

DESIGN FOR A CULTURALLY AFFIRMING INDIGENOUS COMPUTER LITERACY COURSE

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Abstract

It is often assumed by universities that entry-level students possess the skills necessary to use computing facilities effectively. Yet computer literacy amongst Indigenous students remains unacceptably low. In this paper a design for a computer literacy course is presented which endeavours to affirm the cultural values and identity of Indigenous students. It does this by drawing on Indigenous learning styles theory but also taking into account the particular learning styles of individual students.

Keywords

computer literacy, assimilation in education, Indigenous learning styles

Introduction

In the past ten to fifteen years the ability to use computers competently has become part of the necessary skills set and knowledge base of all students undertaking tertiary education. To a large extent universities have assumed that entry-level students already possess basic computer literacy. Yet, there is evidence that students do not always have these skills. Indigenous students, in particular, often have poor computer literacy because of a number of contributing factors.

Computer literacy has been identified as an important issue in the ongoing commitment by the University of Technology, Sydney (UTS) to Indigenous education (Barraket, Payne, Scott & Cameron, 2000). Furthermore, in a recent UTS report aimed at increasing Indigenous participation in the Faculty of Information Technology and in the Information Technology (IT) sector, improving computer literacy was viewed as necessary both for students wishing to study IT and more generally for Indigenous students across all disciplines (Robertson, Dyson, Norman & Buckley, 2002a). Recommendations of the report included developing a computer literacy program to be offered to all Indigenous students at the University, and the development of a computer literacy module as part of a Pre-IT course aimed at interesting and preparing potential students for a career in IT. This is part of a major faculty initiative and part of a new three-year pilot program to attract more Indigenous students into the Faculty of IT.

This paper formulates a design for the proposed computer literacy module of the Pre-IT course. Principles in the design will then be applied to other modules and future courses delivered to Indigenous students. The challenge in the design and implementation of any course for Indigenous students is how to make the course engaging and empowering for them. Despite improvements in Indigenous university education, the rate of students failing to complete courses remains unacceptably high. A range of factors has been pinpointed, but an important one that recurs in the research literature is the assimilationist nature of much university education. If a computer literacy course is to be successful, it must be culturally affirming and appropriate to Indigenous students' interests, perspectives, values, learning styles and identity. The first part of the paper briefly presents evidence for low levels of computer literacy amongst Indigenous university students and the need for a computer literacy course. Then the issue of assimilation and tertiary education is examined. This is followed by an analysis of Aboriginal learning styles theory, which has been the dominant theory of Indigenous education in Australia since the 1980s, and the application of this theory to computer education. In conclusion the design for a culturally affirming

computer literacy course is presented based on Indigenous learning styles but also taking into account the needs of individual students.

Computer Literacy Amongst Indigenous University Students

A case study into the use of communication and information technology by students at UTS showed that Indigenous students had poor levels of computer literacy compared to a control group (Barraket et al., 2000). This in turn gave them a lack of confidence in accessing the computer labs provided by the university and meant that they used email for contacting staff members and other students less often. They were also less likely to own a computer due to economic disadvantage, a finding confirmed by Robertson et al. (2002a). Low levels of computer ownership and lack of confidence in using university computers are important factors in low computer literacy since access to the technology and ability to use it are interdependent (Barraket et al., 2000).

Students complained of the university's lack of support for developing skills. Though some support was available through the Aboriginal Tutorial Assistance Scheme and a computer lab provided for Indigenous students in Jumbunna Indigenous House of Learning, staff at Jumbunna did not all have the necessary computer expertise to assist students when needed and applications in the Jumbunna lab were not always compatible with software students were required to use in their faculties. Jumbunna now conducts courses in communications and numeracy but there is still nothing similar in computer literacy. Furthermore, Barlow and de Lacey (1998, p.11) found that for Indigenous students 'access to and competence in technologies often appear outside of their schooling and social environment and this creates a barrier'. Students lack networks of friends and relatives who themselves are sufficiently technologically competent to give support.

