

## **Cultural impacts upon the learning processes of Indigenous students in Adult Bridging Courses**

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*The impact of cultural factors on Indigenous Australian students' learning has been the subject of debate by various educators in recent years (for example, Anning, 2003; Dayson, 2003, Harris, 2000; McLoughlin & Oliver 2000 Bourke & Burden, 1996). However, the aim of this paper is to analyse reflectively the experiences of a non-indigenous teacher working in an Indigenous educational environment. The paper focuses on personal observations based on a teacher's day-to-day struggle to learn how to assist Indigenous students to access knowledge and skills that they need in order to succeed in tertiary education. This small-scale exploratory research suggests that although culture has a significant impact on Indigenous children's learning, it does not exert the same effect on Indigenous adults' learning in the area of mathematics.*

### Introduction

My interaction with a number of cultures had been both enriching and at the same time a challenging learning experience, but never perceived as a difficulty, as I had not consciously thought about the notion of culture. However, it was not until becoming engaged in teaching in Australia in the 1990s that I noticed this phenomenon of culture as an important factor with which a teacher should be concerned. Until then, although noticing some impediments to the smooth flow of teaching, I could not verbalise the problem by any specific name or definition. This is not to say that I was completely ignorant of the effect of culture on education—quite the contrary. For example, when I was teaching in Africa, it became evident to me that the examples from my Persian background were not going to serve any practical purpose. However, I was not then able to fully recognise those cultural factors which could impact on the learning/teaching environment.

This recognition particularly came to me when I was given the opportunity to work in Kumbari Ngurpai Lag Higher Education Center (KNL) of the University Of Southern Queensland (USQ) in 2001. In facing the challenges of teaching within an Indigenous educational environment I had to become familiar with, make sense of and come to terms with certain assumptions. As a result some questions started to take shape in my mind such as:

- Are the assumptions made in the literature about Indigenous learning and teaching true representations of the situation?
- How would a teacher be able to create a successful learning/teaching environment for Indigenous students in the light of these assumptions or the lack thereof?
- Is it about 'what' I teach (mathematics) or 'how' I teach it that would result in a good or not so good learning outcome for the students?

This research aims to explore these and related questions within the context of mathematical education for Indigenous students in a tertiary bridging course. The paper contributes to the literature by highlighting areas that require further research in order to make informed decisions in this area.

### Culture influences learning

Culture can be viewed from a contemporary or traditional perspective. From the contemporary point of view, culture implies continual changes in response to new ideas. The traditional

perspective of culture suggests that culture constitutes the manner of doing things specific to a group of human beings and is transmitted from generation to generation (Australian Catholic University (ACU) in KNL 2001). Either of the two views implies culture as a significant context within which individuals' knowledge and experiences are shaped.

Hofstede (1984, p. 51) seems to combine both traditional and contemporary views of culture by stating that 'Culture is the collective programming of the mind which distinguishes the members of one category of people from another'. The definition also seems to be linking the act of learning (programming of the mind) to the notion of culture. However, learning is not a passive and isolated act, but rather an active operation of constructing new meanings on the basis of individuals' past experiences and knowledge (Mousley, 1993; Tennyson, 1990), which in turn are (at least partly) influenced by their culture.

Hence, teachers' awareness of the cultural aspects of learning is crucial to educational discourses—in particular in early childhood and primary schooling stages (Craven et al 2005). This is so as effective teaching can take place when teachers facilitate an inclusive and culturally conducive learning environment for their students. Such an environment, according to Osborn (in Anning 2000, p. 48), allows the students to build their knowledge and skills 'in ways with which they are at least partly familiar'. Lack of an appropriate response by teachers to the students' cultural needs may result in a lack of rapport, which in turn can cause the students' failure both academically and eventually socially (Anning 2003).

Within the educational literature the impact of culture on children's learning has been debated frequently, and contrasting views could be found in relation to such subject specific domains

as mathematics. For example, claiming that 'number is a natural domain of human knowledge', Klein and Starkey (in Guberman 1999, p. 1) uphold the notion of similarity of understanding of mathematical concepts by all children regardless of their race and promote the idea of 'universals in children's mathematical thinking'.

