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An adventure in integrating educational computing within teacher education

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Abstract

As the study of Information Technology (IT) in initial teacher education courses has developed, more emphasis has been placed on educational computing within curriculum areas and on the use of computer-based resources in children's learning. Teacher education institutions have provided instruction through discrete educational computing subjects, through the permeation of these studies into curriculum subjects and through mixes of these two approaches. Use has also been made of telecommunications, practicum and school based subjects. This case study describes the use of CD-ROM adventure software to permeate IT into initial teacher education, the prior classroom trials of the learning strategies being taught and the students' responses to this experiment.

Keywords

Elementary education, teacher education, classroom practice, literacy, multimedia, pedagogy

1 INTRODUCTION

The historical development of Information Technology in Teacher Education (ITTE) began with discrete computer literacy subjects, then discrete educational computing subjects and moved on to the permeation of these studies into other curriculum subjects and into practicum and school based subjects (Robinson, 1996; Oliver, 1994; Heppell, 1993; Wright, 1993; Pratt, 1993). Discrete subjects are close to the traditional university model of subject specialist teaching but Information Technology (IT) studies have the benefit of linking these understandings to the student teachers' future work role. Wright (1993) discussed the case for separate Information Technology subjects to develop the computer literacy of student teachers. He believes the "challenge is to educate for a future in a technology-centred information age - the opportunity is to apply technology to revolutionise the process of education".

An alternate approach has been termed an integrated or permeated approach. Here educational computing is taught within curriculum-focused subjects. Pratt (1993) cautioned that "Permeation cannot succeed without staff expertise but staff will not gain expertise unless they are required to teach IT as part of their course". Oliver (1994) argues that, like school teachers, teacher education lecturers and teacher education students need to experience models of IT use in their own learning before such technologies will be adopted for use with the children the student teachers will teach. Robertson (1996) supports Oliver's view that permeated IT should be designed in such a way as to provide more than a token integration of IT into a few subjects. He suggests that "coherence and progression pose greater challenges for the permeated approach".

Downes (1993) surveyed a cohort of final year student teachers from Western Sydney about their experiences with IT during a block practicum. They reported minimal use of IT in the classrooms in which they had been working. Half the group had experienced a discrete "computers in education" subject prior to the practicum and half the group would complete this course after their school experience. There was no significant difference in IT usage between these two groups. Where IT use had been reported it was the teaching practice of the class teacher that was the main determinant.

These findings suggest that it is classroom teachers using computers who are best placed to provide examples of good practice for student teachers and teacher education lecturers. Sherwood (1993, pp. 172-176) reported the views of Australian teachers who were experienced in using IT in their working lives. Almost 76% replied that the use of computers in their classroom had made a difference to teaching methods. These teachers reported that "the most significant change .. has been the move from teacher-centred to student-centred classrooms". The problems identified by Sherwood were in part: inadequate training both at preservice and in-service phases: lack of teacher educators with direct experience of educational computing; limited resources and finances.

2 PERMEATION OF ITTE AT THE UNIVERSITY OF WESTERN SYDNEY

Following a course review in 1991 the primary teacher education program at the University of Western Sydney (UWS) in Macarthur underwent major changes. This review recast the structure of the undergraduate degree into a more integrated model. As a result there was no longer a discrete compulsory educational computing subject in the core program. A decision was made to integrate educational computing into other appropriate curriculum subjects. Specialist educational computing lecturers within the faculty volunteered to be part of the teaching teams of these subjects. In this way they were able to assist in the design of integrated tutorial activities and assignment tasks. By 1995 the degree programme had evolved to a stage where there were four subjects from a total of eighteen designed to include educational computing.

The permeation model being trialled at UWS, Macarthur Faculty of Education involves the integration of educational computing as a methodology in curriculum areas through provision of computer based tutorials in appropriate subject units within the degree course.

