

INFORMATION TECHNOLOGY IN CLASSROOMS: RETHINKING PEDAGOGY

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The use of information technology in classrooms at all educational levels is having a significant effect on both the form and content as well as the modes of delivery of educational programs. Today, the hardware of IT is so developed, and the achieved or potential computer literacy of students is of such a standard, that the major constraints on the degree of student control over learning are administrative and ideological rather than technological or personal. The Remote Area Teacher Education Program (RATEP) is an example of an initiative to deliver tertiary education to aboriginal and Torres Strait Island students in remote areas using information technology. In other papers we have reported on various elements of the RATEP initiative (Logan and Sachs, 1991, 1992a, 1992b, Sachs and Logan, 1991).

In this paper we are concerned with examining the software materials developed by course writers at Cairns TAFE. We take as our point of departure Linn's (1991:230) assertion 'Like other curriculum materials - like any other teaching technique or technology - micro computers embody particular pedagogic assumptions about the subject area, about learning and about classroom relations'. Our argument is in two parts. First, we argue that assumptions held by course writers and programmers regarding what constitutes appropriate knowledge and how that knowledge is presented control and set the limits of possibility of the software. This in turn predisposes the development and transmission of a particular kind of pedagogy. Second, we argue that this pedagogy is embedded in a more comprehensive regulative discourse that sets the thinkable and the doable and is situated within a discourse of practicality. The concepts of knowledge and pedagogy are used to structure the development of our argument in this paper.

Data Collection and the Context of this Paper

We have had a longstanding involvement and interest in the RATEP project. As external evaluators we were commissioned to document the development, management and administration of the project. We were also interested in investigating how students 'used' the materials as well as examining the development and content of software packages. It is in the context of this latter activity that this paper is situated. The demanding timelines required to implement the courseware at the various sites meant that pragmatic concerns dominated the course writers' decisions. Often working at a pace where they were more concerned with getting the materials finished in time for the next mailing meant that they were often less concerned with intellectualising the nature of their decisions.

In order to collect the data reported here we interviewed course writers

and programmers and reviewed written and computer based course materials. Sitting beside the programmers and writers we were taken through the computer based software. During the course of our interviews we were concerned with asking the following broad questions: What is the role of the software in the delivery of programs to remote communities? and what assumptions underlie decisions you make about software design, selection of content and the presentation of the materials themselves?

The Software as Text

Haddon (1991) argues that technology can be viewed as a text, encoded with a preferred reading by its originators, but one that is actively decoded by its users. This typification is useful as it allows for an acknowledgment of the role that the multiple subject positions inhabited by course writers and programmers alike have in the selection and presentation of what counts as educational knowledge. Like written texts technology can be 'read' in different ways depending on where individuals, in this case the course writers and programmers, are positioned socially, economically, politically, educational experience, age, ethnicity, gender and so on. Like fictional texts, technology texts are doubly ideological in that they vehiculate a particular ideological position, but also promote themselves as forms of discourse, generating their own set of distinctive values, sustaining their own stylistic uniqueness, constructing very particular subjects (Collins 1989: 6). Given this, if we 'read' the software and the responses of the course writers and programmers as texts then the possibility arises for us to examine critically some of the assumptions regarding the knowledge base and pedagogy implicit or explicit within the courseware.

The Knowledge Base of the Courseware

Dowling (1991: 186) makes the point that 'computer technology will tend to be constructed by teachers and students within classrooms in accordance with the cultural practices that attain there'. In the case of RATEP the constraints of accreditation and credentialling were significant factors in the lives of writers and programmers. In other words the content of the curriculum lies outside of the individual writers themselves and is located within the institutional discourses that constitute TAFE programmes. Accordingly, the discourses of vocationalism, practical and relevant knowledge stand at the core of TAFE practice and views of knowledge and curriculum. In this context curriculum is understood to refer to deliberative, documented knowledge which has been recontextualised as course content. Course content includes the subject matter, skills and processes and criteria sanctioned to guide problem identification, selection and resolution. This content is legitimated through the recontextualisation of deliberative knowledge as in the form of a subject. A curriculum makes explicit a corpus of content or selective tradition considered to be worthwhile learning for a nominated group of students, the structure of knowledge into which they should be initiated, and the boundaries of the thinkable and the doable they should access and have

access to. In short, the curriculum is first and foremost a social, cultural and economic value statement.

