly with experience, and further practice with the instrument would likely result in further increases in agreement.

The TAT was designed to permit transcript content to be coded reliably and efficiently. The TAT's primary and secondary categories are presented in Table 1 (see Attachment A for definitions, and examples from the transcript illustrating each category).

Table 1: Primary and secondary categories in the Transcript Analysis Tool (TAT)

Primary Categories	Secondary Categories
T1 – Questioning	T1(a): vertical
	T1(b): horizontal
T2 – Statements	T2(a): direct
	T2(b): answers or comments
T3 – Reflections	
T4 – Scaffolding	
T5 – References, authorities	T5(a): references, quotations, paraphrases
	T5(b): citations or attributions

ATLAS.ti(c), a qualitative analysis software package, was used to facilitate transcript coding and analysis.

Findings

The study's findings are reported here in relation to structural and interactional elements of the transcript. The structural features discussed are network size, density and intensity; interactional features are reflected in the TAT analysis of sentence types found within the transcript.

Structural features

The basic structural features of the online conference network described the characteristics of the network itself. From this analysis came information about the scope for potential interaction, as well as data on the actual extent to which individuals connected and interacted online. (No attempt was made to assess other types of contact among group members, such as telephone, e-mail, or face-to-face interaction. The following analysis refers only to interaction preserved in the transcript of the course computer conference.)

Network size

The network in this study was modest in size, consisting of 13 students (6 women and 7 men), and the instructor. (While the small size of the group obviously affected generalizability, it was desirable in an exploratory study.) As no student chose an alternate activity to replace the course conferencing requirement, all students were members of the online network, and each student thus potentially had a total of 12 other students (and the instructor) with whom to interact.

The influence of network size on interaction is direct: as the size of the network grows arithmetically, the number of potential linkages grows proportionally. (For this group of 13 students, the number of potential person-to-person links was 78; if the instructor is added to the possible links, the number rises to 91. For a group of 15 the number is 105, for a group of 25 it is 300, and for a group of 50 the total is 1,225.) Clearly, size is a major structural determinant of what level of involvement is feasible for a given network. Group size is also important because it is used in the calculation of other network parameters (Ridley & Avery, 1979). If some students are not actually involved in the network (because they have chosen an alternative activity, for example), their absence should be reflected in the value for size.

Density

The density of network communication (the ratio of the actual number of connections observed, to the total potential number of possible connections) was calculated to assess the level of person-to-person linkage. (Density, it should be noted, may have been somewhat affected by the fact that there was a minimum course requirement for participation. However, while students were required to contribute to the conference, no specific direction was given about with whom they should interact.)

Various definitions of the term *density*, and differing methods for calculating it, have been proposed (Ridley & Avery, 1979). Berkowitz's (1982, p. 45) formula

was used here:

Density (D) = 2*a* / N(N – 1)

where *a* = the actual number of interactions observed (61), and N = the number of participants in the network (13).

Using these values in the above formula, the density of this network was calculated at 0.782, or 78%.

Density is a measure of the breadth of social experience of the individuals in any group (Berkowitz, 1982), and may also be seen as a measure of *connectedness* within the network. (Connectedness here means linkages between pairs of network members, occurring as a result of either party's initiative.) Density may be useful in determining how well a group of people "mixed" or connected, but some caveats apply to its interpretation. First, high values for density can result from the efforts of a small number of "connectors" reaching out to others in the network. If this were to occur, density values would be inflated, while the average number of connections of all network members (the *degree* of the network, a measure of how "democratic" interaction was) would be low. In fact, such a pattern was observed here: the average number of contacts in the network was 6.9, or about 58% of its possible maximum (12), while the density, as shown above, was 78% of its possible maximum value. We conclude, therefore, that a relatively small number of participants accounted for a large part of the interaction. (More evidence is presented below for this interpretation, in the discussion of intensity.)

Another caveat is that network density is highly associated with network size, and density figures in larger networks are predictably lower than in smaller ones. Comparisons of density values should not be made between groups of different sizes as a way of inferring network connectedness (Rytina, 1982).

Intensity

While density shows the number of links among all individual network members, intensity is reflected in the depth and persistence of the interaction. Intensity implies the participants are actually engaged, rather than merely dutiful. (Density suggests the presence of dutiful behaviour: participants politely "checking in" with each other, but failing to engage.) Intensity is one of the better measures of involvement in the interaction itself, because it measures dedication and persistence and not mere one-time contact (Ridley & Avery, 1979). Evidence of the competence of the analytic method to measure intensity was of special interest in this study.

Levels of participation. A major indicator of intensity in this network was the degree to which, on average, participants exceeded the minimum course

requirement for conference participation. As noted above, while the requirement was 14 postings the average number of student postings was 26. Thus, the average number of student postings was 195% of the requirement (356 postings were made by students, where 182 would have met the requirement).

S-R ratio. In order to assess further the parity (and quantify the disparity) of the interaction among individuals in the network, a proportion of "messages sent" over "messages received" (the S-R ratio) was calculated for each member. The S-R ratio for the students was 1.59, indicating that, as a group, participants sent about one and one-half messages for each message received. (The instructor's S-R ratio was 0.43, indicating receipt of more than two messages for each one sent.)

At the level of individual participants, the S-R ratio confirmed the considerable variability in communication intensity already mentioned. The range in the S-R ratio was striking: from a high of 2.7 (a student who made 16 postings) to a low of 1.0 (a student who made 22 postings). Examination of the S-R ratios for individuals confirmed that reaching out to touch others did not necessarily result in reciprocation: the individual who was most highly connected (the student with the widest number of contacts, who had interacted with 12 others in the group) did not receive replies from 6 of those she contacted. (Her S-R ratio was a relatively high 2.1, compared to the average group S-R value of 1.6).

Persistence. Another measure of intensity, or the conference's "pull," was found in the participants' persistence in the interaction, shown by the level to which topics were pursued. The term *level* as used here means how many messages appeared in the "thread" of a discussion, from the first posting on the topic to the last. The level to which a topic had progressed was readily apparent to participants, as part of the structure of the transcript. Levels of posts appeared as follows in the transcript:

```
Initial posting

Level 2

Level 3

Level 4

Etc.
```

Topical progression suggests that as a discussion continues it will move away from the original focus (the discourse topic), and may, if continued long enough,

evolve to a discussion of a completely different topic, just as a spoken conversation might (Witte, 1983). Even if they are aware of this "drift," participants may not choose to recognize it by beginning a new sequence, because doing so might interrupt the thread of the discussion. Instead, they may choose to continue the discussion, posting to each other's comments and extending the discussion to deeper levels, all the while perhaps moving further away from the original topic. Whether topics drift or not, the fact of persistence in the discussion was seen as indicating engagement reflective of the intensity within the interaction.

Examination of levels achieved in the transcript, shown in Table 2, revealed the extent to which discussions persisted: more than 20% of all postings went beyond the fifth level, while about a third stopped by Level 2. As there is little directly comparable information in this area, Levin, Kim and Riel's (1990) experience with the culturally heterogeneous and international "Intercultural Learning Network" (ILN) are also shown in the table, for contrast.

Table 2: Persistence in student topic development

Topic terminated at:	#	%	Levin et al. (%)
Level 1	2	1	54
Level 2	126	35	24
Level 3	47	13	13
Level 4	70	20	6
Level 5	33	9	3
Level 5+	78	22	1

Clearly, the participants in this study showed more persistence than was observed by Levin et al. This might reflect the impact of size on persistence (the ILN group was much larger). It may also indicate the importance of structure and moderator presence (the ILN was an electronic message system – a bulletin board – rather than a moderated computer conference). Whatever the explanation, it is clear that persistence is another variable on which participation and participants differed here.

Another observation about persistence, providing further insight into the individual variability of intensity, was that the participants who made fewer postings overall also tended to make them earlier in the conference and were thus less persistent. The two individuals who made the fewest postings overall (13 and 16) made 72% of their contributions (21 of 29) in Levels 2 or 3, and only 14% (4 of 29) at Level 6 or higher. In comparison, the two students who made the

highest number of postings (47 and 39) made 29% of their postings at Levels 2 and 3 (25 of 86), and 30% at Level 6 or higher.

Persistence reflected the personal investment of some participants in the conferences more than simple numbers of postings did, because both implied commitment of time and energy over time. Persistent participants actually interacted; they did not simply log-in, post and leave, oblivious of others.