In contrast, Guberman (1999) confirms the impact of culture on children's learning by verifying two distinct associated characteristics of children's learning processes. While resonating the notion of 'universals in children's mathematical thinking', he also emphasises the influence of the children's various cultural contexts in shaping their similar understanding of mathematical concepts. That is, the children's extent of mathematical knowledge differs across social classes and cultural groups. This could be confirmed through research (Geary et al in Guberman, 1999) which shows that before schooling, Asian children perform better in understanding many mathematical concepts than the children in the United States of America. Hence acknowledging children's prior 'informal' knowledge in helping them to make new knowledge is essential.

As such, teachers' ability to apply culturally relevant and meaningful methods to facilitate Indigenous children's smooth transition from their familiar informal learning environment to mainstream formal schooling is essential (Harris, 2000; Staton 1994). As such mandatory study of 'Indigenous Studies' by pre-service primary teachers is important as 'Many Australian teachers are often ill equipped to either understand or address Indigenous children's educational disadvantage as a complex and critical social justice issue of our time' (Craven 2005, p.1).

There are also references by some educators to the impact of cultural experiences on adult learners in the literature (for example, Ada, Curtis & Rasool, and Mayo, Sleeter & Giroux in Sleeter, Delgado and Bernal, 2002). These educators maintain that pedagogy should focus on the students' lived experiences which connect them to their cultural circumstances. In this way,

pedagogy 'functions as a cultural practice to produce rather than merely transmit knowledge' (Giroux in Sleeter, Delgado & Bernal, 2002).

In Australia, although the impact of culture on adult education has been discussed, yet the literature concerning the impact of culture on learning mathematics by Indigenous adults is sparse and needs further investigation (Marshal, McLoughlin & Hayward 2000). Nonetheless, comments made by FitzSimon (in Marshal et al., 2000) seem to suit Indigenous adults' position. The author states that adults' mathematical backgrounds vary from basic numeracy, through to tertiary courses, depending on their life experiences and desire to learn. However, not all such adults have had the same opportunity to advance in mathematics beyond primary schooling. In addition, many mature age Indigenous students who return to study have not even successfully completed their high school education. Neither may they have any understanding of university culture (Griffin & McLoughlin in Marshal, McLoughlin & Hayward, 2000).

From a broad perspective, culture permeates learning; hence in designing instructional environments serious consideration must be given to the social and cultural dimensions of the design and structuring of instructional materials and communication channels in order to cater for culturally diverse learners (Damarine & De Voogd in McLoughlin & Oliver, 2000, p. 2). Consequently an inclusive curriculum (Kanpol, 1997) which provides fair access and opportunities to a diverse body of learners empowers students. Such a curriculum ensures that the teaching strategies, resources, assessments, languages and practices are nondiscriminatory and could foster equity (University of Southern Queensland Equity Committee, 1995).

In fact designing of inclusive and culturally relevant curricula becomes more necessary when it is realised that Indigenous students themselves do not come from a homogeneous group. They come from complex and diverse groups, from 'tradition-oriented people living in geographically isolated communities speaking predominantly their own languages, to people living and functioning ably in Western culture speaking English' (Robinson & Nichol, 1998, p. 1). Each student's life experiences are influenced by the socio-economic status of the group to which they belong and includes the individuality, strengths, ambitions and goals of the members of each category (Budby 1993).

In brief, the literature examined indicates that culture impacts on education; however, no strong link appears to be established between culture and adult learning in the area of mathematics. Therefore, this paper endeavours to explore this link further.

#### Indigenous students adhere to specific learning styles

In recent years the notion of 'Indigenous pedagogy' has been debated by some educators (for example, Anning, 2003, Osborn in Anning, 2000, Harris in Lee, 1993). Pedagogy is defined as the art and science of teaching (Knowles, 1984), the process of producing knowledge (Giroux; in Sleeter, Delgado & Bernal, 2002) or a tool that can lead to liberation or oppression (Friere, 1973). Accordingly Indigenous pedagogy due to its cultural implication for learning is an important area and deserves further thoughtful investigation.