While taking into account the fact that institutional discourses shaped the form of much of what is mandated to teach in making their selections about what to teach the course writers, not surprisingly drew on their own corpus of knowledge. That is, in developing their courses they had implicit and unarticulated assumptions, beliefs and values about what should be taught as well as about the social context of schooling. Accordingly, during the course of the interviews we were often greeted with disbelieving stares and poignant silences for what we were asking seemed to them to be obvious and beyond explanation.

Two themes dominate the literature on teachers' knowledge. On the one hand there is what Liston and Zeichner (1991: 62) have referred to as the "dismal view" of teachers' knowledge, where the teaching culture is said to be insular, reliant on custom and whim, and immune to thoughtful reflection. Buchmann (1987) for example argues that teachers learn their craft through reliance on imitation, habit and tradition. According to Buchmann, what she refers to as the folkways of teaching have the practicality of common sense; prudence and astuteness in sizing up persons and situations and in adopting means to (given) ends without much cogitation. This practicality implies an 'objective chance of success' that makes people secure and capable (Buchmann, 1987: 156) Alternatively the work of Elbaz (1983), Connelly and Clandinin (1988) and others present a laudatory view of teachers' personal and practical knowledge - one that maintains that teachers' personal and practical knowledge is rich, substantial, and reliable. For the purposes of this paper we place ourselves within the perspective presented by Elbaz and Clandinin and Connelly. However, we temper their perspective by arguing that a pragmatic and practicality ethic dominates the decisions made by course writers in the development of RATEP course materials. This is evident in a concern of form over the content of the materials developed. We will deal with each of these in turn.

Form

In translating course materials into computer text materials writers and programmers alike were instrumental in their justifications for what was presented and how this was to be presented on the screen. The issue of time was a pre-eminent and an overriding concern in the development of both computer based and print materials. Given this concern it is not surprising that epistemological questions and issues regarding whose knowledge is presented and to what degree do the responses of the students actually represent their knowledge constructs were left silent.

The development of materials themselves was pragmatic. In the words of one course writer 'technical constraints override the pedagogical curriculum ... we don't have time to think about curriculum and pedagogical issues'. Compounding this was the ability and experience of the course

writers themselves. As one course writer suggested 'we were all on steep learning curves during the early stages of RATEP'. Gotts et al. (1992: 6) elaborate this point and suggest that the CAL packages developed later were quite distinctive when compared to the CAL packages produced in the early part of the project, as the skills of the course writers and programmers became more sophisticated'.

The concern with form over content was also evident in the importance placed on screen presentation, the use of colour, animation, graphics, photographs and sound. There appeared to be great deliberation over this and in some cases when there was incongruence between the position advocated by the course writer and programmer tensions emerged. Decisions about whether to use voice-over or not and what function this serves as a case in point and seemed to be of concern for all course writers. However, there was variation in viewpoints. Nevertheless, it could be said that these decisions were made on the basis of the course writers own subjective opinions and intuitions about how aboriginal students 'read' and respond to the texts. The following responses illuminate this point: ' ... In the photography unit I used voice whenever I could to reinforce what had been said ... to tell somebody that rather than have them read it'. Here the use of voice was used to reinforce content. For another 'voice provided the opportunity to hear concepts and content in their own language ... it provided authenticity'. Voice was also used to give feedback. It was suggested that 'written feedback was too definite ... voice enables discussion'. In this sense voice provided for the absent presence of a teacher and as a consequence not only helped facilitate closer links between students in the remote communities and the staff at Cairns TAFE but also provided for the symbolic presence of staff on the communities.

Content

The instrumental view of knowledge was particularly evident in the emphasis placed on skill development. Across all subject areas there was a strong emphasis placed on the development of skills. For example in the course Contemporary Race Relations the development of 'how to tackle the text', analysing the text and generalising and extrapolating were emphasised. The CAL packages, it was suggested, 'provided more time for reflection and for students to think about the content'. In the words of one course writer 'students were more in charge of their own learning ... there was no "shame" in making a mistake'.

The types of responses demanded through the courseware were short and were more in line with behavioural objectives that represent surface learning rather than deep conceptual understanding. In other words much of the detail of responses were a measure of students' ability to take on the language while remaining marginalised in the discourse.