In network theory, in order to participate in a conference other opportunities for interaction of different kinds must be foregone; membership in a network is seen as both facilitating and limiting, permitting and restricting. Commitment to a network affects the kinds of interaction, range of topics, and the eligible individuals with whom one might interact (Ridley & Avery, 1979). Within a structured conferencing setting such as obtained here, early contributions may be seen as preferable by some because it is easier to make original observations when there are fewer postings already there. For those less inclined to interact, or less engaged in the topic, there is also less to connect with: Level 1 comments do not have to relate to a potentially extensive existing discussion. Since all participants met the minimum requirements of the conference, none can be said to have been insufficiently connected to the network. The fact that some greatly exceeded the minimum, and how they did so in various ways, is a notable finding from the analysis of the structural components of the transcript.

Interactional features of the conference

Interactional characteristics of the network were addressed by TAT analysis of the types of content in the transcript. (See Attachment A for definitions and examples of TAT categories.)

The TAT analysis of transcript content.

The frequency of each of the TAT types in this transcript is shown in Table 3. The number of sentences is shown for students' postings only.

To facilitate comparisons, Table 4 presents occurrences of each TAT type per thousand words.

Gender patterns were not the focus of this study (see Fahy, 2001b, for a fuller treatment of this question), but some intriguing differences emerged from the above. Women were more likely to ask questions of both types (types 1A and 1B), and were also somewhat more likely to answer questions and to refer to previous material in their postings (type 2B). Men, on the other hand, were somewhat more likely to cite authorities in the form of quotations or para-

Table 3: Frequency of TAT types

TAT Types	Men		Women		Total	
	#	%	#	%	#	%
1A: Vertical questions	9	35	17	65	26	1
1B: Horizontal questions	21	45	26	55	47	2
2A: Expository statements	593	45	736	55	1329	52
2B: Referential statements	104	42	142	58	246	10
3: Reflections	241	46	285	54	526	21
4: Scaffolding, engaging	88	35	164	65	252	10
5A: Quotations, paraphrases	47	53	42	47	89	3
5B: Citations	27	63	16	37	43	2
Total	**1130**	**44**	**1428**	**56**	**2558**	**100**

phrases (type 5A), and were considerably more likely to include citations in their postings (type 5B).

These differences were small compared with the overall uniformity of the pattern of conference interaction revealed by the TAT: type 2A sentences (statements) predominated at 52%, followed by type 3 (reflections) at 21%; together, these two types accounted for almost three-quarters (73%) of the sentences in the transcript. Scaffolding and engaging (type 4) and references to others' posts (type 2B), at 10% each, accounted for another fifth of the interaction. Questions of both types, and quotations, paraphrases and citations, together accounted for the remainder (8%).

Discussion

Two questions were posed to guide this study. First, what structural and interactional exchange patterns characterized the interaction in the conference? Second, what do the patterns suggest about the nature of interpersonal communications and interaction in this conference?

Table 4: Occurrences of TAT types per 1000 words

TAT Type	Men	Women	Total
1A: Vertical questions	0.41	0.67	0.53
1B: Horizontal questions	0.97	1.09	1.02
2A: Expository statements	28.63	30.62	29.55
2B: Referential statements	5.00	6.42	5.65
3: Reflections	11.56	11.86	11.70
4: Scaffolding, engaging	4.13	7.60	5.73
5A: Quotations, paraphrases	2.35	1.76	2.08
5B: Citations	1.38	0.74	1.08

In relation to the first question, the social network concepts used here appeared to provide useful insights into the workings of this online conference. Network size and complexity, for example, showed how important these apparently simply concepts were to the potential for genuine group interaction. Furthermore, considering these structural elements of the network raises questions about the choices students should have in conference participation, including alternatives to network participation. The behaviour of students observed in this study should cause facilitators and moderators of online interaction to consider questions such as the following:

1. Should students, especially those whose connection to the network, for whatever reasons, is likely to be minimal, be offered alternative methods of interaction?
2. What effects does minimal or unwilling social interaction have on the individuals exhibiting it, and on the network?
3. What should our response be to indications that some of our students find network sizes intimidating, or the conferencing experience less satisfying, valuable or personally feasible than we intend?

In this study, no student took advantage of the available alternatives to conferencing. At 13, this group was relatively small for a distance education class, and, as shown, the maximum possible number of interactional combinations for a group this size was relatively small. With even modest increases in size, however, complexity increases dramatically. Obviously, the expectation of what

constitutes realistic participation in (or even awareness of) the whole of the interaction in a conference is affected by these mathematical realities, and should be reflected both in our moderating behaviour and in our requirements for participation. Size limits the number of contacts, and it forces participants to be selective in their interactions. How network participants choose to limit the size of their personal network, and how they select their contacts, is of interest, and we recommend further research in these areas.

Density and intensity measures showed high levels of variability in the participation and connectedness of network members. Again, these findings should raise concern for the apparent experience of the participants. First, it would be unwarranted to conclude that individuals with minimal links to others had deficient social or intellectual experiences. Cook (1982) suggests that the quality of "exchange relations" rather than the quantity of exchange transactions should be the focus of analysis in determining the quality of interrelationships. Future research (for example, using an instrument such as the TAT to assess content in networks of varying density) might illuminate the question of the relation of connectedness measures to other criteria.

Clearly, there were wide variations in the connectedness of individuals within this network, as shown by the discussion of density. Density reflects the degree to which all are acknowledged within the network. The usefulness of density-related measures should now be established in relation to core distance education issues such as network health (Kadushin, 1982), cognitive presence (Garrison, Anderson & Archer, 2001) and social presence (Rourke, et al., 1999), and the relation of interaction to learning itself (Gunawardena et al., 1997).

The desirability and feasibility of *multiplex* or multi-strand networks arises from analysis of participant behaviour. Participation and connectedness were variable in this study, supporting the practice of permitting participants to diverge from given topics, to form special interest groups, and generally to adapt the conferencing experience to their individual needs. It seems clear that network membership constrains choices (Rytina, 1982). The degree to which it may be possible to create community within a flexible online environment needs to be investigated.

In relation to the second research question posed for this study, the TAT provided information on the interactional aspects of the conference. In this conference, over half of students' sentences were direct statements (52%), while the next largest category, reflections, comprised 21%. In relation to the theory of expository and epistolary types (Herring, 1996), this suggests that the predominant discourse type in this conference was *expository*, oriented to the transfer of information. Reflections, on the other hand, are considered an *epistolary* type (like a typical friendly letter, affirming the other, aligning with the other's views, and supporting continued dialogue). Further study is needed to determine the usefulness of typologies such as Herring's in analyzing the content of interaction in relation to various outcome measures, including levels and types of

participation and interaction, and gender differences in online behaviour (Fahy, 2001b.)

Some results of the TAT analysis accorded well with previous transcript research. Herring (1996) reported that 67% of the statements in her study expressed points of view. In this analysis, Type 2 sentences (statements) comprised the greatest single type, at 62% of the total. Gunawardena et al.'s (1997) method coded the greatest portion (92%) of their corpus as Phase 1 ("sharing and comparing of information" p. 414). These findings suggest consensus that information-related statements are likely to comprise the largest portion of online conferences.

Another corroborating finding related to the relatively rare occurrence of questions in transcripts. Five percent of Herring's statements requested information, while 3% of statements in this study consisted of questions. There appears to be consensus that questioning constitutes a consistently small fraction of interaction.

Finally, the overall proportion of engaging or scaffolding sentences (10%) in this study may be compared with other studies, if care is taken in doing so. Rourke et al. (1999), for example, estimated that up to one-quarter of message content might consist of "expressions of feeling, self-introductions, jokes, compliments, greetings and closures" (p. 54). In our study, these kinds of expressions were coded as Type 4, and constituted 10% of all postings. However, identifying expressions of feeling can be problematic, as in this study they may have been coded Type 3 if they were judged to be reflective. Type 3 constituted 21% of all postings; if half of these were expressions of feeling the resulting proportion (added to Type 4), at 20%, is close to what Rourke and his colleagues observed. (In comparison to our findings here, Herring reported that 10% of statements in her study expressed feelings.)

In regard to the question of the directional flow, or directedness, of interaction within the conference, the variability noted throughout led to the conclusion that interaction here appeared asymmetric and non-complementary. In the absence of information about the participants' motivations and personal outcomes derived from network interaction, their widely differing levels of participation seemed to indicate different levels of purpose, and varying perceptions of benefit. If the online discussion was indeed social, participation or non-participation can be regarded as a judgment about the results: participation suggests benefits were being achieved (Ridley & Avery, 1979), while non-participation suggests disappointment, or conflicting priorities (Rytina, 1982). On the evidence of this study, the question of the meaning of asymmetric directedness remains open, and in need of further research.