Lack of computer skills is therefore the result of five main factors:

- Poor schooling
- The lack of a computer literate social network
- Low computer ownership
- Inadequate training and support
- Lack of confidence to use facilities provided.

Of these factors the last three can be improved by the university. Computer ownership is now being addressed by the Special Needs Unit, at least for Indigenous students in remote locations, by a loan scheme for the purchase of computers for home use. Support by staff at Jumbunna has been partially improved by a policy whereby every academic staff member now has a laptop: it is expected that this will lead to greater computer skills amongst staff, who will then be in a better position to assist students. These measures as well as the current development of a computer literacy course should lead in turn to improved confidence and use of facilities.

The Assimilationist Nature of Tertiary Education

In the 1970s low participation in university education by Indigenous people was recognized by the Australian Government as an issue for the first time. By the mid-1980s the Government had adopted a policy of equity, and the numbers of Indigenous students began to rise significantly. By the late 1990s the Government could claim:

The access rate of Indigenous people to higher education, at 1.5 per cent of commencing students, is now only slightly less than their population share of 1.7 per cent. Their academic success and retention in higher education remain very low, however. The high attrition means that participation by Indigenous people in higher education overall is also low, at 65 per cent of what would be expected from this group's share of the general population (DETYA, 1999, p.3).

Disparity between access to university education and success is even more marked in particular disciplines. For example, undergraduate enrolments in IT courses nearly tripled from 1989 to 2000, but completions remained static (Robertson et al., 2002a).

There are many factors affecting the success of Indigenous students. Bourke, Burden and Moore (1996) found student support, staff attitudes, enjoyment of university life, distance versus on-campus study, family situation, gender, finances and housing, and whether students were prepared for university study significant. One concern that surfaced in their report was the loss of cultural identity that many students feared from attending university. They reported feelings of alienation, discomfort and resentment at being expected to conform. One student commented that 'the uni is an assimilation process and so the clash of cultural values etc plays an important part' (Bourke et al., 1996, chapter4). For many students it is a choice between succeeding and losing their identity, or maintaining their identity, rejecting assimilation but failing their course (Peacock, 1993).

Several researchers of the 1980s had begun to interpret education in Australia as a political activity. It pretends to be neutral, providing opportunities in a pragmatic fashion. Yet, really, it is a 'powerful political and cultural weapon', imparting the values of Western society and reinforcing the domination of those values over other cultures (Folds, 1987, p.98). From this perspective we can see the failure of Indigenous students to succeed as 'active resistance ... to the cultural destruction implicit in many of the educational programmes' (McConnochie, 1982, p.20). Assimilationist practices are not solely a matter of content but go deeper into the very thought processes embedded in mainstream education. Harris (1990) sees much Western classroom practice and the thinking behind it as antithetical to traditional Indigenous ways of thinking. These un-Indigenous ways include:

- De-contextualized thought
- The posing of hypothetical problems
- Question and answer techniques
- Verbal explanations
- Verbal comparing and contrasting
- Extrapolating from the particular to the general and so deriving principles to be applied to all situations
- Objective evaluation of others' beliefs
- Open criticism
- Summarizing, justifying, proving, clarifying, interpreting, understanding, challenging, enquiring
- Academic purposefulness, whereby students have a clear goal of what is to be learnt, exercise control over their learning, and use feedback from teachers to adjust their learning approach
- Competitiveness in the classroom
- Focus on doing, manipulating, controlling, measuring
- Division of behaviour into separate transactions
- The expectation that students will listen
- The expectation that students should attempt to answer all questions
- 'Why' and 'when' questions.

These practices, which are taken for granted in our education system, are central to the scientific, positivistic world view, which allows control and domination of the world and of others through technology, science and the acquisition of Western knowledge. This is the 'hidden curriculum ... what rubs off over time onto students during the school experience although it may not be deliberately taught' (Harris, 1990, p.8). Teachers versed in mainstream education practice see this as normal. It is against this which many of the Indigenous students who drop out of university are rebelling. If a computer course is to be successful for Indigenous students it must come from a different base. It must be designed with Indigenous culture and Indigenous ways of doing, thinking and learning at its core.