It is not surprising then that an instrumental, pragmatic and practical view of knowledge informs the development of the programs. When faced with choices of using theoretical knowledge or practical knowledge the course

writers preferred the latter. The activities of the course writers and programmers is consistent with Sachs and Smith's (1988: 433) claim that 'teachers activities are a deliberate, organised, conscious effort by them to construct a more satisfying culture. They draw upon a previously determined set consisting of theoretical and practical knowledge and associated technical means'. In the case of the RATEP course writers the limitations of both the courseware (Authorware Professional, Macromind Director and Quicktime) and the experience of the programmers meant that 'theory' was recontextualised into 'practical' forms that worked. This was exacerbated when there was a lack of congruence between the expectations and meaning of what was considered to practicable between the course writers and the programmers.

Pedagogy

The issue of pedagogy is a complex one. It is a shifting signifier and means different things to different people. For example, in the conceptualisation of RATEP six pedagogical issues were identified to guide RATEP course writers. These include inter alia:

- i. Courseware construction is multimedia to provide formultisensory learning.
- ii. Materials are integrated.
- iii. Linearity and the traditional one-way model of communication are broken by utilising the potential for interactivity provided by the technology.
- iv. The materials are culturally relevant.
- v. Student involvement with the technology is documented.
- vi. The coursewriting is experimental and takes account of the moral, political as well as empirical issues

(Smith and Macindoe 1991)

The conception of pedagogy above has commonalities with Lusted's (1986) position that pedagogy must recognise that knowledge is produced, negotiated, transformed and realised in interaction between the teacher, the learner and the knowledge itself. It is the linkage between the knowledge and values set down in the curriculum for reproduction and the personal knowledge production of the student which Smith and Macindoe see as important in the development of software. Nevertheless, the congruence between Smith and Macindoe's view and the realisation in courseware is somewhat unclear. This may, in part, be due to a lack of convergence between course writers, operating as they do within a practical discourse, and the theoretical discourse presented by Smith and Macindoe. We see pedagogy as problematic within the RATEP model and suggest that it is the

discourses of the technology itself and how this positions course writers, programmers and students within functionalist assumptions that create a set of contradictory relations between knowledge producers and knowledge consumers. These assumptions support direct teaching strategies applying deductive or inductive presentation-practice-test-feedback templates to control student learning (Alessi and Trollop 1991). The technicist ideology coheres with the course writers' predisposition towards practicality in two ways. On the one hand it supports the tenets of instructional design based on computer instruction and on the other the power of censorship of the programmer over the course writer. Ultimately, at least in the RATEP study, the programmer rather than the course writer set the limits of the educational experiences delivered through the computer. This was partly due to the course writers as teachers operating outside of their domain, that is in the world of the programmer, programming and technology; and the time frame that favoured compromise and harmony in the interests of practicality (maintaining the schedule).

Drawing on Bernstein's (1990) concepts of regulative and instructional discourse we elaborate our position about the development of a set of contradictory relations as they articulate around the issue of pedagogy. Following Bernstein (1990) we hold that pedagogy is embedded in a more comprehensive regulative discourse that sets possibilities for the thinkable and the doable. The institutional requirements set the parameters for practice by recontextualising the regulative as an instructional discourse. This instructional discourse is expressed as hierarchical criteria, rules for selecting and reforming knowledge for its reproduction by students, rules governing pacing and sequencing of student learning and access, and assessment criteria (Bernstein 1990).

Curriculum

Curriculum is understood here to refer to deliberative, documented knowledge which has been recontextualised as course content. Course content includes the subject matter, skills and processes and criteria sanctioned to guide problem identification, selection and resolution.

The curriculum developed for the RATEP courses aimed at developing culturally reflexive practitioners who are able to critically assess the worth of their own and others practice in schooling and act to enhance both their own and others learning on the basis of their reflection. The scope of culturally reflexive teachers is more inclusive than simply improving learning. As socially reflexive professionals they are concerned to ensure that schooling itself is serving the interests of the community.

Through training, instruction and initiation into ways of making meaning, it is anticipated that teachers positioned into this discourse develop professional sensitivities, individuality and independence. They are aware of the limitations and possibilities of their own actions, and are able to modify their practices in response to reading the meanings construed by themselves, their students and significant others. Central to their

practice are the capacities and the predisposition to negotiate the rejection, mutual adaptation or adoption of curriculum, pedagogy, organisation, assessment and evaluation; and to explicate and justify their own praxis. Central to this perspective is, as Gentile (1985: 7) observes, the need to 'find a commonality in the experiences of difference without compromising its distinctive realities and effects'. The degree to which these perhaps somewhat utopian ideals are transferred into the actual classroom practice of the graduates of RATEP is yet to be measured.

