

Stand and Deliver : Technology and Teacher Education
in Remote Communities

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STAND AND DELIVER: TECHNOLOGY AND TEACHER EDUCATION IN

REMOTE COMMUNITIES

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There has been a proliferation in the use of technology in people's lives, both for professional and leisure purposes. However, educational institutions have made limited use of technology for delivering courses. The use of print material and face-to-face modes remain predominant. Where technology is used it is mainly in non-interactive forms such as in the use of overhead projections, audio and video tapes and computer projections. As Sachs, Smith and Chant (1990, p.6) argue information in the form of a productive resource is as yet rarely exploited in mainstream tertiary education. In most cases video disc, texts on diskettes, authoring languages and interactive computer based programs remain things of life beyond the schools and higher education institutions.

Teacher education programs in particular have been slow to take up the possibilities for alternative modes of program delivery that Information Technology (IT) now provides. Policy makers and administrators have failed to recognise schools and universities as workplaces that are in need of modernisation and re-equipping with the new learning technologies (backed up with necessary levels of training), if they are to provide the higher standards of learning and of pupil and teacher commitment to learning that are now expected (POST, 1991).

In this paper we present information about the use of IT in tertiary education derived from a study of the first phase of the Remote Teacher Education Program (RATEP) project. The program was implemented in four Aboriginal and Torres Strait communities on Cape York Peninsular and Torres Strait during 1990 and 1991. We argue that in this project the potential for IT to be used as an instrument for teaching and learning was demonstrated. In its early stages the success of IT surpassed the expectations of most of those involved in the project for the delivery of course materials in what can only be described as very remote and difficult conditions with inexperienced tertiary students. In developing our argument we will focus on three issues as they emerged during the first year of the project: conceptualisation and design of technology based courses, interactive learning systems, pedagogy and the features of IT and RATEP pedagogy. However, before developing these issues we contextualise the study within teacher education and then briefly describe the aims and program characteristics of RATEP.

Technology and Teacher Education

The term 'technology' is characterised by a plurality of meanings. Attempts to define 'technology' by Plomp and Van de Wolde (1985), Mackenzie

and Wajcman (1985) and Sachs, Russell and Chataway (1991) indicate that the word 'technology' has at least three different layers of meaning: at its most general level 'technology' refers to hardware or physical products; second it refers to the purposeful application of knowledge; and finally, 'technology' refers to what people 'know' as well as what they do. That is, there is a reflexivity between the technical knowledge required to produce technical products and how those products are used in the development of social relations. For the purposes of this paper the reflexivity between the technical product and the social user is important. Following Sachs et al (1991) we argue that any definition which has a preoccupation with hardware or products and ignores the human perspective fails to grasp the full meaning of technology. The reality is that both the technical and human aspects of technological change contribute to the production of activity and to an understanding of the dynamics of wealth creation.

Previously within educational contexts computers and technology have been seen as sophisticated solutions for unsophisticated problems (cf Bigum, 1990; Plomp and Van de Wolde, 1985; Wellington, 1990). Bigum, (1990, p.65) argues that when computers first arrived in classrooms, 'they were high technology solutions in search of low technology problems'. Rather than responding to the 'quick fix' and 'innovation for the sake of innovation', attitudes that are so prevalent in schools, administrators and teachers need to reflect on how best to use the technology available, and integrate it into their teaching repertoire. Technology then becomes incorporated into the various 'technologies' already used by teachers within their professional practice. A synthesis of a variety of technologies is incorporated into classroom practices which takes into account other developing technologies including interactive cable networks, video discs, satellites, data banks and expert systems. As a consequence, discrete technologies such as computers would not be used in isolation, but rather, 'it may be that several of these technologies will ultimately influence education more than the 'simple' micro in isolation' (Cerych, 1985, p.229). The RATEP initiative aimed at integrating a variety of technologies in the delivery of programs to remote communities.