The roots of participant motivation overall remain to be explored. Our analysis found willingness by some to engage in the social network far beyond minimum requirements. The aspects of the network experience which encouraged the

investment of time and energy, and how these motivators might be detected in network interaction, remain to be determined, a task we suggest may be feasible with the TAT and the other tools used here.

In terms of the TAT itself, this study produced evidence that the TAT was usable for a coding task of the magnitude encountered here (some 53,000 words), especially when used with a computer-based coding and analysis tool. The study demonstrated the capacity of the TAT to discriminate among the types of sentences within the transcript. A weakness of the TAT is the level of inter-rater agreement demonstrated to date. Further trials need to be conducted to determine how reliable the TAT is under conditions of greater practice. (The apparent intra-rater reliability reported here, and by Keller [1999], suggests that there is potential for high levels of agreement, and thus of reliability, with sufficient training and practice.)

While we suggest further work with our instrument and procedure, we also recognize the possibility that other useful instruments may appear (including an improved TAT). We expect the instrument and procedures to evolve as others (and we) make further uses of them in different applications.

Conclusion

This study found evidence that the exchange patterns in a conference could be assessed by analysis of a combination of structural and interactional evidence. We also found the tools of network theory were useful and applicable to the analysis of the online interaction in the transcript. As an exploratory study, the analysis raised a number of questions which we are encouraged to think may be addressed in future applications of this analytic method. We recommend that research and experimentation with analytic systems and tools in the area of transcript research should continue. We hope that the issues we articulated and addressed in this paper will generate further comparative data.

We particularly commend to transcript researchers use of objective measures of structural and interactional properties in the analysis of conference networks and transcripts. Our experience here with the concepts and tools of network social interaction was positive, and this encourages us to agree that research methods in this area should be used and questions posed which turn (or return) to "fundamental concepts and constructs" (Saba, 2000). Disciplines which have grappled with the analysis and description of face-to-face interaction potentially have much to offer those who work with interaction in virtual communities. Researchers should regard this work as fundamental, and consider how it might assist us in advancing transcript research.

Attachment A

TAT Categories and examples

T1: Questioning:

Type 1A includes *vertical questions*, which assume a "correct" answer exists, and the question can be answered if the right answer can be found.

Examples:

- "Is the presenter involved in producing the script?"
- "What do you do with your questionnaire results at the end?"
- "Would I be correct in using 'paradigm pioneer' and 'entrepreneur' in the same way, or would there be differences between the two?"

Type 1B are *horizontal questions*: there may not be one right answer, and others are invited to help provide a plausible or alternate "answer," or to help shed light on the question.

Examples:

- "What do these indicate about our cultural orientation to 'technology' (as a form of tool-making), and perhaps how this view may have changed over time?"
- "Afterall, what makes a technology advanced?"
- "Just because we put a course online does that mean that is all that learners can have access to, does that mean we have to forget about the great textbooks and other resources that are available?"

T2: Statements:

Type 2A statements contain little self-revelation and usually do not invite response or dialogue. The main intent is to impart facts or information. The speaker may take a matter-of-fact, a didactic, or even a pedantic stance, providing information or correction to an audience which he or she appears to assume is uninformed or in error, but curious and interested, or otherwise open to information or correction. *Statements* may contain implicit values or beliefs, but usually these are inferred, and are not as explicit as they are in *reflections*.

Examples:

- "In my organization, strategic planning occurs in a focus group of individuals assigned to the organization and development of course material and yearly plan."
- "We found that keeping content up-to-date, distribution and PC compatibility issues were causing a huge draw on Ed. Centre time."
- "Both excellent and learning organizations have similar characteristics."

Type 2B are direct answers to questions, or comments referring to specific preceding statements**.**

Examples:

- "I suspect there is a lot of truth in your statement."
- "[Name], this is not the only case, I'm afraid, of a technology being acquired in the assumption that a use would be found for it later."
- "In fact, what you have defined nicely here is 'the learning moment'."

T3: Reflections (significant personal revelations): the speaker expresses thoughts, judgments, opinions or information which are personal and are usually guarded or private. The speaker may also reveal personal values, beliefs, doubts, convictions, and ideas acknowledged as personal. The listener/reader receives both information about some aspect of the world (in the form of opinions), as well as insights into the speaker. Listeners are assumed to be interested in and empathetic toward these personal revelations, and are expected to respond with understanding and acceptance (though the speaker may act somewhat apologetic). The speaker implicitly welcomes questions (even personal ones), as well as self-revelations in turn, and other supportive responses.

Examples:

- "So, my view is that if a technology is actually better for some purpose than some another technology, it is genuinely 'advanced'."
- "I personally think a specific technology is only obsolete if it is no longer useful."
- "I have often wondered – still do, in fact – why we were not successful."

T4: Scaffolding and engaging: these are intended to initiate, continue or acknowledge interpersonal interaction, and to "warm" and personalize the discussion by greeting or welcoming. Scaffolding and engaging comments connect or agree with, thank or otherwise recognize someone else, and encourage or recognize the helpfulness, ideas and comments, capabilities, and experience of others.

Also included are comments without real substantive meaning ("phatic communion," "elevator/weather talk," salutations/greetings, and closings/signatures), and devices such as *obvious* rhetorical questions, and emoticons.

Examples:

- "I hope this gives a little more info. about our methods – let me know if it doesn't."
- "Just a reminder, for those of you who feel overburdened by the CMC requirement (you know who you are!): don't feel you're alone."
- "Even as a parent and a teacher (with pretty good math skills!) I still learned some new things :-)."

T5: References, authorities:

Type T5A: references to, and quotations or (fairly direct) paraphrases of other sources.

Examples:

- "You asked, 'What can you tell about a culture by its tools?"'
- "We are told that the medium is sometimes the message."
- "Herbert Simon, Nobel Laureate economist, said, 'What information consumes is rather obvious: it consumes the attention of its recipients."'

Type T5B: citations or attributions of quotations or paraphrases.

Examples:

- "(J. Robert Oppenheimer, *Science and the Common Understanding*, 1953.)"
- "Max Frisch, Homo Faber, 1957."
- "Phillips, Jack. (1998). The return-on-investment (ROI) process: Issues and trends. *Educational Technology, 38*, 4, July-August, 7-14."

References

Abrami, P. & Bures, E. (1996). Computer-supported collaborative learning and distance education. *The American Journal of Distance Education, 10*(2), 37-42.

Agreement observer. (2000, October). *Chest x-ray*. Retrieved March 21, 2001: [http://www.chestx-ray.com/statistics/kappa.html]

Anderson, T. & Garrison, D. R. (1995). Transactional issues in distance education: The impact of design in audioteleconferencing. *The American Journal of Distance Education, 9(*2), 27-45.

Berkowitz, S. D. (1982). *An introduction to structural analysis*. Toronto: Butterworths.

Burt, R. (1983). Distinguishing relational content. In R. Burt & M. Minor, *Applied network analysis* (pp. 35 – 74). London: Sage Publications.

Chuang, J. (2001). Agreement between categorical measurements: *Kappa* statistics. Retrieved March 21, 2001: [http://www.cpmc.columbia.edu/homepages/chuangj/kappa/]

Collins, A. (1996). Design issues for learning environments. In S. Vosniadou, E. De Corte, R. Glaser, & H. Mandl (Eds.), *International perspectives on the design of technology-supported learning environments* (pp. 347-361). Mahwah, New Jersey: Lawrence Erlbaum Associates, Publishers.

Collins, M. & Berge, Z. (1996). *Facilitating interaction in computer mediated online courses*. Retrieved May 30, 2001: [http://jan.ucc.nau.edu/\char126\relaxmpc3/moderate/flcc.html]

Cook, K. (1982). Network structures from an exchange perspective. In P. Marsden & N. Lin (Eds.), *Social structure and network analysis*, (pp. 177 – 199). Beverly Hills: Sage Publications.

Cookson, P. S. & Chang, Y. (1995). The Multidimensional Audioconferencing Classification System (MACS). *American Journal of Distance Education, 9*(3), 18-36.

Fahy, P. J. (2001a). Addressing some common problems in transcript analysis. *International Review of Research in Open and Distance Learning (1)*2. Retrieved May 30, 2001: [http://www.irrodl.org/content/v1.2/research.html\#Fahy]

Fahy, P. J. (2001b). *Epistolary and expository interaction patterns in a computer conference transcript*. Manuscript submitted for publication.

Fahy, P. J., Crawford, G., Ally, M., Cookson, P., Keller, V. & Prosser, F. (2000). The development and testing of a tool for analysis of computer mediated conferencing transcripts. *Alberta Journal of Educational Research, 46*(1), 85-88.

Fulford, C. P. & Zhang, S. (1993). Perception of interaction: The critical predictor in distance education. *The American Journal of Distance Education, 7*(3), 8-21.

