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# TOWARDS PEDAGOGIES of MATHEMATICS ACHIEVEMENT: *An* ANALYSIS of LEARNING ADVISERS' APPROACHES *to the* TUTORING of MATHEMATICS *in an* INDIGENOUS TERTIARY ENTRY PROGRAM

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## ■ Abstract

This research examined different ways in which tutors of mathematics approach their tutoring among Indigenous students enrolled in the Tertiary Entry Program (TEP) at Central Queensland University's Indigenous Learning, Spirituality and Research Centre. The study sought to establish whether or not there were any differences between Indigenous and non-Indigenous tutors' approaches to tutoring and, document challenges and opportunities in tutoring mathematics to Indigenous students. Using qualitative data obtained from interviews, the study raised more questions than answers. The results reflect tutors' own teaching orientations. This is particularly clear when all of the tutors who participated in this study were NOT mathematics trained teachers but had either taken interest in the subject as a result of doing a mathematics-related subject such as engineering and science. Overall, there was consensus that establishing rapport between the students and Learning Advisers was crucial. Knowing who the students are and, vice versa, was also considered fundamental. For some, it was an acknowledgment that both the tutor and the student were on a discovery journey. The majority of the tutors prefer a process where a mathematical concept was explained first, followed by an application of real life situations.

## ■ Introduction

The past decade has seen an increased recognition of the complex nature of teaching Aboriginal and Torres Strait Islander (ATSI) students in higher education. Of particular importance to the broader debate on the complexities of teaching and learning of ATSI students in higher education are factors related to the social, economic, historical, cultural, environmental, psychological, lingual and attitudinal problems to learning (McLean, n.d.). These broader issues have also contributed to the subject-specific learning outcomes for ATSI students. In response to these fundamental issues, the Australian government has been providing specific support to enhance ATSI student's performance in various areas of academic scholarship, be it in TAFEs or institutions of higher learning. One of the most popular forms of support for Indigenous students is the Indigenous Tutorial Assistance Scheme (ITAS) whose main aim is to improve the educational outcomes of Indigenous (tertiary) students.

"Nulloo Yumbah", Central Queensland University's Indigenous Learning, Spirituality and Research Centre, is one of the many centres across Australian universities currently implementing ITAS across a range of subjects to students in selected Correctional Centres and those attending the program as distance students. A discussion held in 2006, with colleagues in Nulloo Yumbah and The Koori Centre demonstrated that no comprehensive study had been undertaken to examine approaches used in tutoring mathematics to Indigenous students undertaking the Tertiary Entry Program (TEP).

## ■ Literature review

Since the 1990s, the teaching and learning of mathematics and its relevance to Aboriginal and Torres Strait Islander students has received much attention as researchers unravel the disparities between the Western education system and Indigenous ways of

learning (Cooper et al., 2005; Michie, n.d.; Nichol & Robinson, 1998, 1999, 2000). The issue of culture has featured highly in much of the academic literature. For example, Bishop (2002) specifically argued that “for many children around the world the mathematics education experience in schools is not culturally consonant with their experience” (p. 16). Meaney (2002) takes the issue further as she observed that for Indigenous students, mathematics teaching and learning in schools were, most of the time, in conflict with their own beliefs and backgrounds. For some, mathematics teaching from the Western or Eurocentric standpoint was tantamount to hegemony as the teaching and learning lacked coherence and holism.

Nichol and Robinson (2000) provide a comprehensive list of what they consider to be characteristics of pedagogies which represent the Indigenous worldview of learning mathematics. In their analysis, they categorise Indigenous learners as:

- Holistic learners – meaning that Indigenous students learn in a complete, cooperative, and integrated manner,
- Imaginary learners – where the student’s learning environment is unstructured,
- Kinaesthetic learners – where learners learn through manipulation and movement,
- Cooperative learners – where learning emphasises group interaction rather than individual effort,
- Contextual learners – where the learning takes place in a specific context relevant to the learning,
- Person-oriented learners – where learning is not information-oriented but rather person-oriented.

While research in the tutoring of mathematics continues to unfold, the emphasis has been on schools. Within that context, Warren et al. (2004) draw out four main factors that appear to directly impact ATSI students’ learning of mathematics, namely language, assessment, learning style, and the relevance of the mathematical activity. Over the past decade, the Tertiary Entry Program for Aboriginal and Torres Strait Islander students has gathered pace. The introduction of the Indigenous Tutorial Assistance Scheme (ITAS) has raised hopes considerably for improvements in the learning of various subjects. One of the features of ITAS has been the engagement of Learning Advisers.

