Convergence of Distance Education and On-Campus educational strategies and methodologies.

Ron Oliver  
Interactive Technology Research Project  
Edith Cowan University  
2 Bradford St,  
Mt Lawley 6050.

Introduction  
Computer-based technologies are increasingly being used in educational settings to augment, supplement and in some cases to replace conventional teaching. In such settings, a major user of educational technologies has been the distance education sector. Distance education has been an element of educational systems for many years, continually changing and evolving into its current form. Much of the change that has occurred in distance education has been brought about by applications of new technologies to improve aspects of the teaching/learning process. By all accounts, these changes have been quite successful. In Australia today, over 45,000 students from 20 universities study in an external or distance mode (Pritchard, 1993). Recent remarks by Government have indicated that there is an expectation that distance education in Australia will continue to grow and that future expansion in the university sector will be supported by Distance Education Centres and open learning initiatives.

Current moves to restructure higher education in Australia have seen actions that have resulted in the transfer of many applications of technology from distance education to on-campus teaching. The restructuring is being brought about by a number of factors including a desire to improve the efficiency and cost of on-campus programme delivery and to expand access to higher education. The convergence of methods that has resulted and will continue to result from such a process is the topic of this paper. The paper presents a synopsis of the applications of technology that have been made in distance education and investigates their potential use in on-campus teaching. This convergence of distance-education and on-campus teaching methods will be discussed and analysed in light of existing research into the use of technology in teaching.

Classroom Teaching, Distance Education and Open Learning.  
Distance education is described as education that occurs when the learner and the teacher are not face-to-face (Holmsberg, 1989; Catchpole, 1992). Open learning which by default is a form of distance education, is characterised by continuous exit and entry form courses, flexible access and self-paced learning.
Classroom teaching is the mode of education with which we are most familiar and is reliant on face-to-face contact between student and teacher.

Today there is a blurring of the methodologies that have traditionally separated the instructional modes that characterise higher education. More and more the distinctions between classroom learning, distance education and open education are decreasing as each of these modes embraces methodologies from others. This has been brought about by changing classroom practices, greater access to new technologies, media and communication systems.

Distance education has a firmly established place in the local setting. With its long distances and metropolitan clusters, Australia has many people living away from educational institution and whose only opportunities for education lie with alternative courses. It is difficult to generalise about a standard mode of instruction and teaching employed in distance education. Whereas in the past, one may have considered distance education to be characterised by highly structured course materials and study guides, the wide range of delivery and organisational structures in use today tend to invalidate any such generalisation.

When the identifying characteristics of distance education are considered, two important ones that emerge are the independence afforded by the learning mode and the lack of interactivity between the teacher and the student. There is some argument among distance educators as to which of these attributes is of paramount importance (Stubbs & Burnham, 1990). It is clear though, that distance educators actively seek ways to improve the interactivity of the instruction while maintaining the independence that is the hallmark of this form of learning (Garrison, 1989).

Instructional Paradigms
In analysing the general development and evolution of distance education, it is possible to define three distinct phases or generations. Garrison (1985) describes these three generations in terms of the technological innovations underpinning each: correspondence, telecommunications and computers. Nipper (1989) describes three similar generations as, correspondence, multi-media and telelearning and in this description separates the media from the instructional methodologies employed. Each of the generations has resulted in a paradigm shift in the delivery mode. For example, Garrison (1990) provides a description of these in terms of the concepts of learner interaction and learner
independence. The applications of technologies and paradigm changes that have changed the form of distance education over the years have not been evident in on-campus education.

Interactivity. Interactions, it is argued, enable the forms of exchanges between students and teachers that lead to the development of higher-order skills and cognitive processing (Catchpole, 1990). The self-paced learning packages on which much of distance education is based need to be used in an environment where a teacher can still guide, correct and influence the process of learning as it occurs. In distance education, new technologies are frequently used as a solution to the interactivity problem. The effectiveness of distance education programmes have often been questioned in the light of the failure of many to provide a level of interaction between students and teacher (Haughey, 1991).