A by-product of pedagogy relates to the recognition of students' learning styles (Fleming, 2001). It is suggested that Indigenous students are primarily holistic (observing and discussing), imaginal (experienced based and sequenced), kinaesthetic (observing and doing) and cooperative (group work) learners (Robinson & Nichol, 1998). While these assumptions make sense in many instances, it also seems fair to say that Indigenous students are not limited to these learning preferences and like other students, learn through a variety of styles. Therefore, this paper investigates the issue further.

An insight to this issue by Harris and Malin (1993, p.125) confirms that the recognition of what is called 'Aboriginal learning styles and Aboriginal rules of interpersonal communication' should not be at the price of the acceptance of these notions by teachers as a 'legitimate' reason for the Indigenous students' lower achievement. In other words, 'stereotyping' and lowered expectations' of the Indigenous students by token of these assumptions should be resisted.

Given the apparent shortage of the literature about this topic further research is necessary to more clearly establish whether or not other learning styles are applied by Indigenous students.

Flexibility is a requirement of Indigenous educational environments

Flexibility in higher education, refers to the learner's choice of subjects, entry and exit times, mode of attendance, mode of learning, availability of resources, interaction among the learners, support providers and methods of assessment (Temple, 1991).

In Australia flexibility has been discussed for more than a decade as an important feature of contemporary educational systems in Australia. Flexible learning is basically learner-centred and needs-based practice, necessitating 'accessibility, democratic process, social justice' which ensure students' success mainly in relation to their needs and aspirations (Aulich Report in National Board of Employment, Education and Training, 1994).

From an Indigenous perspective, flexibility is said to be a characteristic of Indigenous cultures (Applebaum in Kicket, 1992), hence a factor to be considered in teaching Indigenous students. From the students' point of view, the connotation associated with flexibility seems to be due to its association with the notion of time particularly in meeting the deadlines in education. This is because traditional societies are task-oriented (time is somewhat irrelative to the completion of the task) whereas non-traditional societies are time-oriented—a rigid system of performing tasks within a limited time. The two systems have different views of 'work'. Traditional societies consider work 'as a means to an end', whereas the other perceives work 'as an end in itself' (Applebaum in Kicket, 1992, p. 2M). Yet, as mentioned previously, the diversity of Indigenous peoples must be considered in that the notion of flexibility could be understood quite differently by traditional Indigenous individuals in the remote areas from, say, urban individuals (Robinson & Nichol, 1998).

Despite the acknowledgement of the role that flexibility plays in the Indigenous culture, more research would be beneficial to adequately connect this notion to Indigenous learning environment. Therefore, this research explores the position of flexibility in relation to Indigenous adult learners.

## Methods

This small-scale, exploratory study uses a variety of techniques to address the questions posed in the first section of the paper. Firstly the research has used autoethnography, a personal narrative, entailing the author's interaction with the research participants, Indigenous students in the tertiary bridging courses in KNL at USQ. Through this technique the author draws on her professional experiences to extend understanding of the impact of a particular culture [Indigenous] on education (Ellis, Reed-Danahay in Holt, 2003). Secondly, a survey using VARK; an instrument that investigates learning styles; visual, aural, read/write and kinesthetic, (Fleming, 2001) has been conducted for 73 Indigenous students in the IHEPP (Indigenous Higher Education Pathway Program- a bridging course in KNL) program over four semesters, from 2003 to 2005, to explore their learning styles. Thirdly, two Indigenous academics and eight Indigenous students in undergraduate courses at the USQ have been interviewed in order to

investigate the validity of the notion of flexibility for Indigenous students in the context of tertiary education.

### Findings of the research

This section addresses the findings of the research in relation to four issues raised in the literature and discussed above: namely, the impact of culture on learning mathematics by adults, the issues related to developing appropriate instructional design in the area of mathematics for Indigenous adults, Indigenous learning styles and the position of flexibility on Indigenous education.

#### Issue 1: The extent of cultural impacts on learning mathematics in tertiary preparatory courses

In the course of my teaching in bridging courses in KNL Indigenous students' mathematical knowledge poverty and low achievement in numerous cases have been evident.