"We are trying to:

- improve quality of teacher training to improve educational outcomes for the children our students will teach,
- reflect good practice in schools,
- broaden lecturers' skills and understandings,
- reflect the philosophy of Bachelor of Teaching" (Nanlohy, 1994).

3 SCHOOL TRIALS OF ITTE STRATEGIES

It has been the practice of the specialist IT lecturers at UWS to conduct research and trials of IT-based learning strategies in classrooms. In this way they learn from school teachers and their students in order to teach their students about being effective users of IT. In the present case study this has been achieved by cultivating opportunities for trialling of exemplary software in senior primary classes. The exchange of skills and information benefits both the school and the university. The school has the services of the lecturer to assist with its staff development. The university benefits because one of its staff can obtain recent and relevant experience within their field of expertise. The nature of the relationships in this arrangement are different from the usual relationships in teaching practice. The student teacher does not meet the school teacher or the students. The lecturer is not placed in the role of supervisor or adviser but rather is a learner first and a teacher second. Heppell (1993, p. 233) believes that the "current generation of children are literally the first children of the information age". This type of school based trial provides opportunities for teacher education lecturers to learn about classroom and home use of IT from children whose experience of literature and of communication technologies is different from those of adults. The lecturer is able to experiment with appropriate IT classroom software and strategies as shown in Figure 1.

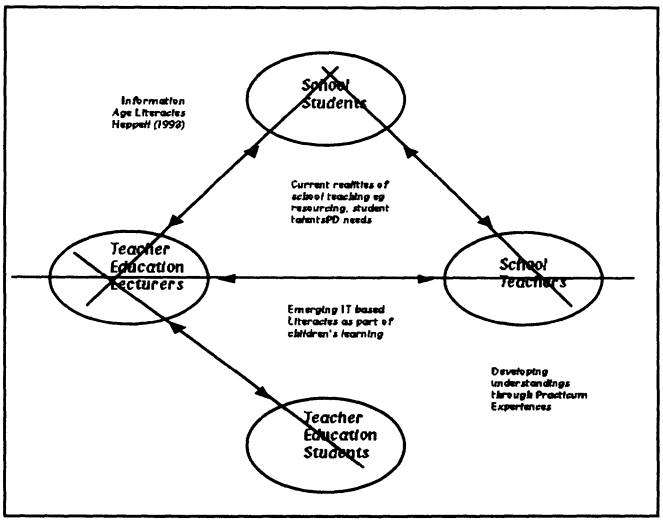

Figure 1 Relationships between teacher education stakeholders

Heppell (1993) suggests that teachers and teacher educators need to understand the emerging capabilities of the 'information generation'. Teacher educators should "become more immersed in the entertainment and edutainment media that are increasingly common currency in young children's day-to-day language and lives". Negroponte (1995) suggests that the model for learning in the future might be seen in the way children learn to use "simulation tools (like the popular SimCity) and more information rich games".

4 TRIALLING THE ADVENTURE WITH PRIMARY STUDENTS

In the trial that led to changes in the UWS teacher education course, the CD-ROM adventure game "Mist" was used to stimulate purposeful writing with two groups of senior primary students. "Mist" is a prominent example of CD-ROM adventure software. Clicking the mouse in a given direction allows the user to appear to "walk" through a world depicted with finely rendered graphics. Movement is smooth and the point of view is that of "first person participant."

Why use the "Mist" CD-ROM adventure?

This adventure program is a popular game that is an example of an emerging class of mass media text. This program melds mathematics and literacy in an investigation that unfolds a hidden mythical realm. It is useful in a classroom setting because the program provides significant cognitive challenge, has clear links to aspects of state curriculums and provides an experiential learning environment.

The "Mist" adventure has a relatively non-violent scenario. There is emotional violence inherent in the struggle between the male protagonists, Atrus and his sons Sirrus and Achenar. The main female character, Catherine, the mother of this warring family, is cast in a passive role. However "Mist" is most successfully completed by students in pairs or small groups who solve its puzzles through discussion and collaboration. This may be why this adventure is attractive for girls who in the main have stayed away from the "drop dead" variety of computer games. Dale Spender suggests that girls who reject the violent games that feature death and competition are showing good sense. She points out that girls "are interested in personal relationships, in the ongoing story of existence" (1995, p.187).