A fundamental aim of university education is more than simply providing a knowledge base for learners. It should also provide a setting in which the learner is made to reflect and consider, and whose views and opinions are formed and developed as a consequence of the education being received (Garrison, 1990). The difficulty of distance education to provide interaction between the student and the teacher is a problem for which solutions have continually been sought. In many instances, technology has been applied to limit the isolation experienced by students and to improve the level of interactivity. Moore (1989) describes and states the importance of three forms of interaction that apply to teaching and learning. These include the familiar teacher-learner and learner-content forms but also interactions between the learner and other learners. Telecommunications and computer mediated communications appear to provide the means to build interactivity into distance learning programmes but the full potential of these technologies have yet to be determined (Garrison, 1990; Pelton, 1991; Goldman & Newman, 1992).

Learner Independence. Smith (1987) argues that the increasing popularity of distance education is congruent with the private nature of Western lifestyles. He cites examples of the popularity of private living by demonstrating the ways in which technology has caused shifts from public to private activities. Such devices as car, radios, television, telephone and video recorders have all been responsible for reducing public activities by providing the means for private use. He argues that in a similar fashion, as education becomes available in private modes, so too will the popularity and usage of these modes increase at the expense of public modes such as on-campus
The private mode of education is facilitated by instructional modes that provide flexible access (Taylor, 1992) and that accommodate the individual requirements of external students.

Learner-independence, however, can be a limiting factor as well as a strength in a delivery mode. Catchpole (1993) argues against moving further along the continuum of openness in education by making a claim for the large numbers of learners that lack the self-discipline and self-motivation required to work in isolation and solitude, modes of learning often advanced by proponents of self-paced instructional materials using interactive multimedia technologies. Distance education and open-learning can fail in providing the motivation, support and structure required by students in the process of completing courses of work. Catchpole (1992) describes conditions of flexible access and self-paced learning at North College Island where faculty have moved to restrict these attributes of distance education courses to improve student retention rates and to improve student achievement.

Instructional Technologies

Perhaps the single most important technology that has provided the means to improve the quality of distance and open education has been telecommunications technology. Telecommunications is used to describe the use of electromagnetic channels to transfer and receive information and this generation of distance education delivery involves the use of such technologies as telephone, television, facsimile, audioconferencing and teleconferencing. The essence of the telecommunications applications is the facility to increase interactivity between teacher and student. It is this factor that characterises the paradigm shift brought about by telecommunications to the nature and scope of the instruction and learning. There are many instances of telecommunications being used in distance education teaching and not all of these are characterised by high levels of interactivity. Television and radio broadcasts typically deliver instruction with no prospect of learner interaction, although there are now instances of these applications being trialed with interactive elements. In settings where remote students have access to particular forms of technology, interactive distance lesson formats can include:

- audioconferencing, multiple channel use of telephone networks to enable simultaneous communication between teacher and students,
- audiographics, for example audioconferencing coupled with facsimile transmission and reception,
- videoconferencing, audio and visual connections between teacher and learners,
More recently, computer-mediated communications have been employed in distance education to provide an interactive element to the teaching/learning process. In computer mediated communications, the teacher and learner are able to interact through computer applications such as electronic mail (e-mail) and telematics. These interactions can be instantaneous or delayed and be in formats of one-to-one or one-to-many or many-to-many.

The applications of technology to distance education have been distinctly influenced by the need and wish to improve the effectiveness of learning by increasing interactivity. There is a prospect of high levels of interaction being achieved through computer-assisted instruction (CAI). The degree of interactivity provided by the various types of CAI is questionable. While many will see interactions with a computer as being of far less value than interactions with a teacher, Garrison (1985) argues that we should consider the interactions with CAI as interactions with a teacher through the computer. He argues that it is not the hardware and technology providing the responses in interactions but rather the learning framework created by the instructional designer, who in this case is the teacher in the interaction.