Anecdotal evidence from numerous students' verbal expressions as well as from colleagues have indicated to me that it is possible that the educational environment of some schools could perpetuate the failure of the Indigenous students. This happens when the cultural aspects of their learning are ignored while they are at an important stage of their learning experiences in preschool, primary and even in higher stages of schooling. The students have expressed issues such as the feeling of being unnoticed by the teacher or not being able to understand the teacher or just the lack of sense of belonging in primary schooling to have been the contributor factors to their poor knowledge. Often this knowledge poverty in the area of mathematics results in the students' encountering more problems and eventually losing interest in learning this subject. Further, continual lack of success appears to cause loss of interest in the KNL preparatory program altogether leading to students dropping out of the program.

Because of these observations, my effort to discover the most effective methods to assist these students to overcome the barriers that have stopped their progress has been ongoing. Mainly I have needed to find out the real meaning and implications latent in the 'impact of culture on learning', and have come up with some answers which I will explain next.

As the literature revealed, a good knowledge of culture is vital when teaching children (for example, see Craven, 2005, Harris, 2000, Staton 1994, Osborn in Anning 2000 concerning the impact of culture on Indigenous children), but is this requirement fully applicable to higher levels of education (for example preparatory courses)? I have found out that in teaching pre-tertiary mathematics courses there is not an absolute need for a teacher to be fully submerged in the culture of the Indigenous students to teach mathematical concepts. One reason is that in principle, mathematical concepts are universal, that is to say, the **content** of what I teach—mathematics—does not vary each time I teach it in a culture other than my own.

In addition, the students who intend to enrol in the KNL bridging courses must take a competency test that indicates their basic knowledge in mathematics. Therefore, it seems safe for me to assume that the students who have entered these courses (tertiary bridging courses) are familiar with the fundamental mathematical concepts or they could not have enrolled in this program. As such, despite the possibility of flawed initial primary learning in the context of an unfamiliar culture (Robinson & Nichol 1998) it has been possible for me to build on the students' prior knowledge without feeling the need for full application of cultural examples or evidences.

For example, I have hardly needed to apply cultural examples in teaching topics such as fractions, decimals, percentages or even algebra or graphing to Indigenous students in the

bridging courses. I have used the same methods to teach such topics to high school mainstream students. As such, although not well versed in the Indigenous culture, I have been able to teach mathematical concepts without a great deal of difficulty. In addition, in tertiary level, teaching certain abstract mathematical concepts such as algebra or calculus would not be much easier if it were done in a cultural context, hence one does not need to be immersed in the cultural background of the students. This was confirmed by a personal e-mail from O'Reilly (2003).

However, what would help me to better teach these mathematical concepts in a different culture to adults? My response would be teacher's awareness of the **social and cultural** aspects. In other words, a sympathetic learning environment which exercises respect and understanding for cultural issues would facilitate students' achievement considerably.

Accordingly, what motivates the indigenous students to learn is both the teacher's sound mathematical knowledge, but more importantly the teacher's awareness of appropriate ways of dealing with students. As Craven (in Robinson & Nichol, 1998, p. 11) has stated: 'Aboriginal cultures are more person-oriented than information-oriented'. Hence, the way a teacher relates to the students is important in motivating them to become more cooperative, willing to take chances to learn and to attempt new tasks. My experiences in teaching adult Indigenous students in preparatory education is that they are mostly courteous, agreeable and responsive to a genuine approach of a teacher, although due to past historical events some resistance towards a non-Indigenous (and for me, non-Australian) teacher can be noticed.

In contrast, lack of a supportive climate can result in alienation and isolation of minority students in an educational set-up, which could contribute to lack of retention and success. This is confirmed in research which showed that: 'One of the most potent factors in the decision of Indigenous 'on-campus' students to 'withdraw' from university life was isolation. It does highlight the need for Indigenous students to receive positive feed back and support early in their course, so as to allay the possible development of a feeling of isolation which may not be warranted by the circumstances' (Bourke, Burden & Moor 1996, p .xiv).

## Issue 2. Development of an appropriate instructional design

In line with the need for consideration of sociocultural and equity issues in Indigenous education and at the institutional level, the modification of curricula by KNL at USQ to suit the cultural condition of the students is mentioned here as an example.