Garrison, D. R. (1989). *Understanding distance education: A framework for the future*. New York: Routledge.

Garrison, D. R., Anderson, T., & Archer, W. (2001). Critical thinking, cognitive presence, and computer conferencing in distance education. *The American Journal of Distance Education, 15*(1), 7-23.

Gibson, C. C. (1996). Collaborative learning in action via computer mediated conferencing. In *Proceedings of the 12th Annual Conference on Distance Teaching and Learning: Designing for Active Learning*, (pp. 121-125). Madison: University of Wisconsin.

Gunawardena, C., Lowe, C. & Anderson, T. (1997). Analysis of a global on-line debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing. *Journal of Educational Computing Research, 17*(4), 397-431.

Haughey, M. & Anderson, T. (1998). *Networked learning: The pedagogy of the internet*. Montreal: Chenelière/McGraw-Hill.

Henri, F. (1992). Computer conferencing and content analysis. In A. Kaye (Ed.), *Collaborative learning through computer conferencing: The Najaden papers* (pp. 117-136). Berlin: Springer-Verlag.

Herring, S. (1996). Two variants of an electronic message schema. In S. C. Herring (Ed.), *Computer-mediated communication* (pp. 81-106). Philadelphia: John Benjamins Publishing Co.

Jonassen, D. (1999). Designing constructivist learning environments. In C.M. Reigeluth (Ed.), *Instructional design theories and models, Volume II: A new paradigm of instructional theory*. (2nd ed., pp. 215-239). Mahwah, NJ: Lawrence Erlbaum.

Kadushin, C. (1982). Social density and mental health. In P. Marsden & N. Lin (Eds.), *Social structure and network analysis*, (pp. 147 – 158). Beverly Hills: Sage Publications.

Kanuka, H. & Anderson, T. (1998). Online social interchange, discord, and knowledge construction. *Journal of Distance Education, 13*(1), 57-74.

Keller, V. (1999). *Adaptation and application of a transcript analysis tool to analyze a computer-mediated communication (CMC) distance education course transcript.* Unpublished master's thesis, Athabasca University, Athabasca, Alberta.

Levin, J., Kim, H. & Riel, M. (1990). Analyzing instructional interactions on electronic message networks. In L. Harasim (Ed.), *Online education* (pp. 185 – 213). New York: Praeger.

Morris, R.M., Mitchell, N. & Bell, M. (1999). Student use of computer mediated communication in an Open University level 1 course: Academic or social? *Journal of Interactive Media in Education, 99*(2). Retrieved May 30, 2001: [http://www-jime.open.ac.uk/99/2/]

One-third of workday on computer, study says. (2000, February 26). *The Edmonton Journal*, p. I10.

Ridley, C. & Avery, A. (1979). Social network influence on the dyadic relationship. In R. Burgess, & T. Huston, (Eds.). *Social exchange in developing relationships.* (pp. 223-246). New York: Academic Press.

Rourke, L., Anderson, T., Garrison, R. & Archer, W. (1999). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Distance Education, 14*(2), 50-71.

Rytina, S. (1982). Structural constraints on intergroup contact. In P. Marsden & N. Lin (Eds.), *Social structure and network analysis*, (pp. 81 – 100). Beverly Hills: Sage Publications.

Saba, F. (2000). Research in distance education: A status report. *International Review of Research in Open And Distance Learning (1)*1. Retrieved December 21, 2000: [http://www.irrodl.org/content/v1.1/farhad.pdf]

Shank, P. (2001). Asynchronous online learning instructor competencies. Retrieved March 6, 2001: [http://www.learningpeaks.com/instrcomp.html]

University of Colorado. (1999). Calculating Cohen's *Kappa*. Retrieved March 21, 2001: [http://www.Colorado.EDU/geography/gcraft/notes/manerror/html/kappa.html]

Wellman, B. (1982). Studying personal communities. In P. Marsden & N. Lin (Eds.), *Social structure and network analysis* (pp. 61 – 80). London: Sage Publications.

Witte, S. (1983). Topic structure and revision: An exploratory study. *College Composition and Communications, 34*(3), 313-341.

Zhu, E. (1996). Meaning negotiation, knowledge construction, and mentoring in a distance learning course. In *Proceedings of Selected Research and De-*

velopment Presentations at the 1996 National Convention of the Association for Educational Communications and Technology. Indianapolis, IN. (ERIC Document Reproduction Service No. ED 397 849)

Citation Format

Fahy, Patrick J., Crawford, Gail & Ally, Mohamed (July, 2001) Patterns of Interaction in a Computer Conference Transcript. *International Review of Research in Open and Distance Learning*: 2, 1. http://www.icaap.org/iuicode?149.2.1.4

International Review of Research in Open and Distance Learning
ISSN: 1492-3831
Volume 2, Number 1.
July – 2001

Virtual Community for Adults with Developmental Disabilities and their Families

Susan D. Moisey
Athabasca University

Adults with developmental disabilities in Northeast Alberta, Canada, face numerous barriers to learning opportunities within their immediate and extended communities. The disability itself, as well as geographic distance and the circumstances in which individuals live, may hamper their access to information, interfere with their ability to communicate, and reduce their ability to achieve the quality of life they desire. There are few opportunities for individuals to meet, to get to know each other, and to share their experiences and learn from each other. Family members and guardians face similar barriers, such as lack of access to information, few networking opportunities, and limited means of providing input into decisions about service needs and policy making.

The *Northeast Alberta Virtual Community for Adults with Developmental Disabilities and their Families* addresses these barriers, forming a model for community development in a rural setting. Integrating distance education communication and information technologies in an accessible website, this project creates a virtual community where adults with developmental disabilities in Northeast Alberta and their families/ guardians can meet with each other as well as with service providers, community groups, policy makers, and advocates. Communication and information technology combined with local community-based resources provide a means where information may be easily accessed, where support may be given and received, where advice and experience may be shared, and where hope and dreams may be developed and realized.

The vision is a highly accessible virtual community or 'meeting place,' where individuals interact with each other in a mutually supporting manner, offering advice, encouragement, and friendship. They readily access information about local support services, and engage in discussions with service providers. If services are not available or suitable, they contact advocates or policy makers to communicate their unmet needs. The community is dynamic, providing up-to-date information about developments, opportunities, and local achievements as they occur. Access to high quality information and increased communication opportunities may enhance the ability of persons with developmental disabilities and their families to be well informed, to make their needs and views known, and to participate in community-based policy and decision-making. Used properly, online communication and information technology are important enabling

technologies (i.e., electronic curb-cuts) for people with disabilities, increasing their access to and their ability to participate in an increasingly knowledge-based society.

Goals and Objectives

The project aims to achieve the following goals:

- To examine how individuals with developmental disabilities (as well as their families, guardians, and others involved in their life) access Web-based information to make choices and improve their quality of life in areas, such as the following: housing, employment, leisure, support services, education.
- To investigate how individuals with developmental disabilities (as well as their families, guardians, and others involved in their life) use Web-based communication technologies to build and maintain contact with a social support network, express views, share experiences, and provide input into policy and decision-making processes.

To support these goals, the following project objectives have been identified:

1. To develop an accessible website that provides information to support decision-making and fosters communication among community members. Website accessibility is defined broadly and includes the following: information is provided at Grade 6 reading level; site is accessible by screen reader software; facilitators are available to explain/ assist with access to website; and there is suitable promotion to ensure community awareness of website.
2. To promote community-wide Internet access throughout Northeastern Alberta using the Community Access Points (CAP sites) network. Alberta North has established and funded 20 educational technology centres in Northeastern Alberta. Workstations in these sites will be upgraded with text reader software, and staff will be trained to facilitate online communication.
3. To develop appropriate supports so that adults with developmental disabilities in Northeastern Alberta can engage in their virtual community to the extent they choose. Supports include ensuring availability of computer technology and Internet connectivity, and training for service provider staff in how to teach/ facilitate Internet use for individuals with developmental disabilities and their families.

Project Partners

The project is supported by a grant from the Office of Learning Technologies, Human Resources Development Canada through their program, 'New Practices in Learning Technologies.' This collaborative project involves the following partners:

- Centre for Distance Education, Athabasca University
- Alberta North
- Northeast Alberta Community Board for Persons with Developmental Disabilities

- Alberta Association for Community Living

For more information on the Northeast Alberta Virtual Community for Adults with Developmental Disabilities and Their Families, visit our project website at AU's Centre for Distance Education.