The whole question of the use of media in the learning process is the subject of considerable debate in academic circles. While may educators are rushing to embrace applications of the new technologies as multimedia and computer managed learning, they are counselled to be cautious in their expectations and anticipations by many writers (Schramm, 1977; Clark, 1983; Clark & Salomon, 1986). Research clearly indicates that media themselves do not influence learning, but rather it is the instructional design accompanying the media that influences the quality and quantity of learning. Clark supports this argument with the observation that the media (delivery technologies) are "mere vehicles that deliver instruction but do not influence student achievement any more than the truck that delivers our groceries causes changes in our nutrition (1983, p 455.)"

Convergence

Evans and Nation (1993) provide a description of the forces that are driving the convergence between distance-education and on-campus teaching and learning methods. When one examines the weaknesses of on-campus teaching and learning, there are many sound reasons for use of the new technologies. For example, the reliance of the learners on the teachers and instructors. Whereas distance education students are the masters of their own learning, on-campus students have an expectation to be led and
make very few decisions about their own learning. The aim of university education to prepare students for lifelong learning is not well advanced by such practices but can be furthered by appropriate use of the technologies.

Several studies of implementations of resource based educational programmes have revealed poor acceptance on the part of many of the stakeholders. Kelly (1987) describes a project where an on-campus programme was modified from the conventional mode to a mode that provided students with less lecturing and guidance and placed resources and materials at the disposal of students to enable a student-centred and self-paced approach to learning. Responses from the students to this approach were less than favourable and despite repeated modifications and alterations, full acceptance of the approach and the ideology behind it was never gained. However, a research base that might guide the teachers and trainers in this area is sadly lacking. Where research is being conducted into the effectiveness of the technology, many of the methods and activities are less than rigorous and not really able to provide the answers that are required (Reeves, 1993).

In descriptions of teaching/learning activities at Griffiths University where instructional methodologies from distance education programmes were employed in on-campus teaching, Ross (1993) describes difficulties when not all parties perceive a problem to exist. This project involved the use of multimedia products and distance education packages to provide student-centred learning and the replacement of some forms of traditional teaching with technology based alternatives. Some of the difficulties experienced in this setting included poor student response, high costs and a perceived erosion of conditions for both staff and students.

Dunnett (1990) in describing the use of technology in education, compares and contrasts applications where the media is supportive of the instruction and instances where the media is essential to the instruction. He sees a significant distinction is caused when the same media are applied across distance and on-campus education because the media necessarily serve disparate purposes in each. Recent moves in the on-campus circles of higher education within Australia to adopt new technologies to supplement on-campus teaching shows symptoms of what can be called technology-led curriculum development. This model of adoption of new technologies into education is practised in systems worldwide (Reeves, 1992) and many questions exist in terms of its effectiveness and utility. The research and development that one might normally associate with innovative
activity of this kind usually follows the adoption of the technologies and when this occurs, actual outcomes and results are frequently less than those anticipated and intended.

It is only when organisational structures are tied to clear-cut goals that the full benefits are likely to be derived from the changes and restructuring. Clear-cut goals imply a full understanding of the limitations of the existing systems that are to be addressed, and an acceptance and commitment by relevant parties of the need and value for restructuring. As Reeves (1992) points out, it is not surprising that given these circumstances, computers have not made much impact in transforming education despite their potential and appeal. The need for research and development to govern decisions concerning the adoption of new technologies in any educational setting is difficult to dispute.

The Need for Research
New technologies have established a firm place in education and training despite what many would see as serious shortcomings in many of the performances that have been recorded to date. Technological innovations have been being applied to improve the quality of education for many years. There are many instances where applications of the technology have had the potential to completely revolutionise educational systems, this potential having been validated by research. This capacity to reform was very strong with such devices as radio, television and video recorders. Cuban (1986) reviews the history of many technological innovations that have failed to have the anticipated educational impact. He found that teachers were often held to blame for resisting change and failing to modify their practices to accommodate the new technologies. Cuban argues that a principal reason for failure to reform was the narrow focus on student learning given to the applications. Riel (1992) cites the failure of applications to address the dynamic relationship between student and teacher as an important but missing aspect in their implementation. The need to consider the wider impact of the applications of new technologies to the total institution of teaching and learning is a message that emerges from this research.