Teaching plan for the first classroom trial

The first trial took place in an inner-urban Sydney school. The teacher was keen to offer her academically gifted students the opportunity to create personal narratives of the mystery text form. She suggested ten groups of three, with a girl and two boys in each group. The author visited initially the class one afternoon each week to lead whole class activities, and later to conduct writing conferences with each group. The groups had one hour each week to use the "Mist" program.

In weeks 1 to 3 "Mist" was introduced to the class through demonstrations and discussions, and by the end of this period they had reached the stage of individual writing. During the following 4 weeks writing conferences were held in the withdrawal room off the classroom where the computer was housed. Observation notes were kept of the conferences and the group game play. In order to help the students develop their story, questions were asked by the author on the plot and

structure of their narrative, how they were to plan the next stage and how they were arranging to work together.

The two most common observations made of the children during this trial described a high level of competition between groups and the disharmony within groups. The gender balance of the adventuring groups (all had two boys and one girl) and the behaviour of the boys meant that these otherwise intelligent, confident and articulate girls were marginalised during their time on the computer, often physically. Efforts to encourage sharing were only partially successful in that only "old solutions" were exchanged in the class discussions. The girls were often left to complete writing tasks after the weekly writing conference. With the exception of two groups, the children's writing was generally at or below their usual standard. The two groups that did write in a co-operative way completed sophisticated texts of a standard well above their previous competent standard.

To get the students' views on the trial, they were asked to complete two feedback sheets. In discussions about the roles played within the groups, the dominant boys explained that they ignored the roles and took control of the game because of their impatience with the other team members. Quick success with the problems of the program was seen as justification for behaviour they acknowledged as inappropriate. The same group expressed a disappointment in the non-lethal nature of the adventure.

Second trial in a country school

Some of the issues addressed in the design of the second classroom trial (which was carried out in a rural central school in a farming area in NSW, where the class had a high level of access to technology) were:

- a stronger focus on "Mist" as a text to shape the content of the student's writing and on the writing and drawing processes used by the program's authors,
- role definitions with clear responsibilities to other group members described and practised as the adventure was introduced to small groups,
- early encouragement of a co-operative environment with regular sharing sessions and creation of "clue cards" as cryptic hints for their peers,
- writing tasks both at the adventure and back at desks described and monitored,
- the "Mist" Story 1 and 2 sheets were retained to provide a first draft structure for the children's narrative and recount texts and to provide feedback on the students' experiences with the program.

This trial had a much more positive set of outcomes. While the younger members of the cross grade classroom lost interest in the adventure, the more senior members were eager to continue. In interviews recorded two months after their trial finished, the children were able to recall in detail the events of their adventure. They had definite opinions on the positive value of the experience for the writing tasks that were involved, but were less impressed with a rigid implementation of the group roles and recording of the events of their adventuring. They reported that the rotation of duties would sometimes be abandoned after the group members had settled into preferred roles. When the girls in the interview group were asked about the lack of active female characters in the adventure scenario they responded that this did not matter so much because they "liked the way the game was played". When questioned on this point they said that they liked the collaborative nature of the decision making required to play the game and the detail and depth of the stories embedded in the adventure.

5 THE UNIVERSITY TRIAL

For the first semester intake of teacher education students in 1995, initial contact with educational computing was part of a compulsory subject called "Foundations of Literacy and Maths". This subject was delivered during tutorials lasting a total of four hours each week for 13 weeks. The tutorials were divided into two hours of 'Introduction to Children's Literacy' and two hours of 'Introduction to Elementary Mathematics'. Educational computing activities were used in these tutorials to illustrate the principles and classroom strategies being discussed. An assessment task worth 20% of the subject grade was designed to draw on what the students had learnt during both aspects of the subject. In addition the subject was intended to satisfy the university-wide compulsory "computing competencies" (UWS, Macarthur, 1995, Calendar p. 137). The assignment was intended to demonstrate good teaching practice suitable for using this type of software as a part of literacy learning in an elementary classroom.