Indigenous Learning Styles and Computers

Indigenous Learning Styles Theory

The term 'learning style' refers to a student's particular approaches and strategies for acquiring knowledge. Usually it has been applied to the study of individual learning behaviour, but has also been used to describe learning approaches common to identifiable groups. Over the last two decades the most influential theory of Indigenous education has been Harris' Aboriginal learning styles theory, first expounded in *Culture and Learning: Tradition and Education in Northeast Arnhem Land* in 1980.

Harris identified five main areas in which the learning of traditional Aboriginal Australians differs from the mainstream:

- *Learning by observation and imitation*
Verbal instruction and verbal correction and criticism are not traditional teaching and learning tools. Instead students watch and do.
- *Learning from life experiences*
Practice in artificial settings such as the classroom is not part of traditional education. Learning tasks are therefore always real.
- *Learning by personal trial and error*
Gradually, the student comes closer to the ideal through a series of increasingly refined approximations, unguided by teacher corrections.
- *Focus on skills for specific tasks*
Knowledge is contextualized and bound to specific events and tasks. It does not evolve into broad principles and theories.
- *Emphasis on people and relationships*
Knowledge is linked and given authority by the person who is the holder of that knowledge: therefore knowledge cannot be impersonal. Maintaining an harmonious relationship with the teacher and learning co-operatively rather than competitively is most important.

Indigenous Learning Styles and Computer Use

Researchers and teachers working in the area of Indigenous school education through the 1980s and 1990s found that computers fitted with these perceived learning styles. Fryer (1987), focusing on computer-assisted learning, listed several points of congruence:

- The software involved in the study allowed students to work co-operatively in groups.
- Drill and practice formed a useful part of some programs.
- Lessons became more activity based and there was more 1-to-1 interaction and less teacher-to-whole class talk.
- Students took greater charge of their own learning.

Fryer noted that the whole structure of the classroom and the relationship between teacher and student changed. The teacher became more of a helper, and in this aspect the classroom approached the traditional learning situation since 'Aboriginal society had no formal *teacher* as such' (Fryer, 1987, p.55).

O'Donoghue (1992) also notes the opportunities for co-operative enjoyment and lists several other reasons for Aboriginal children's computer success, many of which he couches in terms of an Indigenous learning style. According to O'Donoghue, computers:

- Appeal to Indigenous visual-spatial strengths through their colourful graphics
- Allow tactile skills to be exploited
- Are a patient medium, allowing students to make mistakes and self-correct through trial and error
- Give instant results compared to paper and pen
- Depend little on writing and so fit with people coming from an oral culture
- Allow escape from the negative influence of the non-Indigenous teacher and the 'language of the conqueror' (1992, p.51).

Steen (1997) presents a synthesis of research into computer literacy and Indigenous education. She quotes from one survey of Northern Territory schools:

The computer fits into the learning style of the Aboriginal student – it is endlessly patient, repetitive, individually interactive, positively reinforcing, sets short term easily apparent goals to reach, provides instant rewards for success, provides further explanation free of negative comment, allows the child to progress at his or her own rate and frees the child from peer pressure of conformity to the average standards of the group (Steen, 1997, p. 15).

In another study from South Australia, quoted by Steen, the absence of preconceptions about computers and lack of past failures was suggested as a factor in students' success, even with students previously seen as low achievers. Computers were viewed as non-threatening, and not incurring the shame that Indigenous students felt if giving an incorrect answer in front of a classroom. Woodside's unpublished study quoted by Steen yet again confirms that computers support

characteristics such as imitation, observation, trial and error, persistence and repetition; characteristics which prevail in Aboriginal traditional communities (Steen, 1997, p.19).

However, Steen stresses the need for suitable software and that not *all* programs presently cater for Indigenous learning styles.