When the prospect of future use of new technologies emerge in educational settings, there seems to be an innate acceptance that positive outcomes will be achieved and these outcomes will more than justify the costs involved. When research is conducted to verify these assumptions, the actual outcomes can be somewhat less those expected. An example of this is evident in the use of telelearning as a model for distance education. The theory
behind telelearning is based on the notion that the interactivity provided in the learning context is able to create environments where information can be shared, critically analysed and applied and in the process become knowledge in the mind of the learner. There is a need for a learning environment that is able to make the learner question pre-existing views and values, to suggest alternative viewpoints and to assimilate, accommodate and validate the knowledge that is gained (Garrison, 1990). Garrison supports this argument with evidence from Canada where telelearning is used in up to 74% of distance education courses. Feedback from students exposed to learning in this mode is extremely positive and suggestive of an effective instructional delivery system. Goldman and Newman (1992) provide an equally enthusiastic picture of the potential benefits of the educational applications of telecommunications in school settings.

Taylor (1992) on the other hand, is quite concerned about moves in Australia to adopt similar models in our distance education system due to limitations and problems that he suggests are inherent in such a system. He cites research that shows only a small number of students (20%-30%) participate meaningfully in telelearning sessions and gives examples of telelearning activities that clearly are unable to provide the outcomes that would merit their use. He argues that the cost that is paid for the interactivity achieved by telelearning is the removal of flexible access from the learning environment. Being aware of the popular moves to adopt these technologies, Taylor argues that there is a need for further research and evaluation of the pedagogical efficacy of specific courses in particular contexts (1992, p. 27). Bates (1991) argues in a similar frame to Taylor in an earlier paper and with such disparate views and opinions being proffered by such prominent people in the field, it is difficult to deny this need for research.

While there is clearly ample room for research to investigate the use of telelearning as a model for distance education, the same must be said for the educational use of interactive multimedia applications. The technology-led curriculum development that has seen the emergence of educational programmes of this form once again can hide the inefficiencies and problems associated with its use. There has been little research done on learning with multimedia environments (Kozma, 1991) yet it appears to have unparalleled popularity among advocates for its use in self-paced instructional materials. Ross (1993) observes that multimedia products are always underway and are never finished. The products can cost many times as much to create as conventional materials and can usually only be accessed by students with state-of-the-art equipment at their immediate disposal.

Research that has investigated learning outcomes from multimedia
applications has not always shown the positive achievement gains that might normally be expected (Hannafin, 1985; McNeil & Nelson, 1991; Saga, 1992; Perzylo & Oliver, 1992). This is not to say that interactive multimedia applications cannot have significant benefit in educational applications, rather there is a need to be prudent in selecting the appropriate place in a course, the appropriate topic and content, the appropriate instructional design and the appropriate instruction to guide the learner.

The Interactive Technology Research Project
The Interactive Technology Research Project (Intech) at Edith Cowan University is currently sponsoring and undertaking a significant number of research projects that are investigating the use of new technologies in education and the prospective convergence between distance education and on-campus education methodologies. The purpose of the research is to firmly establish the outcomes and consequences of the application of various forms of instructional technologies within the educational programmes to ensure that funds expended on developments return the intended outcomes.

The need for research to complement development is made clearly evident in the development of the Virtual Campus at Edith Cowan University. The Virtual Campus is a telecommunications facility that gives isolated students the electronic equivalent of on-campus facilities. On-line services, available 24 hours per day include electronic mail, access to remote databases, submission and reception facilities for files of work, and library access. Early feedback from field trials of the system have shown very positive responses from participant students who have seen great value in the capacity to communicate with tutors and colleagues. As the university moves to the full operation of the facility, the value of initial context-based research has become evident. For example, while the service offers considerable advantage to the students, many staff are still reluctant to regularly participate in the communication process offered by the system. Reasons for the reluctance are being investigated enabling solutions to be found.