International Review of Research in Open and Distance Learning
ISSN: 1492-3831
Volume 2, Number 1.
July – 2001

Case Study of a Knowledge-based Organization

Philip Lillies
2001 Tim Byrne Memorial Scholarship

This interpretive case study is an attempt to gain insight into the operation of a successful organization working within the new knowledge-based society, with a view to increasing the efficacy of educational interventions targeted at ordinary knowledge workers.

Q, the organization that is the subject of the study, has shown remarkable 20 percent growth over the past five years. But what particularly caught my attention was Q's aspiration of becoming a learning organization. Since this was an aspiration with some history in the organization, it was reasonable to suppose that progress made toward becoming a learning organization would in some sense underlie or be associated with Q's success. It is rather like squaring the circle. Since both the circle and the square are in the plane geometric domain, it seems reasonable that there should be some way of correlating a change in radius with a change in length of the sides.

However, as the study progressed, it became increasingly clear that Q lacks the pervasive double-loop learning that one would expect to find in a learning organization. According to Morgan (1997, pp. 87-88), who attributes the double-looping concept to Argyris and Schon, whereas "single-loop learning rests in an ability to detect and correct error in relation to a given set of operating norms, double-loop learning depends on being able to take a 'double look' at the situation by questioning the relevance of the operating norms." However, aside from a few "methodologies" that have been developed by upper management, Q's work processes suffer from such a general lack of formality that even single-loop learning is a challenge.

Still, Q does appear to be an organization that learns. Indeed, there are many visionaries in its senior staff ensuring that Q is on a learning curve that keeps it ahead of its competitors. Perhaps the problem is with the concept of a learning organization, which though ill-defined, is too idealistic to have much value in the real world. Unlike the concept of bureaucracy, for example, it does not appear to give us much insight into why organizations are successful. As Nevis, Dibella, and Gould (1998) suggest, instead of trying to develop a not very useful, idealistic classification scheme, perhaps a more reasonable approach would be to focus on the conditions for success of organizations in the knowledge industry. We could then extrapolate back to understand what learning would encourage these conditions for success.

Unfortunately, this approach also has its problems. Success is a concept that is at least as vague as the concept of a learning organization. Indeed, in the business literature success is often given a narrow economic definition, such as shareholder return on investment. However, a few moments of reflection is sufficient to throw this definition in doubt; indeed, the economic success of firms can have negative consequences both for their workers (e.g., failure to achieve their potential) and for society in general (e.g, the danger from negative externalities, such as pollution).

Postmodernism, a philosophical position that denies the existence of absolute standards and principles, provides a way out of this quandary. Rather than being neatly pre-defined and categorizable, the world is constructed as each mind grapples with its own personal reality. Success, then, is not a standard, but a vision of reality that those implicated in an organization commit themselves to. Even the term 'organization' must be used loosely. Indeed, certain authors, such as Boje, prefer to speak of a transorganization, an organization with fluid boundaries defined by the relationships of its members among themselves and to the community they are embedded in.

New insights were obtained through a broader analysis of Q's organizational dynamic using socio-technical (STS) theory, a theory that does not presuppose a definition of success but attempts to derive it from the requirements for community and internal commitment. According to STS theory every organization is made up of a social subsystem (the people), a technical subsystem (of tools, techniques, and knowledge), and an environmental subsystem (of which customers form a part). The success of the organization depends on the fit and balance between these three subsystems. If, for example, the technical system is overemphasized, STS theory would lead us to believe that opportunities will be lost for creating an optimized organization. To understand the dynamic of the system, all viewpoints must be considered, including that of workers, managers, suppliers, customers, and community.

One of the most important insights that application of STS theory provides is that Q closely resembles a lean production (LP) organization, a form of organization made famous by Womack, an MIT professor who studied automobile manufacturing in Japan (cf. Womack et al., 1991). Essential features of this organizational type are that learning, in particular double-loop learning, though highly valued, is primarily the responsibility of a management elite. Teamwork, though present, is very much focused on completing tasks and is generally not concerned with organizational learning or with development of team members.

Several interesting questions remain. Why would an organization like Q that sincerely set out to organize itself as a learning organization wind up becoming something else? And what educational intervention might change this?

Additional insights can be obtained by evaluating Q with respect to the following postmodern definition of a learning organization, a definition that I am proposing because it more adequately reflects how a learning organization might arise from the sharing of worldviews:

A learning organization is an organization that respects and attempts to appropriately accommodate reality-based resistance.

Reality-based resistance can be contrasted with mere psychological resistance. Although psychological resistance is the subject of much discussion in the business literature, it is perhaps worth keeping in mind that it is the resistance of reality that presents the greatest danger to any human endeavour. As Hacking (1999, p. 71) explains, reality cannot be ignored, only "accommodated."

Respect for resistance requires that resistance be carefully weighed to determine the proportion in which it is reality-based or has a merely psychological foundation.

Then we can see why Q, despite setting out to organize itself as a learning organization, has wound up more like a lean production organization. In effect, Q's development as a learning organization (which requires respect for reality-based resistance throughout) has been distorted by the metaphor of a traditional hierarchical organization, a metaphor that is generally accepted by both managers and ordinary workers. In accordance with this metaphor (which becomes what is sometimes called a 'self-fulfilling prophecy'), the leaders at the top must make up for the lack of learning, coordination, and self-management at lower levels; or in an alternative formulation, the opinions of those further down in the organization are more likely to have a psychological component that requires human resource management.

Now we can also see more clearly what educational intervention might change Q's orientation from a lean production organization to a learning organization. It would have to be an intervention that led organizational members to throw off the traditional hierarchical metaphor and replace it with one in which the organization is defined by the communal relationships of its members with one another. Taking a tip from Senge (cf., for example, 1994, p. 208), I suggest that this educational intervention would have to lead all members of the organization through personal mastery to shared vision.

As a final note it is worth mentioning once again that Q is clearly an organization in the knowledge industry. Hence, I am not proposing a generic solution, but rather a solution that could most effectively be applied in the knowledge industry.

So by redefining a learning organization in a postmodern sense we have come up with a means of understanding how Q's progress toward becoming a learning organization in some sense underlies Q's success. The visionary thinking and learning that occurs among the leaders steers Q strongly toward overcoming reality-based resistance; however, failure to deepen the learning in the direction required by learning organizational theory may well be hampering Q's future success, when success, of course, is defined in community as well as economic terms. The circle is squared.

References

Boje, D. M. (2000). *Transorganizational development and the death of organizational development*. Retrieved January 2, 2000 from: http://web.nmsu.edu/~dboje/TDdeathofod.html

Hacking, I. (1999). *The social construction of what?* Cambridge, MA: Harvard University.

Morgan, G. (1997). *Images of organization*. London: Sage Publications

Nevis, E., DiBella, A., and Gould, J. (1998). *Understanding organizations as learning systems*. Retrieved June 1, 1999 from: http://learning.mit.edu/res/wp/learning_sys.html

Senge (1994). *The fifth discipline fieldbook*. London, UK: Nicholas Brealey Publishing.

Womack, James P., Jones, D.T., and Roos, D. (1991). *The Machine that Changed the World: The story of lean production*. New York: Harper Perennial.

International Review of Research in Open and Distance Learning
ISSN: 1492-3831
Volume 2, Number 1.
July – 2001

Case Study in Planning Online Interaction

Captain L. A. Murphy
Canadian Forces

In using the qualitative case study methodology (Merriam, 1998) an MDE candidate at Athabasca University investigated the effects of planning learning activities intended to heighten online student interaction. The investigation targeted several pivotal decisions in instructional systems design (ISD) addressed in the conversion of an existing course for online delivery. Training for Improved Performance (TIP), developed by AU (1990), was selected as the ISD model. The study sought to identify planning decisions taken during analysis, design and development processes that would foster interaction.

Wagner (1997) posited that the primary goal of interaction is a positive final outcome; not necessarily the agent upon which the educational experience was grounded. "Interaction can serve as an outcome of clearly conceptualized, well-designed, and well-developed instruction" (p. 25). She identified 12 interaction strategies:

- Participation
- Communication
- Feedback
- Elaboration
- Learner Control
- Motivation
- Negotiation
- Team Building
- Discovery
- Exploration
- Clarification
- Closure

The research problem involved the conversion of an on-campus post-secondary course to online delivery. The question was, what design decisions affected the interaction that students will ultimately experience? Eleven TIP processes were undertaken in the instructional design (ID). In this qualitative research the teacher and participant-observer came together as an ID team.

The case centred on the development and delivery of an online course entitled Planning a Marketing Strategy. Twenty one community college students took the course during the second

semester of an automotive marketing diploma program. Furthermore, the case comprised the community college's use of an online learning management system and TIP processes. The participant-observer analyzed the interaction strategies that were employed to describe results achieved in applying TIP processes to heighten student interaction. Finally, the case study examined the heuristic of why these planning decisions led to a successful conversion of the on-campus course to online delivery.