Two types of applications of education technology can be identified (Plomp and Van de Wolde (1985)) in RATEP. The first is a product approach which focuses on all sorts of materials, machines and hardware (including audio-visual products like TV, projectors, recorders, language laboratories) as technical aids in teaching; and aids to presentation, assessment, demonstrations or solutions to logistic problems. The second, is the process or the technique for designing software or instructional materials or programmes. These include the development of learning programs, especially programmed instruction, which are instrumented with educational technology products. Both of these orientations have limitations as both refer only to parts of the teaching learning process. By integrating both of these approaches the limitations inherent in both are minimalised. On the one hand, the product approach for example is limited as it is concerned only with new teaching aids. There is the risk of not

considering the teaching/learning process as a whole. On the other hand, the process approach is limited to instructional design with the possibility that systematic, designed instruction is too easily chosen as the solution without considering other alternatives (Plomp and Van de Wolde 1986, p.245).

The Remote Area Teacher Education Program Project

The Remote Teacher Education Program (RATEP) is an affirmative action project in Aboriginal Communities on Cape York Peninsular and Torres Strait Islander communities in Torres Strait. Three concepts from the platform of the Program: social justice, education and technology. The social justice imperative is concerned with achieving a 'fair deal' for all judged in terms of the extent to which personal freedom and integrity is protected by basic social institutions. The proposers of RATEP hold education to be one of those fundamental social institutions. Education is seen to have the potential to further social justice in these communities by providing indigenous teachers and by enabling each Community to build an infrastructure of qualified people necessary for its self-management and development. However, education, it is held, can further socially just development only if the system itself enacts tenets of equal opportunity, particularly in respect to the credentialling system. As Smith (1991:12) argues:

The starting point must be the establishment of a covenant to proceed with social justice strategies in a school system and its constituent communities. The requisite core of such a covenant is agreement to the principles of constitutional liberty for students; to a strong version of equality of educational opportunity; and only to those inequalities in the share of credentials which work to maximise the share of the least educationally well off.

RATEP Aims

The following aims were set for RATEP.

Introduce decentralised on-site delivery of higher education (teacher education) in remote Aboriginal Islander Communities where none has previously been available.

Encourage Aboriginal or Islander "ownership" of the local RATEP site.

Produce qualified teachers with a greater measure of cross cultural awareness who will be more effective in the teaching of Aboriginal/Islander students, and who may remain for longer periods as teachers in their home Community or Island, thus to maintain greater stability and continuity.

Develop a high level of maintained creative/lateral thinking in

coursewriters, lecturers and tutors, in order to produce courseware and interaction patterns which will attain teacher qualification objectives.

Develop bi-cultural curriculum content with sensitivity to the need for strengthened self-concept and raised self esteem in students, complemented by the reality to develop a bi-cultural teacher.

Introduce a variety of media modes for courseware delivery, but strive to retain the personal relationship imperative, which has shown itself to be the central factor in Aboriginal/Islander education success at all levels.

Use full-time tutors on-site to assist and provide the "transformer" relationship between student and institution.

(Queensland Department of Education, Pensinular Region, Position Paper, Remote Area Teacher Education Program, undated)

Program Characteristics

Organisationally RATEP is a co-operative constituted by the indigenous Communities, tertiary institutions, the Queensland Department of Education (Peninsular Region and the Office of Higher Education) the Queensland Open Learning Project, DEET and the BYTE Centre (Queensland franchisers of Apple Computers). The project is managed by a Program Director advised by a Reference and Management Committee. A secretariat (Program Coordinator and Secretary) administered the program.

The program is characterised by the following structural features:

- joint provision by a University and a TAFE College
- current and retrospective credit transfer
- qualifications led to full professional registration (Diploma of Teaching and Bachelor of Education)
- recognised awards conferrable at the end of the first (Certificate of Community Teaching), second, (Associate Diploma of Education - Community Teaching), fourth (Diploma of Teaching) and fifth years of student (Bachelor of Education).

In terms of delivery, the "official" and "unofficial" documentation of RATEP enumerates the following features:

- the use of interactive information technology
- on-site instruction in the Communities
- the project will conceptualise, design, produce and deliver teacher education materials in a packaged form of multi-media resources
- establish an information technology based communications network consisting of conference telephone, fax, micro-computer, VCR, audio recorder and photocopier.
- identify, select and train local liaison people who will provide

support, information and co-ordination for the program on site

- use a modular type of design
- be culturally sensitive and relevant
- provide the means to personalise higher education.