Aided by lecturers and written support material, the students were asked to spend at least ten hours outside tutorial time exploring the same program used with the trial schools. They were asked to use this experience to create a variety of written products that reflected their experiences within the program. Of the 154 students who completed the assignment, work samples were collected from 135 (88%) who were divided into 66 groups.

The university students found that they were initially frustrated by the ambiguity of the adventure but given time and some success became enthusiastic about the inspiration it provided for their writing. A high proportion of the cohort (45 out of 66 groups who returned the survey) specifically mentioned variations of the word "frustrated" in describing their experience with the adventure. The cohort also reported that as they became more comfortable with the adventuring they began to enjoy the experience and got a heightened level of reward perhaps because of the difficulties at the outset:

"*Frustrated, Relieved, Distressed, Excited, Sense of achievement, Enjoyable*" (Group 33)

"*Honestly it was very frustrating, however very enjoyable and extremely challenging*" (Group 25)

They were impressed by the graphics technology of the adventure and the inclusiveness of the interface. The students found the small group structure to be very supportive, a way of sharing the workload, and of being more successful in the adventure. This was a useful insight into the nature of group tasks in a university setting.

"*Working in pairs was more rewarding, one played one wrote. If one missed information the other might pick it up*" (Group 39)

There was a contrast between the university students' and the school students' approach to these experiences. The school students plunged enthusiastically into the game and engaged deeply in the adventure to solve its puzzles. The university students came reluctantly to the technology and many played only as much of the game as was needed to complete the assignments. There was a small group of teacher education students who organised a "Mist Game Day" after the assignments were

done because they wanted to be free to play the game without the compulsion of assessment tasks. Where the school students found the writing tasks a chore, that got in the way of their enjoyment of the "game", the teacher education students found delight in writing the journals and the stories because these were familiar tasks and they were well prepared by their experiences in the adventure.

6 FUTURE PERMEATION OF ITTE AT THE UNIVERSITY OF WESTERN SYDNEY

There are some lessons from this use of school trialled IT strategies for the design of university level teaching and learning in the permeated model. They may be summarised with the following points.

- The trial at UWS, Macarthur pointed to the reluctance of teacher education students to 'engage" with computer programs beyond utilitarian purposes like word processing. If permeation is to happen it has to be at the level of integration with curriculum and not as a clip-on application like "word process this assignment".
- The provision of detailed support did not work. A better way might be to provide the lecturers in the teaching team with "in class coaching" as a professional development strategy. In the terms of Joyce, Weil and Showers (1992) this would help "build communities of professional educators" (p. 381). The primary students did not need IT support.

The lessons from the primary students' trials are:

- allow for the fun.
- do not be too prescriptive in the processes you expect the small group to use.
- expect that the school students will be your teacher and be open to their suggestions for improving the use of IT in their classrooms.
- Within a teacher education faculty the implementation of a permeation strategy must be lead by an evangelist who has the support of the leadership of the faculty and who is skilled in supporting adult learners. Such an evangelist has a key role to play in the design of courses, subjects, lectures and tutorials.

Concluding comment

It has become a truism that human society is moving into an information age. The implications of the development of information processing technologies for society are manifold (Spender 1995; Negorponte 1995; Ong, 1982). Spender posits the demise of print as the main medium for information transfer and suggests that the nature of learning and the current support structures for learning will change. She suggests that the "concept of a (university) degree will become rapidly and increasingly inappropriate". She believes that the qualifications offered by degrees is "based on the premise that you could be trained once and that was it. These days, there is widespread recognition that learning is an ongoing process". Teacher educators are in a privileged position to respond to these imperatives. They are able to offer experiences to their students that will help them in turn prepare their students for the changing world.

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8 BIOGRAPHY

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