With respect to six study questions the following conclusions were drawn:

1. *Effects of planning decisions in heightening interaction for online delivery* -- The participant-observer advocated that ID for online learning should rely on tenets of active learning. Interaction is an essential part of the learning strategy for any online course, including courses wrapping around a textbook. In concert with textbook readings Rowntree (1995) suggested other learning activities be incorporated in ID such as learning outcomes, overviews, discussion, contrasting viewpoints, alternative examples and feedback. Computer conferencing offered a venue for this interaction and learning activity; it provided an environment for students and teacher where they could share and build meanings as part of constructivist learning. To effectively accomplish ID, the participant-observer persuaded the teacher to follow TIP processes related to the design and development for interaction.
2. *Effects attributed to use of an offline textbook and course assignment in heightening interaction for online delivery* – Student-content interaction relied on the adjunct use of a textbook and course assignment. Interaction was prompted by assigned readings and some selected case studies from the textbook were used for online discussion. The course assignment permitted students further interaction in developing personal marketing plans while they employed concepts from the text, gained in mastering unit learning outcomes.
3. *Interaction strategies anticipated by TIP planning decisions* – In taking planning decisions, specified in the table below, the teacher considered respective interaction strategies that could be employed by students or teacher while participating in and moderating computer conferences. The activity of selecting interaction strategies was found to be almost indistinguishable from taking planning decisions.

   Table 1. Summary of Planning Decisions And Interaction Strategies.

   In interviewing the teacher during the study, six planning decisions envisaged certain interaction strategies.

PLANNING DECISION	INTERACTION STRATEGY
Perform Instructional Analysis (i.e. valid learning outcomes for weekly units)	Learner Control Communication Motivation
Develop Performance Measures (i.e. personal marketing plan and practice quizzes)	Elaboration Feedback

Develop A Media Mix (i.e. computer conferencing with online and offline instructional resources)	Learner Control Communication Clarification Discovery
Develop Forum Topics (i.e. a welcoming environment and thought-provoking forum questions)	Participation Communication Elaboration Negotiation
Develop Principal Components Of Instruction (i.e. instructional methodology)	Communication Feedback
Develop Instructional Resources (i.e. suggested alternative readings and website resources)	Elaboration Discovery

4. *Help provided by the teacher so students could quickly master skills needed for interaction* – The teacher provided learner support early in the online course to help students adopt skills needed for interaction. Through guidance given in online instructional materials, direction given in the discussion forum as part of learner control, and reinforcement and further guidance offered in the discussion forum as part of feedback, the teacher prompted students to complete learning tasks relevant to effective online interaction. Students needed little assistance in navigating the learning management system.
5. *Teacher interaction strategies in computer conferencing and announcements* – The teacher employed overwhelmingly the three interaction strategies of communication, learner control and feedback. He initiated communication in the weekly forums through a combination of approaches that included posing questions, providing additional learning resources and informing students of appropriate learning tasks. Feedback comprised the teacher's responses to individual student postings and weekly summaries of content highlighting student contributions.
6. *Student interaction strategies observed in computer conferencing* – Students primarily employed three interaction strategies in computer conferencing: communication, clarification and elaboration. Right from the first forum, students shared ideas and reflections relating to concepts presented in the readings. In response to the teacher's initial prompting and feedback, postings by students over eight forums comprised communication of shared ideas, with clarification of other students' contributions and elaboration beyond initial contributions. These involved relating relevant experiences and expanding ideas through other learning resources. In the participant-observer's opinion, these three strategies characterized constructivist learning. To a limited extent, students also employed interaction strategies of exploration, negotiation, exploration and participation.

To heighten interaction as part of an efficacious instructional strategy, the principal recommendation for online instructional designers and teachers falling from this case study is that certain planning decisions need to be carefully considered for possible effects on interaction. In

this case study, planning decisions affecting interaction involved six TIP processes (identified in the table above). This study should lead to hypotheses for further research.

References

Athabasca University. (1990). *Training For improved performance series*. Athabasca, Alberta.

Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco, CA.: Jossey-Bass Publishers.

Rowntree, D. (1995). *Preparing Materials for Open, Distance and Flexible Learning: An action guide for teachers and trainers*. London, UK: Kogan Page.

Wagner, E. D. (1997). Interactivity: From agents to outcomes. In T. E. Cyrs (Ed.) *Teaching and Learning at a Distance: What it takes to effectively design, deliver and evaluate programs: No. 71. New directions for teaching and learning*. San Francisco, California: Jossey-Bass, pp. 19 – 26.

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (July, 2001)

Book Review: Leadership for 21st Century Learning: Global Perspectives from Educational Innovators

Don Olcott, Jr.
VCampus Corporation

Leadership for 21st Century Learning: Global Perspectives from Educational Innovators
Colin Latchem & Donald E. Hanna, (Eds.) (2001)
London: Kogan-Page
267 pp.
ISBN 0-7494-3204-7

Given the growth of open and flexible learning during the past 5 years, it is understandable that the number of books written on distance learning, particularly those focusing on the use of the Web to deliver education and training, has increased exponentially. Most purport to bring some shining new revelation to the field beyond the power of online learning, only to fall short of the claims in their opening prefaces. These publications all cite the current "buzz words," and they all have the answers (of course, this assumes they know the right questions to ask). Many of them predict the final, unavoidable, extinction of traditional higher education institutions that do not embrace technology, respond to competition and new markets, and recognize the global change from a supply- to a demand-based market economy.

The reader may wish to challenge this somewhat critical assessment of this high growth industry. But the real purpose of this opening is to point out that occasionally a book comes along that transcends the obvious, embraces the difficult, and provides a synthesis of theory, practice, and innovation that brings all the pieces of the puzzle into focus. Latchem and Hanna's *Leadership for 21st Century Learning: Global Perspectives from Educational Innovators* has met this scholarly challenge.

The editors open by identifying the major themes of their book: (a) examining global developments and trends in open and flexible learning, (b) highlighting the challenges and choices in this rapidly changing market, (c) developing an entrepreneurial culture that examines processes of organizational change, and most importantly, (d) analyzing leadership in open and flexible learning. Moreover, the editors point out that educational institutions must respond to the shift from a supply-driven to a demand-driven market. In sum, the editors build their entire book around the central theme of how visionary and entrepreneurial leadership can navigate and position an institution to be responsive to market

demands and changing priorities.

The first five chapters are written by the editors and lay the scholarly and practical groundwork for the remainder of the book. Chapter 1 provides a solid overview of the various approaches to open and flexible learning across the globe. Chapter 2 focuses on challenges and choices that face institutional leaders in strategically positioning their institutions to respond efficiently and effectively to an accelerated demand market. Major issues include customer focus, quality, branding and reputation, cost, technology, and organizational structure for innovative institutions.

Chapter 3 is particularly illuminating in assessing the challenges facing traditional institutions developing an "entrepreneurial culture", and the ways traditional ivory tower culture collides with an open, market-responsive posture that places the customer and student first. Latchem and Hanna astutely link leadership with fostering the kinds of institutional changes that are systemic rather than temporal, altering the status quo culture and the "core values" that define that culture. They do not candy-coat the challenges of changing the academic culture, particularly regarding faculty, given that they exert dominant control over most of the key governance processes for instituting change. The editors cite Barry Munitz, former Chancellor of the California State University System, on the topic of faculty change:

> faculty by and large are brilliant and creative people who are dramatically liberal about everything but their own work, in which case they become almost instant reactionaries....They are very happy traveling around the world committing everyone else to change and extra resistant to anyone who suggests they might also be changing (p. 47).

In chapter 4, Latchem and Hanna examine various processes of organizational change, including strategic planning, developing staffing capabilities, and open and flexible learning as a scholarly activity. Moreover, they provide numerous examples of how different organizational processes work successfully for different organizations. There is no "silver bullet" organizational structure or compilation of processes that work for every organization, especially academic institutions. This fact provides a good lead into chapter 5 that focuses on leadership in open and flexible learning, and the importance of creating organizational structures and processes that foster responsiveness, flexibility, and recognize and reward innovation across the organization. Latchem and Hanna insightfully distinguish between managers and leaders. The reviewer is reminded of the anonymous quote "Managers do things right – leaders do the right things!" The editors close chapter 5 by discussing the attributes of successful leaders and the role of leadership in open and flexible learning.

It is at the beginning of chapter 6 that this book rises above most, if not all,

recent publications on open and flexible learning. Rather than write the entire book themselves by researching various global institutions and speculating on the role of leadership in these institutions, Latchem and Hanna do their greatest service to the field and the study of leadership by conducting interviews with leaders from around the globe who have been successful in guiding their organizations in the open and flexible learning marketplace.

