

Lost in a sea of literacy: Numeracy and indigenous adult learners

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This paper was presented as part of a panel discussing indigenous learners.

After researching indigenous adult numeracy five years ago and again for this panel, there seems to have been little change: the field, at least in Australia, has received limited interest. In fact, most references are usually in reports about adult literacy. As a researcher in cultural studies in science education, I look at similarities with mathematics education, although most of the research deals with school-aged indigenous learners rather than adults. These main ideas include:

- *the culture of mathematics, and teaching mathematics as border crossing between cultures, including metaphors such as “teacher as culture broker” and collateral learning and the ease or difficulty of border crossing*
- *hegemony of western mathematics over ethnomathematics*
- *culturally appropriate/responsive/relevant pedagogies and Aboriginal ways of learning.*

Introduction

Let me first introduce myself, to give you some idea of my background. I am a 5th generation Australian of Scottish and Irish descent; I trained as a secondary science and maths teacher and this would be my 37th year of teaching; I have taught in all sectors of formal education and I've taught Aboriginal students in each sector; I have lived and worked in Darwin now for almost 30 years. I have worked as a science curriculum officer and as a consultant; I am currently doing a PhD on indigenous science education and teachers as culture brokers.

In 1999 I undertook a survey for the Batchelor Institute on the topic of indigenous adult numeracy in Australia, with a slight gaze beyond. I remember doing a number of searches of the World Wide Web to see what was available at the time and I stitched together a report. There wasn't much, most of what I did find was either lost in a sea of reports on literacy or, if numeracy, a passing reference to indigenous; work undertaken by a group of dedicated people trying to get something going in their various institutions, and very little research.

So when I was asked to be a member of this panel there were two things which I did first up. One was to revisit the Batchelor report. The second was to visit the WWW, using much more powerful search engines than six years ago. What did I find? There wasn't much, most of what I did find was either lost in a sea of reports on literacy or, if numeracy, a passing reference to indigenous adults; work undertaken by a group of dedicated people trying to get something going in their various institutions. Looking further afield I found that there had been a variety of courses and materials prepared for teachers and students in the tertiary sector (e.g. Hurley et al, 2003; Tankard & O'Kelly, 2004), teaching approaches using IT had been researched and evaluated (Marshall, Northcote & Lenoy, 2001; Northcote, Marshall & Lenoy, 2002) and that some of this work has been reported in the literature or at conferences like this (Nawrocki, 2004; Yasukawa, 2004), as well as some reports for various funding agencies (e.g. Johnston, 2002; Kral & Falk, 2004). There is a comprehensive reference list in Johnston (2002).

There still appears to be a poor cousin relationship between numeracy and literacy; I remind you of my title, “Lost in a sea of literacy”. It appears from Johnston (2002) that in the Certificate in General Education for Adults (CGEA), ideas from the literacy movement and from theories of literacy as practice, have informed the concept of numeracy as it appears in the CGEA” (p.32), and one might suggest, beyond it. She also refers to Ciancone and Tout (2000), that numeracy is about using maths for a particular social purpose within a certain context, and that numeracy and literacy are taught together and teachers who have no formal training in maths find the learning outcomes easier to understand and work with.

Mathematics and culture

I'm going to suggest that for most of us mathematics is so ingrained with our western culture that we may never have thought of it as something which is alien to us. Like many of you, I once believed in the universality of (western) mathematics, and although I taught maths to Aboriginal students for many years I hadn't really thought of their perception of maths as an alien culture (but I hadn't done this in science, either, until recently).

When I started my literature search for this talk I was aware that there had been a number of people who had looked at the culture of mathematics but I was surprised that the field didn't seem as defined as cultural studies in science education (or my search engine was not too good). I suppose what I was looking for were some complementary ideas to match those I was used to in science education, although I must admit I also found them difficult to articulate (must be the ingrained ideas of mathematical universality). Anyhow, I'm going to address them under three headings.

The culture of mathematics and teaching mathematics as border crossing between cultures

Alan Bishop has been one of the leaders in looking at the cultural issues in maths (e.g. Bishop, 2002). His comment that "for many children around the world the mathematics education experience in schools is not culturally consonant with their home experience" (p.126) is also appropriate to most adults. Tamsin Meaney (2002) considered that many indigenous students find their own background and beliefs come into conflict with mathematics' western, middle-class values and beliefs; ditto for indigenous adults.

Some of the ideas about border crossing, teachers as culture brokers and collateral learning which had appeared in the science education literature in the 1990s (e.g. Aikenhead, 1996; Aikenhead & Jegede, 1999; Jegede, 1995) were being considered by Ezeife (2002, 2003a,b).