Computers and Indigenous Values

Outside the area of Indigenous education there have been concerns expressed by some commentators on the non-neutrality of computer technology, that it is 'the physical medium through which symbolic values are expressed, the trace of a civilization' (Martinand, 1995, p.52). These worries centre around the idea that it comes with the values of the society which produced it.

Though computer technology *may* embody Western values this is less important than the fact that computers open up the classroom and level off the power hierarchy between teacher and student. By placing the student in control of the keyboard and mouse, and relegating the teacher to the role of facilitator, it is the student's culture which has the opportunity of affirming itself.

At least for Indigenous users, computer technology appears largely free of cultural baggage. This is confirmed informally by reports of adult computer use in the Indigenous community. For example, the *Koori Mail* reports the 'wonderful enthusiasm' of mature-age students (1999, p.23). In another article entitled 'Working with Computers. Dream job in sight', the *Koori Mail* describes two people working with computers: one of them is 'very keen on computers, if I could have my dream job it would be computer consultant' (1994, p.4).

Most importantly, computers are free of prejudice. O'Donoghue quotes a young teacher as saying 'Racial differences go out the window' with computers (1992, p.48). In the experience of Johnston, Indigenous people relate well to computers because they are non-judgemental and don't see the colour of the person who is using them (Johnston, quoted in Robertson, Dyson, Norman & Buckley, 2002b). As well as the agreement between Indigenous learning styles and computers, this aspect of the technology, its blindness to colour and culture, is one of the most promising features of introducing computers and computer literacy to Indigenous university students.

Design for a Course

Indigenous learning styles theory is therefore one which sits well with computer education. It allows teachers, particularly non-Indigenous teachers, a way of creating a learning environment which affirms Indigenous interests, values and identity. It helps us avoid the 'Western context-taken-for-granted' that imbues mainstream education (Macken, quoted in Harris, 1990, p.15).

A word of caution, though, should be sounded: Harris developed his theory from the perspective of many years living and working in remote, traditional communities. Much of the application of the theory to computers has been done in outback areas. Research into computer use of Indigenous people living in urban environments is largely absent. Yet the majority of Indigenous people in New South Wales reside in the cities. Despite this, it cannot be assumed that Indigenous culture is not important to these people or that distinct ways of learning and thinking are dead, notwithstanding greater exposure to mainstream culture. The extinction of Aboriginality amongst urban Aboriginal people is an assumption that non-Indigenous Australians often falsely make (Peacock, 1993).

A course for Indigenous students must take into account cultural identity but must also avoid assuming that Indigenous culture is monolithic. Above all, like all good educational practice, it must treat students as individuals with particular learning styles, needs and goals. One great advantage of computers in this respect is the ease with which programs can be customized and their adaptability to the pace of the learner

(Pellone, 1991). The course design is therefore based on two principles: firstly, Indigenous learning styles theory as a guide to avoiding assimilationist assumptions and solutions, and secondly, the need to allow students to learn as individuals.

Course Objectives

One objective of the course is to provide students with the computer skills, understanding and confidence to use the hardware and software that they will need in their degree program within the Faculty of IT. Students will also have their own priorities regarding how they want to use computers, and some may have computer skills from prior learning. Negotiation is a key to ensuring that the course will meet the objectives of the students. Learning contracts, where students set forth what they want to learn, how they will demonstrate that they have learnt, and a time frame for learning, will be a useful way of determining expected learning outcomes, content and assessment. These have been used successfully in the Faculty of Education at UTS for many years.

Learning Environment

Indigenous students at UTS have expressed a wish for a culturally appropriate computer study environment. One student commented that:

Computer labs are all over the place but they don't really provide a supportive environment for Aboriginal students. I would like to study and use computers for Aboriginal people. It makes me feel more supported and connected (Barraket et al., 2000, p.107).

Jumbunna Indigenous House of Learning provides a supportive place for students with an i-MAC lab of 6 computers at present. However, students saw a problem with using the lab because of the equipment provided (Barraket et al., 2000).

It is believed that in order to make the course as useful as possible to the students, that is, to teach them how to use the hardware and software they will need in their subsequent degree programs, the course should take place in Faculty computer labs. Paintings, posters and the Aboriginal colours could be used effectively in one lab to turn it into a welcoming Indigenous environment.