An essential assumption underpinning the courseware design was the need for multi-sensory learning materials which allow people to learn in different ways. As Smith and Brady (1990:5) argue:

Reading abstract material and having conversations with oneself is one way of learning but is not universal. As well, there is an increasing awareness and interest in the probability that contemporary information technology predisposes people, especially the young, to resonate with colour and movement, sound and graphics as well as text.

The use of multimedia, interactive technologies to enable students to match learning tasks with their preferred learning mode is a major experimental feature of RATEP.

Interactive Learning Systems

Tucker (1989) argues that in technical terms, the term interactivity normally refers to combinations of the micro computer with one or other of the picture and text carrying media; video disk, video tape, compact discs of one or other types, and access via telephone lines to remote sources of information. Courseware and materials using interactive technology varied. Some of the learning packages make creative use of instructional text integrated with other electronic media, print and field work. Other modules remain akin to 'electronic books'. Differences in the usage of the technology were influenced by the course content, the pedagogy of the lecturer, the expertise of the programmer and the working relationship between the course lecturer, the course writing team and the programmer.

Students quickly developed competence and confidence to use the equipment (computers, videos, fax, teletutorials). They appeared to see the computer and a neutral, non-threatening learning medium. It provided them with control over their learning in respect to rate, sequence and cycling (the number of repetitions on a task), immediate feedback and the means to reinforce their learning in a non-judgemental context.

At all four sites students were observed working on the interactive computer assisted learning components and making use of information technology based sources and print materials. The pattern of resource use varied between students (computer text, print, tutor assistance, peer discussion etc) which might reflect learning style preferences, confidence in, and comfort with, particular instructional media; and degree of self-direction. The purpose was to develop learning systems in which Tucker (1989) argues, the learner was to a greater or lesser degree the author of the sequences of information. By extension, the idea of interactivity covered teaching/learning situations in which the actions of the learner

not only evoked a response from the teacher (human or electronic) but also genuinely influenced the course of the lesson (p.6).

Information Technology Based Learning

In distance education programs student jurisdiction over their learning is limited by technological, content, human, institutional and cultural influences. Technological factors include the delivery media, (eg correspondence or computer based). The nature of the content influences the structure, sequence and presentation. The expertise of the writing team to utilise the potential of the technology to create learning tasks, and the ability of the learner to engage in such tasks are further limitations. Institutional rules and procedures set requirements for course accreditation, students entry, staffing levels, timetables and finances. Finally, the cultural setting of the learner is a primary influence on the content and processes of student learning. Of the course design and delivery possibilities available to ameliorate some of these limitations combining a variety of media in an instructional program transmitted interactive technology holds considerable promise.

Technologically based interactive learning refers to programs that use technology to provide multiple pathways or linkages for students for ways of knowing (O'Neill, 1987). The multiple pathways are provided through combining telecommunications, computer technology, audio, video, graphics, written text, fieldwork and face to face contact. The possibility of the learner exercising control over the pathways distinguishes interactive technology based learning from traditional computer-based and computer assisted instruction. The purpose of coupling the multipathway linkages and the opportunity for students to exercise control is to personalise rather than individualise learning. The purpose and practice of the two differ distinctly.

Personalised approaches take account to both qualitative (e.g. preferred learning style, home background, mood, motivations) and quantitative (e.g. learning rate, competency and attainment levels) learner characteristics. Scope, sequence and pacing are governed by professional judgements which take into account students' ability to interpret and to operate within a learning environment that takes into account a changing culture. The experiences are designed to foster a compelling, motivating and realistic future-focussed professional image in which the student sense options and develops mastery over ways to achieve them (Shane, 1973).

Programs designed to achieve personalisation provide students with the means to control matching both the learning tasks and the learning procedures with their own peculiar characteristics. Two features are fundamental to students exercising such control over their learning through interactive technology based programs: random access and branching. Random access refers to the student's ability to access different resources (e.g. computer, print, audio, video, human, contextual). Branching refers

to the ability of the student to choose alternative pathways, sequences, sources, presentation modes and assessments. In a "pure" interactive technology delivered course the computer-based instructional program determines both the access and the branching exercisable by the student. In a modified form, complementary tutorial or other assistance is accessible on demand. RATEP used this modified form.