Chapters 6 to 23 are a who's who of top leaders, including: Sir John Daniel, UK Open University; Denise Bradley, University of South Australia; Rajesh Chandra, The University of the South Pacific; Sister Joel Read, Alverno College; Betty Collis, The University of Twente; Muriel Oaks, Washington State University; Robert Albrecht, Western Governors University; Janet Poley, The American Distance Education Consortium; Abdul Khan, Indira Gandhi National Open University; Dominique Abrioux, Athabasca University; Don Hanna, University of Wisconsin Extension; Barbara Spronk, The International Extension College; Glenn Jones, Jones International University; Marmar Mukhopadhyay, The National Open School of India; Brian Talbott, STEP Start Network; Roger Lewis, Regional Consultant UK Higher Education Funding Council; Data Gajaraj Dhanarajan, Commonwealth of Learning, and Bernadette Robinson, University of Nottingham. As the saying goes, there is no substitute for experience, and the experience presented in this book is extensive.

In the final chapter, the editors synthesize the major leadership concepts from the literature that are consistent with the leaders' experience of applying leadership principles and attributes in the practical short- and long-term evolution of their organizations. Latchem and Hanna summarize leadership values, characteristics, and behaviours that are essential to open and flexible learning organizations. Finally, the editors summarize key strategies for leaders, including: (a) scanning the environment, (b) developing and implementing a strategic plan, (c) gaining commitment from multiple constituencies and stakeholders, (d) preparing for change and innovation, (e) leading the process, (f) achieving short-term wins, (g) consolidating and encouraging further innovation and change, and (h) institutionalizing new approaches into the culture.

In summary, this book should be on the shelf of every university president, senior institutional administrator, dean and department chair, board member, and mid-manager and faculty who has responsibility for leading open and flexible learning organizations. Moreover, this book's synthesis of scholarship, practice, and vision for the field means it should be part of every graduate program in open and flexible learning.

The editors' interviews with global leaders, combined with their scholarly approach to leadership and change, culminate in a wealth of information, experience, and practical strategies for all practitioners and leaders. Corporate training managers and government administrators who are leading open and flexible learning initiatives would also benefit immensely from this book. In conclusion, Latchem and Hanna have written and edited a "leadership handbook" for open

and flexible learning professionals at all levels. On a rating scale of 1 to 10, Latchem and Hanna deserve a 12!

Citation Format

Olcott, Jr., Don (July, 2001) Book Review: Leadership for 21st Century Learning: Global Perspectives from Educational Innovators. *International Review of Research in Open and Distance Learning*: 2, 1. http://www.icaap.org/iuicode?149.2.1.7

International Review of Research in Open and Distance Learning ©
ISSN: 1492-3831
Vol. 2, No. 1 (July, 2001)

Book Review: Learning and Teaching in Distance Education: Analyses and Interpretations from an International Perspective

P. Ramanujam
Indira Ghandi National Open University

Learning and Teaching in Distance Education: Analyses and Interpretations from an International Perspective
Otto Peters (2001)
London: Kogan Page
248 pp.
ISBN 0-7494-3594-1

Reviewed by P.R. Ramanujam
Indira Ghandi National Open University

Theorising distance education (DE) had never been as challenging and tentative as it is today. If lack of firm theories of DE was the focal point of debates during the 1960s, 1970s and 1980s, the 1990s marked a proliferation of theories, mainly concerning technology-based delivery and market-driven curriculum. Perhaps there was too much theory of delivery, but too little of pedagogy in the somewhat lopsided and often superficial and repetitive reinforcement of the *importance* of learning and learner autonomy. With the uncritical emphasis on learner autonomy, teaching and pedagogy were nearly forgotten, despite a need to talk about it with some vigour and understanding. With DE practitioners' growing preoccupation with online courses, particularly with access to unlimited sources of information, there is a definite need to step out of the giant spinning wheel of a technology-driven DE race, relax for a while, and reflect on what is actually happening to learning and teaching. But very few have attempted such an exercise. In the age of online and web-based education that diverts so much attention to design and delivery issues, this new book by Otto Peters addresses some of the substantial issues of distance education pedagogy.

The simple and straightforward title of this book may give the impression that it is for light reading. However, a careful reader, suspecting the title reveals less and conceals more will be challenged to go beyond the surface details to discover the richer content, rarely found in the numerous publications in the field of distance education. Rooted in the humanistic tradition of Immanuel Kant, Otto Peters adopts an eclectic position in understanding and accommodating the fast changing technological revolution and its impact on teaching and learning at a distance. Inevitably, Peters chooses to comment on the danger of simplistic solutions offered by those technology enthusiasts who are oblivious

to pedagogic and sociological consequences of online and web-based education. Though not radical, Peters' philosophical framework makes amply clear what both humanists and radicals should look for in DE today.

Wherever necessary in the book's eight chapters, Peters offers commentary on the arguments he advances. The physical layout of the chapters incorporates some features of self-instructional materials. The style is not conversational in the usual sense, and the tone is grave – suitable to serious academic discourse. However, for serious readers, a dialogue is effected between the reader and the text, the ideas, the arguments, the issues and challenges presented. This dialogue requires, besides exposure to distance/open learning in today's world, a degree of familiarity with philosophy, psychology, and history of education.

Chapter 1 takes stock of access, the growth of distance education through three generations, the dilemma regarding quantity verses quality, and characteristics of students. In chapter 2, Peters presents the salient features of various models of distance education, including the: (a) correspondence model; (b) conversation (two-way communication) model; (c) teacher model; (d) tutor model; and (e) technological extension model. Peters focuses on the changing nature of pedagogical issues. Chapter 3 is an exposition of three constitutive concepts of distance education – dialogue, structure and autonomy. The pedagogical, philosophical and sociological significance of these concepts are analysed in-depth, and the debate is carried forward with more insights. Chapter 4 reviews the applications of these three concepts in various practices of distance education, including: (a) dialogue in counseling, tutoring, peer group interaction, and so forth; (b) pedagogic functions of the structural elements determined by behaviourism and educational technology; and (c) autonomous learning and its limits in the current practices of distance education. In Chapter 5, Peters discusses how the concepts of open learning, lifelong learning, industrialised learning and teaching, and postmodern learning modify dialogue, structure and autonomy. Chapter 6 explores how digital information and communication can help distance education achieve goals in mass education, democratisation; and quality learning, as well as meet new requirements for teaching or learning through the new technologies. In chapter 7, Peters critically reviews the practices of some of the leading distance teaching universities, including:

- University of South Africa;
- Open University (UK);
- FernUniversitat (Germany);
- Central Radio and Television University (China);
- University of Air (Japan);
- Empire-State College (USA);

- American National University Teleconference Network; and
- the Canadian project "Contact-North'.

Chapter 8 summarizes the analyses and perspectives of the preceding seven chapters. The brief appendix that follows chapter 8 lists the various "stations on the road from written to *digitized* teaching text" (Peters, 2001, p. 247).

If the recurring themes of the book are *dialogue*, *structure* and *autonomy*, the contexts are *preindustrial, industrialised* and the *postindustrial* situations of distance teaching and learning. Peters also discusses the related issues of advanced technology, and distance education pedagogy vis-à-vis pedagogics of adult learning and classroom teaching. The range of issues and their interconnections are impressive, and Peters' treatment of the issues is refreshing.

While analysing the importance of the pedagogical, philosophical, anthropological and sociological aspects of dialogue, Peters argues for the provision of opportunities to acquire education through knowledge, mediated through dialogue; without these, genuine scientific thinking cannot develop. One realizes that in the distance teaching-learning context, dialogue is a must, not only between the student and the teacher but also among the teachers themselves. The implications of Peters' views are significant in the contexts of strong oral traditions and the painful transitions of teaching/learning from expository, prescribed teaching traditions to exploratory self-learning practices, often without prior experiences or knowledge about existing models. This is particularly true in developing countries that have not developed models of their own.

Peters recognises the limits of educational technology structures when they confront the notion of autonomy, but emphasises the advantages that these structures provide in effecting mass education programmes. While mass education necessarily retains the structured (somewhat closed) pedagogics, those who call for open, autonomy in learning urge more participation and self-initiative by learners which requires removal of structures, both institutional and pedagogical, which restrict learner autonomy in the real sense. The next logical step, therefore, is to change the restricting structures and allow more student autonomy. The key to this 'Copernican revolution' is interactive communication technology. Can sophisticated technology alone bring about the revolution? There are no easy answers.