A major function of KNL is to provide a tertiary preparatory (bridging) program, designated as 'Indigenous Higher Education Pathway Program (IHEPP)' which allows Indigenous students to upgrade their knowledge and skills in order to provide them with entry to undergraduate courses. In order to increase access, retention and success of the students, KNL modified its program in 2002 by adopting a more culturally relevant approach to its curriculum development. This entailed improving and enhancing the content of six courses, mode of study (i.e., multimodality) and enhancement of its student support approach.

At the personal level, in the area of mathematics and in line with the socio-cultural aspects of Indigenous learning and teaching, the inclusion of an introductory module, containing historical and cultural examples and events involving Indigenous people has been a positive step in my effort to modify the curriculum. In this module, the idea of 'ethnomathematics' (Ascher, 1998; NOVA, 2003) or the mathematical practices of various traditional societies is briefly explained, whereby complex mathematical ideas began with the Indigenous people of the world; first by native Australians, later by other traditional people and finally by Western culture (Ascher,

1998). In addition, students are introduced to the mathematical application of 'kin system' (one of the pillars of Indigenous culture) to various levels of mathematics. These range from the basic idea of 'location' (Staton 1994) and measurement in primary school to such mathematical concepts such as grouping, graphing, set theory, algebra and polygons in higher levels of education. These brief accounts boost the students' sense of belonging and pride.

In addition to the above, the contents of the study materials are designed to suit the learning needs of the students (for example, segmentation of the materials, examples, layouts, headings and fonts, illustrations). An increase in the KNL students' pass rate following the adoption of changes in KNL's curricula was noticeable during 2003.

It seems reasonable to suggest that in fact, an examination of the historical development of mathematics by various peoples of the world would be useful for not only Indigenous students but all students regardless of their ethnicity or culture. In such a journey all students realise that 'There is a strong cultural context both within mathematics and between mathematics and other human cultures' (O'Reilly, 2001, p. 7).

Issue 3. Do Indigenous students adhere to specific learning styles?

My thoughts on the concept of Indigenous pedagogy are that it should be considered from a broader instead of a narrow perspective which is likely to box in the Indigenous students and limit the possibilities of their learning. For example, in order to explore the students' learning styles I conducted a small-scale exploratory survey, using the VARK Questionnaire (Fleming, 2001) during four semesters in KNL. The results showed a higher tendency by the students towards the 'Kinesthetic' learning style, the second preference and very close to the first preference-'Kinesthetic'- was the 'reading and writing' style. Next in rank were 'aural' and 'visual' styles respectively. The result of the survey confirmed that there was not a significant difference amongst the students' learning styles and that there was no evidence of the existence of a dominant 'Indigenous' style amongst the students as has been indicated in the literature.

Although at this stage the test's merit is important only for my teaching and possibly for other colleagues, it is nevertheless an indication that Indigenous students do not necessarily conform to certain types of learning. Therefore a variety of instructional materials (print, audio-visual, computer based, projects, group activities) have been used in mathematics classes in my effort to cater for different learning needs with the hope to adhere to the principles of good teaching. One approach to catering for a variety of learning styles is a 'Hybrid' mode of delivery (Pederson, 2005), a computerised method of teaching, which combines all four learning styles (visual, aural, read/write and kinesthetic) in order to provided the students the opportunity to learn through their own particular learning preference. This method is being used presently at USQ by some faculties and could be an effective way to enhance the students' learning in the mathematics area. Obviously, in adopting such a method the students' socio-economic circumstance (i.e. access to computer) should be taken into consideration.

In conclusion, further in-depth study which compares Indigenous and non-Indigenous students' learning styles is necessary. In addition, it should be noted that the current survey is conducted for adults participating the bridging courses in KNL and as such, is only representative of this group

#### Issue 4. Flexibility is a requirement of Indigenous educational environments

Indigenous students showed a lack of interest in exercising excessive flexibility in relation to tertiary education.