The degree of control learners can exercise over their own rate and sequence of learning in such programs is determined by the nature of the instructional program itself; the student tasks; and the role enacted by the tutor. Whatever that control is initially, it could be expected to increase as the students proceeds; to vary between students; and to differ by subject and task. Indicators on the ways that students exercise such control include their record tracked by the instructional program, tutors reports, work completed for assessment and the students' comments.

Pedagogy

Pedagogically IT has to be conceived as more than just a collection of modern technological products which have to be used in education while their usefulness is taken for granted. What is required is teachers who understand, and can operate in and through, processes of educational change (Gwyn, 1986). The RATEP project aimed at arming these student teachers with such knowledge to enable them to have a broader view of the technological enterprise and its application to educational settings. The intention is not to leave unchallenged instrumental views of technological and educational change, but rather to view the use of technology across a variety of contexts as problematic both as an instrument for teaching as well as a subject for learning.

Reconceptualising the pedagogy both of distance education and Aboriginal and Islander education was fundamental to the success of the RATEP program. The technology in RATEP is being used to provide a 'different' way of structuring learner/content interaction. The course writers claim that by using technology students are more motivated to learn, and that content is enhanced on the computer by providing a variety of ways of organising knowledge and information. There is also a belief, albeit unsubstantiated that technology relates to learning style.

The computer is seen by the RATEP students as a neutral, non-threatening and non-judgemental medium for learning. It provides immediate feedback, can be used to reinforce learning and offers the students control over their learning pattern and rate. We observed students engaging with the technology and using it as an integral part of their individual learning strategies.

On the basis of the current design of the course materials and the articulation between computer and text-based material there is some evidence to suggest that where the computer is just an 'electronic book' students found this boring and unchallenging. Their potential was not

fully realised nor was the potential of the software. One of the tutors put the issue of the computer well by maintaining that 'we don't to use that computer as a alternative to a book'. They attempted to use the computer as the means to guide the student learning but with variable degrees of sophistication. However, observing some students it became unclear as to whether they were learning as a result of the medium, or just engaging in trial and error to achieve 'right answerism' or over learning through multiple repetitions. But, as the coursewriters and users have become more sophisticated and were able to exploit the possibilities that the software provided we anticipate that the nature and the quality the interactions will change.

RATEP demonstrated that the distinctive characteristics of IT in general and the computer in particular can be exploited to deliver tertiary programs to learners who previously had had little or no experience of higher education. The ability of computers to store, retrieve and process information proved to be central. Similarly, the capacity of the computer to enable students to learn at their own pace in an environment that is seen by them as non-threatening was a positive feature. While we acknowledge that technology can be used as a motivator for student learning, its limitations must be recognised. It is important as we have already stressed that there is a provision for human mediation between learner and the software. Such mediation might be through audio forms of IT such as teleconferencing.

Features of IT in RATEP Pedagogy

The distinctive characteristics of interactive information technology are being exploited to enable students to learn in an environment which is perceived by them to be non threatening and non judgemental. The potential of the technology is recognised by all parties concerned and the boundaries of possible use continue to be explored. To date the interactive nature of the program delivery has achieved the following outcomes.

- enhanced student self-confidence to engage in learning tasks;
- students exercising control over and responsibility for parts of their study program;
- high student motivation both to maintain engagement on the task at hand and to promote engagement with related tasks;
- presentation of concepts in ways not possible in other media, eg animation, the use of voice coupled with text;
- immediate, non-judgemental, instructive feedback to students;
- cooperation amongst study group members on technological and content matters.

Conclusion

The RATEP project was characterised by an experimental approach to the development of interactive, technologically based learning materials. A combination of technologies characterise the Program's distinctive delivery. Students have quickly become "technologically literate" and appeared to benefit from the opportunities to exercise some autonomy over sequence, rate and mode of access to information. Also the multisensory presentation appeared to enhance student engagement with tasks.

The generalisability of the RATEP model hinges on the expertise of the coursewriting teams. Other limitations include content; access to hardware; the sophistication of the instructional program required; and the role, expertise and availability of tutors.

While the RATEP model is robust and potentially highly transferable, decisions about its portability will need to be course specific. The program's portability lies in its capacity to be particularised to a wide range of purposes, tasks, populations and contexts.

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