- Border crossing suggests that because mathematics is a different culture, for some people there are degrees of difficulty moving from their real-world culture to the culture of mathematics, from easy through manageable, hazardous to impossible.
- To facilitate such a transition, a teacher might have to act as a culture broker, a person who, in its simplest form, has an understanding of both the western and the students' culture.
- Collateral learning explains the conflicts between students' cultural knowledge and western knowledge. Some ideas are compatible while other ideas may be discordant and cause some sort of internal conflict.

The hegemony of western mathematics over ethnomathematics

Recently Rowlands and Carson (2002) looked at four possible approaches to the relationship between ethnomathematics and the teaching of formal academic mathematics: replacing academic mathematics; as a supplement in the curriculum; as a springboard to academic mathematics; included in preparing for learning situations. They concluded that the real value of any ethnomathematics was understood and appreciated "only through the lens of formal, academic mathematics sensitive to cultural differences" (p.79). This would appear to be a minor concession to the hegemonic view of western mathematics to ethnomathematics.

In a response to Rowlands and Carson, Adam, Alangui and Barton (2003) suggest there are five different possibilities for an ethnomathematical curriculum: mathematics in a meaningful context; ethnomathematics as a particular content; a stage in the progression of mathematical thinking; mathematics classroom in a cultural context; and their preference, integration of a student's cultural mathematics in formal academic mathematics. They also make the interesting point that Greek rationality is not the only form of rationality (p.330).

The idea of using indigenous science in mainstream science courses has some currency and some of my work in the past ten years has been to undertake that at the school level and in a course I taught at the Batchelor Institute; not only was indigenous science seen as a cultural consideration, it was also seen as starting from what the students knew. It would seem that parallels should be taken in mathematics and of course there have been some already. At the College of New Caledonia in British Columbia they have had an Ethno-Mathematics Project where they applied a socio-cultural perspective to maths, including native content integrated into problems and acknowledging the contribution of indigenous peoples to mathematics (McGregor & MacMillan, 2004). Knijnik (2002) has used ethnomathematics in her work with people from the Brazilian landless movement. Of course such work involves an understanding of a particular indigenous culture and its mathematical ideas otherwise this kind of approach can be very superficial.

Culturally responsive/relevant pedagogies and Aboriginal ways of learning.

If you can't explain how it's relevant then don't teach it. (Jack, quoted in Tankard & O'Kelly, 2004, p.3)

Over the past 25 years a number of terms have been used to describe the ideas of making teaching and learning appropriate to students in multicultural education; two of these – culturally responsive and culturally relevant – are frequently used (e.g. Osborne, 2001). He defined culturally responsive pedagogy as

adjusting and readjusting teaching practices and the content of curriculum in such a way as to assist students to develop appropriate classroom behaviour ... because they build from existing skills and knowledge in ways in which they are at least partially familiar (Osborne, 2001, p.61).

Culturally relevant pedagogy had been defined by Ladson-Billings (1992) as

empower(ing) students to the point where they will be able to examine critically educational content and process ... us(ing) the children's culture to help them create meaning and understand the world (in Osborne, 2001, p.177).

There has been some examination and critique of Aboriginal ways of learning in Australia (and elsewhere), originating with Stephen Harris's work in Northeast Arnhemland (Harris, 1980) and moving on to his ideas of two-way learning (Harris, 1990). More recently Hughes, More and Williams (2004) have highlighted Aboriginal learning strengths, suggesting a four-prong approach: identifying students' learning strengths and teachers' teaching strengths; teach to students' learning strengths for difficult learning tasks; strengthen weaker ways of learning; and developing strategies for selecting appropriate ways of learning.

Conclusion

It seems to me that there are two major concerns which apply particularly but not exclusively to indigenous adults:

- a concern that numeracy is included in literacy and that numeracy outcomes are often not apparent, subsumed in literacy outcomes which have minimal impact on the development of mathematical concepts
- a need to acknowledge that mathematics represents another culture, not only to indigenous people but also to many adults whose school experiences make them feel uncomfortable when returning to learn maths.

In some ways we need to rethink numeracy as a technology, and Aborigines have a good track record of adopting useful technologies. There is a caveat there: useful. Johnston (2002) refers to a number of metaphors for adult numeracy which originated in The Certificate of General Education for Adults in her review: numeracy for practical purposes, for interpreting society, for personal organisation, for knowledge. I think it is possible to think of numeracy as a technology which is applied to solve problems where it is needed, because for many indigenous adults the use of relevant technologies is a normal way of life.

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