The use of interactive television as a medium for distance education is another application of the technology currently under investigation by researchers from Intech. In one study, researchers are studying the impact of the interactions on the quality of the instructional delivery. Through this research, it is intended to develop guidelines for presenters and instructional designers that will maximise the advantage to be gained from this mode of teaching in both broadcast and narrowcast modes.
An emergent technology that appears to hold considerable promise for distance education is the data broadcasting system (DBS). This technology provides the facility to insert a data stream into a broadcast television signal. At the reception point, the data stream is decoded by a low cost device and converted into a useable form, for example a hard-copy printout or a computer file. Research at Intech is being undertaken to investigate the utility and efficacy of this technology for use in distance and open learning settings. As well as investigating the robustness of the technology, other interests include instructional design matters and factors influencing instructor and learner usage.

Other Intech projects involve the educational applications of interactive multimedia (IMM). Current activities include an investigation of the mental models of users of IMM, exploring students' information access and retrieval strategies using interactive information sources, and examining the use of IMM systems in the role of user support. The thrust of these projects is to determine ways in which the most effective use can be made of the technologies in teaching and learning environments. The emphasis is on studying applications of the technology being used as a vehicle for the delivery of information and instruction. Solutions are being sought for identified problems and the research is focused on developing applications that will make full use of the potential offered by the technology.

Summary and Conclusion
The purpose of this paper was to examine the way in which new technologies have been applied in distance education and open learning settings in order to improve the quality of the instructional programmes. The success of the technology in these areas is acknowledged as is the current move within universities to embrace a number of the instructional methodologies into on-campus teaching. The paper argues for the need for those educators concerned, to be wary of assuming that similar gains can be expected from this convergence of methods and technologies. There is a need for appropriate research and development to support and guide the forms of convergence that take place. Members of The Interactive Technology Research Project at Edith Cowan University are involved in a number of activities that will provide information capable of guiding prudent applications of new technologies in both distance education and on-campus teaching.
REFERENCES


Catchpole, M. (1993). Interactive media: the bridge between distance and classroom education. In T. Nunan (Eds.), Distance Education Futures Adelaide: University of South Australia.


Evans, T. & N., D. (1993). Distance education, educational technology and open learning: Converging futures and closer integration with conventional education. In T. Nunan (Eds.), Distance Education Futures Adelaide: University of South
Australia.


Holmberg, B. (1989). The concept, basic character and development potentials of distance education. Distance Education, 10(1), 127-134.


Kelly, M. (1987). Barriers to convergence in Australian higher education. In P. Smith & M. Kelly (Eds.), Distance Education and the Mainstream (pp. 175-200). Beckenham: Croom Helm.


in Principles of Distance Education, eds. M. G. Moore & G. C.
Clark. University Park, PA: American Centre for the Study of
Distance Education.

Nipper, S. (1989). Third generation distance learning and
computer conferencing. In R. Mason & A. Kaye (Eds.), Mindweave:
Communication, Computers and Distance Education Oxford: Pergamon.

Research in Distance Education, 3(2), 2-9.

use of a multimedia CD-ROM product for information retrieval.
Microcomputers for Information Management, 9(4), 225-240.

Proceedings of the Technology in Higher Education Conference.
Sydney: AIC Conferences.

flexible strategy for change. Open Learning, 8(1), 21-31.

Education and Urban Society, 24(4), 519-534.

Reeves, T. (1993). Pseudoscience in Computer-Based Instruction:
The case of learner control research. Journal of Computer Based
Instruction, 20(2), 39-46.

telecomputing: a case study of learning circles. Interactive
Learning Environments, 2(1), 15-29.

In P. Smith & M. Kelly (Eds.), Distance Education and the
Mainstream (pp. 114-138). Beckenham: Croom Helm.

Ross, B. (1993). What has happened to convergence? In T. Nunan
(Eds.), Distance Education Futures. Adelaide: University of
South Australia.

Saga, H. (1992). Are we ready enough to learn from interactive

CA: Sage Publications.

Smith, P. (1987). Distance education and educational change. In
P. Smith & M. Kelly (Eds.), Distance Education and the Mainstream (pp. 24-43). Beckenham: Croom Helm.