Teachers

Teachers should act as facilitators of learning and mostly sit beside students rather than stand over them. Preferably the course should be taught by Indigenous teachers. The importance of Indigenous staff was stressed during the research into increasing Indigenous participation in IT (Robertson et al., 2002a). Following on from this, the Faculty of IT recently engaged its first two Aboriginal staff members, one academic and one project manager. Non-Indigenous teachers will obviously be needed in addition, given the shortage of qualified Indigenous computer teachers. Where possible team-teaching with Indigenous educators should be undertaken in order to learn from them.

Course Content

The basic skills assumed for a first year or graduate diploma student are currently:

- Basic computer operations using the Windows operating system including navigation, saving, file management and printing
- Keyboard and mouse skills
- Word processing
- Spreadsheets
- Email
- Internet skills
- Drawing simple diagrams
- Ability to use and understand basic computer terminology.

Other good skills, which could be included if there is time, are the ability to use the Unix operating system and a knowledge of a basic database package. Generic skills such as problem solving, the ability to work in teams, communication skills, numeracy, general study skills and academic purposefulness are

all essential to success in the degree programs, and incorporating activities to enhance these skills into the computer literacy course would be to students' subsequent advantage.

Learning Activities

Learning and teaching methods and activities need to take into account Indigenous learning styles:

Projects

Seeman and Talbot (1995) make a strong case for a project-based Indigenous curriculum, requiring students to choose projects meaningful to them. They see this as a way of escaping from the modularization of mainstream industrialized education and taking a holistic approach which incorporates the interaction of the technology with social and environmental factors. Projects have the advantage that they can be authentic tasks with an application in the real world, and involve the problem-based learning which has proved so successful in the medicine program at the University of Newcastle (Robertson et al., 2002b). An example might be a Bush Tucker Project which involved a group of students researching via the Internet and then producing a database of bush tucker products, a spreadsheet price-list, a word-processed brochure and report on the project including diagrams of the business process cycle, emails to customers and suppliers, and a slide presentation to the class. Groups in the class would work on different projects according to their interests but also to avoid inappropriate comparisons.

Collaborative learning

Collaborative activities remove the shame of being wrong. The Faculty of IT already uses collaborative software tools such as UTSONline, LiveNet, Cisco Networking Academy Caucus and group emailing lists. Chat rooms and message boards, such as those on the NSW Reconciliation website, designed by Indigenous web designer Michael McLeod, will be used as well. There will also be plenty of discussions and group hands-on activities, such as the examination of the insides of a computer.

Oral learning

Indigenous culture is traditionally oral. Class discussions and reading out aloud of printed matter by strong readers are good classroom strategies (Van Sommeren, quoted in Robertson et al, 2002b).

Informal learning

Harris suggests lots of informal learning such as learning by doing, looking, repetition, participation, trial and error, successive approximations to the end product.

Materials

Learning materials, including software and handouts, need to be culturally appropriate:

Graphics

Art is a strong tradition in Indigenous society. Handouts should have more imagery and less text (McLeod, quoted in Robertson et al., 2002b). Graphical displays of knowledge can include concept maps and diagrams.

Indigenous cultural content

Handouts, exercises and activities should include content of interest to Indigenous people, e.g., Indigenous sport or land rights, browsing Indigenous websites such as www.nasca.com.au or www.bidjigal.com, or Indigenous, African or African-American websites overseas.

Assessment

Assessment is a major driving force in tertiary students' learning strategies and is therefore an important part of course design. For Indigenous students it needs to take an advocacy approach, 'demonstrating what students can do rather than what they cannot' (Harris, 1990, p.148). Christensen and Lilley found that traditional methods discriminated against Indigenous students. For one academic interviewed:

... the close relationship between assessment and learning meant that, in disadvantaging Indigenous students, mainstream methods harmed the entire teaching and learning process (Christensen & Lilley, 1997, chapter5).