In summary the use of IT in RATEP provided the mode of delivery for programs into remote areas. The technology itself and the course materials that were developed to support it were seen in purely instrumental and pragmatic ways. The facilitation of effective learning became the *raison d'être* for the use of technology and became an end in itself. Importantly, this restricted view rendered silent other key elements of education, such as equipping pupils with cultural values for participation in a democratic society (Mackay 1991: 7). This is despite its reliance on social justice as a conceptual principle. The domination of a pragmatic view to knowledge production inevitably means that there can be no time for consideration of questions of the order of: Who can speak? Who can speak for whom? What can be said? (Spivak in Gunew and Spivak (1986). Furthermore, it also closes off the potential to investigate what Pettman (1992: 125) refers to as the different listening positions as well as different speaking positions available to different people.

The Regulative Discourse of RATEP

The regulative discourse of RATEP is located in Commonwealth and State government sponsored social justice and equity programs for indigenous people aimed at increasing their access to tertiary education. The Report of the House of Representatives Select Committee on Aboriginal Education 1985; Report of the Aboriginal Education Policy Task Force 1988; Peninsula QATSICC Policy 1988) have emphasised the importance of having fully qualified indigenous teachers in their own communities, the need for these people to be able to access tertiary education within their own communities and to increase the participation, retention and graduation rates of indigenous candidates in programs leading to professional registration. The regulative discourse was to some extent embedded within the traditions, expectations and credentialling procedures of Cairns TAFE and James Cook University - two quite dissimilar institutions. Articulation between these two institutions required negotiating understandings, procedures and processes between two, distinct educational traditions, namely those of technical and university education. While in effect the two institutions retained control over their own programs, CTAFE were conscious that their students had to meet the requirements set by JCU for its mainstream Diploma students. In turn JCU was conscious that the RATEP program had to comply with the same standards as its mainstream program and conform with the conditions for teacher registration and employment. We argue that the regulative discourse of these two distinct institutions had significant effects on the form and content of the programmes developed within each

institution as part of the RATEP initiative.

The Instructional Discourse of RATEP

This instructional discourse recontextualises the regulative discourse as curriculum, pedagogical, managerial and assessment possibilities at the level of procedural authorisation. In the case of RATEP it translates how the programs are to meet officially the regulative social justice aims of the government and the academic demands of the tertiary institutions.

The instructional discourse of RATEP includes: the application of IT to modes of interactive learning; the learning characteristics of indigenous learners; cultural sensitivity; and the practical knowledge of the lecturers. Statements such as the following characterise this discourse: multimedia courseware to provide for multisensory learning, integration of materials, culturally and politically relevant and sensitive content, IT to promote interactivity that enhances the students' control over their own learning, personalised contact between students and staff, modular design of units, documentation of students' work, need for personal interaction and course writers to be experimental and lateral users of IT.

There are internal contradictions between what is said within the political rhetoric and the reality of courseware production and the implementation of the programme. Clearly, while the set content attends to cultural sensitivities, its application is concerned with the reproduction and representation of western modes of thought, intellectual traditions and ways of knowing. This provides for both a conceptual and practical dilemma for coursewriters and credentialling institutions alike. The need to have students successfully complete the programme has worked against any resolution of this dilemma.

Conclusion

We have argued that the regulative discourse of the two accrediting institutions for the RATEP project create a set of material and ideological conditions that limit possibility and action. A consequence of this is that the RATEP software and print materials are embedded in an instructional discourse which promotes knowledge transaction and interactive learning over knowledge transmission. Furthermore, at the macro level the texts are regulated by institutional demands related to the academic calendar, staff costs and accreditation requirements. At the micro level the principles of instructional design and the power of the programmer rather than the course writer to set what can be done reinforces the position of the technical and practical over the educational discourse. Thus at both the macro and the micro levels within the program, functionalist values operate to reshape the interpretation of the instructional discourse from transaction to transmission. That is, the practical and the practicality ethic in management, curriculum and pedagogy is the vehicle for the continued dominance of functionalist practice.