Peters equates the correspondence, distance and digital models as parts of the preindustrial, industrial, and postindustrial stages of distance education. He attempts to establish the necessary links between these stages of distance education evolution with social evolution, as such. While doing so, he introduces the fordist and postfordist approaches to production technologies, and convincingly argues how in fordist (and modernist) and postfordist (i.e., postmodern) societies, these approaches will lose their significance. If the industrialist society was satisfied with mass production of *standardised products* (e.g., selling 15

million Ford cars), the postindustrial society demands *variety* to satisfy individual tastes. The parallels in distance education are in the mass education of the 1960s allowing relatively more autonomy to the learners. The reference point, however, has long remained face-to-face classroom teaching. This is problematic. Peters criticizes the "one dimensionality"(p. 40) of the communication in distance education that precludes socialisation. It is precisely this socialisation through peer group interaction and teacher-student dialogue that is promised by the digital information and communication made abundantly available by modern technology – the satellite, the computer and telecommunication. Peters expects students to change their learning methods as much as teachers will have to change their methods of presentation. He notes the major failure of technology-based distance education is its inability to fully exploit the potential of media to make distance education open. Citing Anthony Bates, Peters shows how only "the cheapest medium, the audio cassette, has been able to make any sort of a career in the Open University, which is very open-minded with regard to media for pedagogics and is an international pioneer and trendsetter" (Peters, 2001, p. 130). Assessing the possibilities of open lifelong and continuing education in the postindustrial (postfordist, postmodern) era, Peters sees a bright future for distance education, provided technological facilities are creatively and imaginatively blended to evolve a new pedagogy rather than replicating conventional face-to-face classroom teaching/learning practices. In the context of teleconferencing, Peters draws a clear line between the North American view of using technology to increase the access to traditional university teaching, and the European interest "in the pedagogical processing and optimizing of teaching with the help of technical media, whereby they deliberately remove themselves from traditional forms of academic teaching" (Peters, 2001, p.144). While recognising the need for different models of distance education operating in the different "real academic and social conditions" (p. 145), Peters, however, cautions:

> no one has anything to say against the practice of teleconferencing at North American universities; what we must defend ourselves against, however, is the claim that a pattern has been developed...that reduces to nothing the previous pedagogical development of distance education and declares it to be unnecessary because it is no longer required as the distance education of the future must be developed on the basis of the new paradigm. We *must* object to this (p. 145.).

This caution is extremely significant, coming as it does from the European thinker whose definition of distance education in the 1960s as the *industrialised form of education* is still the first commandment for many in developing countries. This caution holds well in objecting to the perceived success models which ignore specific socio-cultural realities and which warrant different forms and practices of distance education, particularly when it is fast sliding into a digital mode.

The uncritical replication of the OU(UK) model in many Asian and African countries has already taken its toll. If the American model of teleconferencing is also replicated, then, the dream of distance education as a force for democratising education to all may turn into a nightmare. This applies to online models too. The powerful technology lobbies, modernising distance education through the latest communication technology, give only a partial response when they encounter institutions with inadequate infrastructure back up and limited trained human power to use it appropriately. Piecemeal utilisation of information and communication technologies, for example, creates more problems than it solves, and the high cost involved is often unjustified in poor countries.

Peters candidly admits the demanding nature of digital media and the predictable resistance from the teachers who are not prepared to work through multimedia. Though the media in distance education theoretically offers a large number of pedagogical structures, in practice institutions develop inflexible models. But Peters emphasizes again and again the inevitable move towards the digital information age. At the same time, both the quality of information and the purpose of dialogue are seen as the prerequisites of genuine distance education practice. Analysing the different models of distance education in South Africa, the UK, Germany, the United States, Canada, Japan and China, Peters argues strongly in favour of having different models rooted in different social, cultural and academic traditions. He disapproves of artificial impositions and unreasonable modernising proposals. His commentary on the University of South Africa is an example of a balanced assessment of the contributions of various models of distance education. However, he is firm in his belief that digital, information-based distance education points towards "the future of an information and learning society in which its concepts and experience will be more important than they are today" (p. 246).

Some of the crucial arguments and insights presented in this book need to be revisited. Some of the antinomies present in the sub-text include:

- academic socialisation and autonomous learning;
- advantages of structured self-instructional courses and the need for open learning;
- the need to deviate from traditional classroom teaching and the yearning for academic recognition by traditional institutions;
- the potential of new media, and the reluctance or resistance of teachers to change their set patterns of presentations within distance teaching institutions;
- mass continuing education programmes; and
- the need for high quality research.

While arguing for the one, we notice how the other emerges as the countervailing force. If the co-existence of the above arguments is possible and acceptable, then, a different kind of theoretical framework and more flexible pedagogics will have to be imagined. Peters' own eclectic position does not allow him to go for a more sustained criticism that is necessary to see the concrete features of such a framework.

Pedagogically speaking, should we treat classroom teaching as traditional and by implication an antithesis to distance education? Do not digital information and multimedia alter classroom teaching as much as they do in the case of distance education? Does the adjective traditional connote, besides the mode, the nature of the educational *content* transacted in the classroom? With the *convergence* of face-to-face and distance modes increasing, should we still emphasise only the *distinction* between the two? If multimedia makes it possible and cheaper, is it wrong to replicate or even imitate a good classroom experience? While arguing for autonomous learning in the postmodern, postindustrial, postfordist era, are we not unwittingly legitimising the extremely individualistic, asocial, fragmented and anarchic trends typical of later day ('postmodern', if you like) imperialist ideologies? Should education reflect and endorse only the ruling ideas of the ruling classes through dominant technologies?

The additions made to chapter 6 in the paperback edition (sub-section 6.7) are important in the context of the above questions. The pedagogical flexibility of the virtual university has been analysed in detail. In the final analysis, discussions of flexibility are judged by *accessibility*, *choice and control* by students, students' *responsibility* and the *support* that the students would need. It is interesting to note the order in which the issues are listed. Students in developing countries usually stop with the first issue itself, accessibility. Assuming that access, choice, support, and so forth are provided for, the question of students' *responsibility* remains. What kind of responsibility? This is the key question that begs the answer. Peters says "in order to understand the meaning of *virtual learning* it must be noted that the learning process itself is never virtual, but always quite real" (Peters, 2001, p. 157.).

This is an extremely important observation, since the virtual spaces through which the learner learns are, according to Peters, boundless, uncertain, inconceivable and empty. The challenge here for the learner is to acquire real learning through virtual environments. Viewed this way, the responsibility of the learner as well as the teacher is daunting. Flexibility, in all its range and variety, also must be meaningfully related to: (a) effective learning strategies; (b) quality of content; and (c) the necessary pedagogic support of mentoring, counselling and peer group interaction.

Peters' detailed analysis of the concepts related to autonomous, self-directed learning and the three types of Internet-based universities (ThinkPad universities, Internet universities, and virtual universities) suggests that the learner as well as society are provided with unlimited sources of knowledge and are also

faced with unpredictable consequences and risks. Attainment of self-directed learning, as described by Malcolm Knowles' (p. 163) is possible, provided the learner has all those attributers of Knowles' adult learner. The anticipated pedagogical goal also raises a number of sociological and psychological issues:

1. How will the necessary learning environments be created in a *democratic* way with a *humanistic* approach, when the whole range of innovations – technological or otherwise – are purely *market driven with profit motive?*
2. Who will decide on *the kind of Internet-based experiences* that the learner should have or will have, at what stage and at what cost?
3. Can dialogue, autonomy and structure be meaningful without the presence – not the physical one – of good teachers (by whatever name they are called) who create a new body of knowledge before it is put on the Internet or the WWW?
4. Will not the self-directed learning of the present kind further alienate the learner from the real world which is already much alienated, fragmented and dehumanised?

The above and many more such questions will have to be asked in the context of our *lived* and *living reality* in order to control and choose the right kind of learning, strategies. The constructivist approach can help us, only to the extent that we construct the world we know. Here, the Kantian *categories* are persuaded to pass through Hegelian dialectics, anticipating Marxian reversal of both. References to Piaget are certainly not a resolution of the conflicts but an attempt to search for multiple solutions to a problem posed by a unipolar world covered by different layers of ideological veils – not necessarily the outgrowth of German ideology alone. Peters' search would continue, though the discoveries may be startling to all of us. Undoubtedly, this book will become a classic in the educational debate of technology versus pedagogy.

Citation Format

Ramanujam, P. (July, 2001) Book Review: Learning and Teaching in Distance Education: Analyses and Interpretations from an International Perspective. *International Review of Research in Open and Distance Learning*: 2, 1. http://www.icaap.org/iuicode?149.2.1.10