Oral presentations in front of a class of non-Indigenous students were intimidating. Essays, multiple-choice tests and competitive grading were in conflict with Indigenous learning styles.

Assessment strategies more appropriate to Indigenous learners would include:

- A move away from formal assessment to informal observation of demonstrated computer techniques and skills.
- Folders for each student containing samples of the student's work, ordered consecutively so that progress can be monitored.
- Oral assessment, for example discussions of computer theory and small group presentations of group projects.
- Peer assessment.
- A mixture of assessment based on individual and group work.
- Learning diaries with reflections of learning.
- Pre-assessment to help students focus on areas of learning need.
- Choice of assessment tasks and a variety of tasks.
- Where tests are administered, students need to be taught how to do tests and given trial runs before test results are counted. According to Harris, students are not 'test-wise' (1990, p.148).
- Criterion-based assessment, where the criteria are carefully set forth at the beginning. UTS currently uses criterion-based assessment although sometimes in the Faculty of IT marking criteria for assignments are not explicitly stated when assignments are set.
- Pass or fail assessment, rather than the highly competitive grading system now in place in the Faculty of IT. Students should be able to resubmit work, if necessary several times, should it not be of sufficient standard.

Evaluation

There is practically no discussion of appropriate evaluation methods in the literature on Indigenous education, and yet evaluation should be high on the agenda, considering that this is a new initiative and given the failure of the education system to deliver outcomes to Indigenous people in the past.

A thorough evaluation procedure such as that advocated by Kindler and Tout (1992) could be instituted, but with special emphasis on Indigenous involvement and control:

- Evaluation methods to be negotiated with students.
- Evaluation should be related to goals and needs as expressed by students.
- Methods of evaluation need to be appropriate to the learning styles of the students, e.g., interviews, small group or class discussions, etc.
- Involvement of Indigenous staff in determining the process for implementation of changes resulting from the evaluation.
- All aspects of the course to be the subject of evaluation.

Conclusion

The main aspects of the course design are summarized in Table 1. There are obviously many other approaches to course design which could have been adopted. However, Indigenous learning styles theory has the advantage of being Indigenous-centred. We as teachers never approach a class without expectations and preconceptions. Harris' theory forces us to rethink our assumptions and replace them with an Indigenous context. From this context we will then be able to encounter our students and learn to value and teach them as individuals.

A course in computer literacy is only the beginning. The design of the information systems, networking, programming, web design and other subjects of the Pre-IT program is still to come. It is believed that principles incorporated into the design of this computer literacy module will also be applicable to those other modules. The real challenge, though, will be changing the way our mainstream undergraduate and postgraduate courses are taught, to make them – almost untouched by questions of Indigenous culture now – responsive to the needs and interests of the Indigenous students we hope will be attracted to our Faculty and to careers in Information Technology in the years to come.

Central Shared Core of Learning Styles		Individual Learning Styles	
Shared objectives of class and small groups	Objectives	Individual objectives	
Objectives set jointly by students and teachers using negotiation and learning contracts			
Culturally supportive	Environment	Support individual needs and interests	
Welcoming and supportive e.g., through use of paintings, posters and colours			
Whole-class teaching	Teachers	One-on-one teaching	
Indigenous and non-Indigenous Team teaching Teacher as facilitator			
Collaborative class and small group activities	Activities	Individual activities	
Activities based on Indigenous and individual learning styles and interests e.g., major group project, use of collaborative software, discussions, informal hands-on learning			
Reflect contemporary Indigenous culture	Materials	Reflect individual interests	
Culturally appropriate software and handouts e.g., use of graphics, Indigenous culture, interactive software			
Small group assessment	Assessment	Individual assessment	
Assessment tasks negotiated and formalized in learning contracts e.g., small group project delivery and presentation, individual portfolios, learning diaries, informal observation of skills			
Small group evaluation	Evaluation	Individual evaluation	
Evaluation negotiated e.g., interviews, small group discussions			

Table 1 Design for a Culturally Affirming Indigenous Computer Literacy Course

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