In order to break the domination and reproduction of practical and technical knowledge over other forms of knowledge, both course writers and programmers need to become mutually aware of the transmission model in the discourse of technology and of ways to develop strategies to overcome these limitations. In order to achieve this end conditions must apply that encourage the recontextualisation of theoretical tenets into forms that meet and reshape the notion of practicality. That is, they need to confront and rethink the nature of their practice and the factors that limit and structure that practice. We suggest that such strategies will have three common elements. The first requires that the materials are challenged and supported from outside of the institutional and technological discourses. The second element is that the opportunity must exist for the course writers and programmers to develop a common language and expectation about the limitations of the software and how it relates to how knowledge is produced, circulated and consumed. Finally, the course writers need a situation in which critique and review are valued are seen to be an important part of courseware development. These strategies, we suggest, will help to break the ascendancy of practical knowledge and the domination of the practicality ethic in decision making by course writers in the development of computer software and print materials. This in turn will necessitate that pedagogical considerations and assumptions held by course writers about the nature of knowledge and the possibilities of the software become a central part of their own professional discourses and practice.

References

Alessi, S.M. and Trollop, S.R. *Computer-Based Instruction: Methods and Development* 2nd edition. New Jersey: Prentice Hall.

Bernstein, B. (1990) *The Structuring of Pedagogic Discourse*, London: Routledge.

Buchmann, M. (1987) *Teaching Knowledge: The lights teachers live by*. Oxford Review of Education 13(2):151-64

Collins, J. (1989) *Uncommon Cultures*. London: Routledge

Connelly, M. and Clandinin, D. J. (1988) *Teachers as Curriculum Planners*. New York: Teachers College Press.

Dowling, P. (1991) *The Dialectics of Determinism: Deconstructing Information Technology*, in H. Mackay, M. Young and J. Beynon (1991) *Understanding Technology in Education*. London: Falmer Press.

Elbaz, F. (1983) *Teacher Thinking: A Study of Practical Knowledge*. London: Routledge

Gentile, M. (1985) *Film Feminisms: Theory and Practice*. Westport, CT: Greenwood Press

Gotts, A., Kruger, L., Colmer, D. Makray, J. and Hill, R. (1992) The Remote Area Teacher Education Project (RATEP): An Initiative in Interactive Multimedia Technology. Paper Presented at Information Technology for Training and Education Conference, The University of Queensland.

Gunew, S. and Spivac, G. (1986) Questions of Multiculturalism. *Hecate* XII 1-2, 136-42

Haddon, L. (1991) The Cultural Production and Consumption of IT, in H. Mackay, M. Young and J. Beynon (1991) *Understanding Technology in Education*. London: Falmer Press.

Linn, P. (1991) Microcomputers in Education: Living and Dead Labour, in H. Mackay, M. Young and J. Beynon (1991) *Understanding Technology in Education*. London: Falmer Press.

Liston, D. and Zeichner, K. (1991) *Teacher Education and the Social Conditions of Schooling*. London: Routledge.

Logan, L. and Sachs, J. (1991) *It Opened My Head: An Evaluation of the First Phase of the Remote area Program*. The University of Queensland: St Lucia.

Logan, L. and Sachs, J. (1992a) Using Technology to Increase Access to Teacher Education For Aborigines and Islanders in Remote Areas of Australia, Paper presented at the 12th Annual International Society for Teacher Education Conference, University of New England, Armidale, April 24-30

Logan, L. and Sachs, J. (1992b) Changing Teacher Education Through Technology; A Study of the Remote Area Teacher Education Program. Paper Presented at the 8th International Congress for Comparative Education, Charles University, Prague.

Lusted, D. (1986) Why Pedagogy?, *Screen* 27(5) 2-14

Mackay, H. (1991) Technology as an Educational Issue: Social and Political Perspectives, in H. Mackay, M. Young and J. Beynon (1991) *Understanding Technology in Education*. London: Falmer Press.

Pettman, J. (1992) *Living in the Margins: Racism, Sexism and Feminism in Australia*. Sydney: Allen and Unwin.

Sachs, J. and Logan, L. (1991) Stand and Deliver: Technology and Teacher Education in Remote Communities. Paper Presented at the Annual Conference of the Australian Association for Research in Education, Ramada Hotel, Surfers Paradise.

Sachs, J. and Smith, R. (1988) Constructing Teacher Culture. *British Journal of Sociology of Education* 9(4) 423-436

Smith, R. and Macindoe, M. (1991) Education and interactive multimedia technologies: the Remote Area Teacher Education Project (RATEP) UNICORN 17 (3) 139-145