In general, the view of the Indigenous academics in KNL was that excessive flexibility would have an adverse effect on some students in that they might not be able to cope with the demands of studying in the mainstream higher education institutions. For example, the response of Stephen Hagan (personal communication, March 2005), one of KNL's Indigenous academics, in relation to the place of flexibility in Indigenous education was that a balance between 'flexibility' and 'firmness' is necessary so that students would be prepared and able to work not only within their culture but also in the mainstream culture:

I support flexible teaching styles when it comes to Indigenous education. Indigenous people, because of their divergent cultural nurturing, do exhibit different ways of acquiring knowledge. If flexibility allows for a greater absorption of knowledge, through whatever learning methodology implemented, then I am in support of it. However, I preface my comment by saying that the outcome, end result, must be at the equivalent level of intellectual comprehension to compete at national education benchmark level[s] (i.e. grades 3, 5, 7 & 9) as well as an acceptable OP [Overall Position, the tertiary entrance score currently used in Queensland] score and/or alternate satisfactory entry into undergraduate programmes at higher education.

The Assistant Director of KNL (personal communication, 2003) believes that, in relation to Indigenous students, the type of flexibility adopted by KNL seems to work well. For example, although KNL's courses are external, students attend three compulsory residential schools. Therefore, although the courses are to be studied independently, residential schools and personal tutors facilitate learning more effectively. In addition, flexibility in relation to deadlines for assignments, participation in classes and other relevant activities should not be practiced excessively and should be determined according to each situation.

Some issues raised by Indigenous students (personal communication, 2003) in relation to the notion of flexibility revolved around difficulties with:

- assignments' submission deadlines (many assignments are due at the same time);
- early morning and late evening classes while needing to travel to and from a distance, and at the same time having to deal with the needs of their children;
- change of timetables, even up to a month into the course;
- lack of flexibility in age related (i.e. 50-60 age bracket) issues (i.e. getting tired in the afternoon, having difficulty retaining information and meeting deadlines).

In addition, the adoption of flexibility by Indigenous students in study related activities does not appear to be much different from those of their non-Indigenous counterparts. For example, in a recent seminar at USQ an "on-campus student" was defined traditionally as a student who attends most lectures, tutorials or scheduled classes on campus and has to meet attendance requirements. At present, however, an on-campus student is enrolled in on-campus courses, but may not physically attend all the on-campus activities (Feldman & Hoey, 2005).

However, from the point of view of my teaching, flexibility does become important when the Indigenous students' work or participation is delayed due to family obligations 'involving longstanding kinship responsibilities (Bourke & Edwards, 1994, p.85)' and/ or cultural events

such as tombstone opening. Such events have great significance for Indigenous people and thus take precedence over other activities such as the completion and submission of assignments. Consequently, while setting a high standard for and expectation of students' performance, I do consider flexibility in the areas such as granting extensions for assignment submission or acceptance of late assignments and other similar situations as a means of support when necessary. This is because not only the cultural and family obligations but also socioeconomic factors such as poverty, sickness, physical and geographical barriers, or just lack of motivation or confidence can affect students' performance.

## Conclusion

The aim of this paper was to link and articulate my teaching experiences with current theories about learning in the context of culture. The literature reveals that culture is indeed an important element of gaining new knowledge and experiences and as such must be given deserving consideration by educators. However, the findings of this paper also suggest that in relation to the Indigenous students in higher levels of education (i.e. tertiary bridging courses) the influence of culture on learning certain subject specific domains such as mathematics is less evident. In addition, through this research alternative views concerning assumptions associated with Indigenous students (i.e. generalisation of Indigenous students' learning styles and the place of flexibility in Indigenous education) were investigated. The findings of this small-scale exploratory research indicate that the participants in the bridging course in KNL do not necessarily adhere to specific learning preferences; neither do they indicate the notion of flexibility associated with Indigenous education reflected in the literature. What appears to be confirmed by this research is the importance of culturally relevant curriculum, especially in terms of children, and the importance of the human dimension of teaching Indigenous students. Consequently, in teaching Indigenous students, as with non-Indigenous students, good teaching practices that are supportive and at the same time offer a challenging learning and teaching environment and inclusive and culturally appropriate instructional design must be upheld.

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