Studies looking at approaches to the tutoring of mathematics in TEP in Queensland are non-existent. However, a few studies that have been conducted, and are closely related to TEP, are those that focus on issues of Indigenous and non-Indigenous *teaching relationships* in the teaching and learning of maths in schools, rather than at TEP level (Cooper et al., 2005; Howard, 1998; Malloch, 2000). While these studies have managed to unravel such issues as student-tutor relationships; urban-rural disparity; poor teacher preparation; lack of well trained Indigenous maths

teachers, Cooper et al. (2005, p. 1) observe that “while ... Australia needs more trained Indigenous teachers, an intermediary goal must be more classroom use of Indigenous teacher-aides”. Such views resonate well with Malloch (2000) who in an earlier study, concluded that an in-class tutoring program is perhaps more suitable in the teaching and learning of mathematics than “previously existing “after-school” homework centres” (p. 2). In a similar vein, while these attempts to understand ITAS issues continue, there is very little empirical evidence of any differences in the tutorial processes between Indigenous and non-Indigenous counterparts, or in the tutoring of mathematics, either in schools or TEP. The dearth of the literature in this area of scholarship is also noticed on the international level, where, the focus has been on graduate teaching assistance (Bender, 2004; Meel, n.d.) or raising the achievements of non-Indigenous students entering higher education (Goodwin, 2000; Pruitt, 1997). Therefore the need to examine approaches used by tutors of mathematics in TEP needs to be fully investigated in order to support Indigenous students in their learning of mathematics.

#### ■ The aim and specific objectives of the research project

The study sought to critically examine different ways in which tutors (henceforth referred to as Learning Advisers) of mathematics approach their advisory roles in mathematics among Tertiary Entry Program (TEP) students in Nulloo Yumbah. In addition, the study attempted to establish if there were any differences in those pedagogical approaches in tutoring mathematics between Indigenous and their non-Indigenous counterparts; identify reasons for such differences; and to analyse the implications for the teaching and learning of mathematics among Indigenous students in the TEP. Specifically, the study intended to respond to the following questions:

- How do Learning Advisers in TEP approach their tutoring?
- What teaching strategies are employed?
- In what way(s) do Indigenous and non-Indigenous Learning Advisers differ in their approach to the tutoring of mathematics and why?
- What challenges are encountered and why?
- How can mathematics in TEP be taught more effectively to Indigenous students using Learning Advisers?

#### ■ Research methodology

##### *The sample*

The study was qualitative and engaged a case study research approach, with multiple cases, in order to gain

an in-depth understanding of the issues in question. Using “purposive sampling” (Sarantakos, 2005), the study involved six Learning Advisers (two Indigenous and four non-Indigenous) who tutor Indigenous students in mathematics; and 10 Indigenous TEP students of mathematics. Understanding any differences in tutoring approaches between the Indigenous and their non-Indigenous advisers was considered fundamental to gaining some insights between the two cohorts, particularly on whether Nulloo Yumbah needed to seriously consider ways to change the composition of the advisers. The reason for including students in this study was to corroborate their information with that of the Learning Advisers. These two sets of participants were critical in this research as they provide information that may shed more light on the questions under investigation.

#### *Data collection procedures*

Data was collected using semi-structured interviews. The researcher was engaged in face-to-face interviews with both the Learning Advisers and students. The interviews lasted between 30 and 45 minutes. Three fundamental questions dictated the research process. First, the participants were asked to indicate what key factors they considered critical in the tutoring process. This question was intended to elicit their understanding of issues related to the teaching of mathematics as outlined by McLean (n.d.) and Meaney (2002). The second, and perhaps highly critical question to the study, was about the Learning Adviser’s pedagogical approaches in the tutoring process. This was considered important to identify if the Learning Advisers confused teaching and tutoring. This question was further followed by reasons for their choice of approach. The rest of the questions were aimed at gaining insights regarding challenges and potential ways forward.

#### *Data analysis*

Analysis of data was done through pattern matching, explanation technique and critical discourse analysis (Fairclough, 1995; Sarantakos, 2005). The questions provided key themes and, therefore, the emerging issues were matched, explained and analysed according to these crucial themes. While these techniques were not, and could not provide absolute truths, the aim was to gain an in-depth understanding of the issues and themes. Critical discourse analysis unravels the issues of power between students and the Learning Advisers.

#### ■ Results and discussion

The study has provided some compelling evidence that, perhaps not surprisingly, has generated more questions than answers. It became apparent that understanding

the Learning Advisers’ own philosophies of teaching was essential. As the participants provided their insights about what issues they considered critical and important in tutoring, some of the teaching philosophies that emerged necessitated further analysis.

#### *Issues considered critical in the tutoring process*

A critical analysis of the responses from the six participants (Learning Advisers) provides some common understanding of what they considered critical in the process of tutoring. It is consistent with existing literature by Nichol and Robinson (1998), Meaney (2002) and Cooper et al. (2005). For example, the majority of them considered cultural background, students’ language background, and students’ learning styles to be highly important when engaged in the tutoring process. Three of the participants, in particular, expressed sentiments consistent with the following:

The key issue for me is transferring knowledge, transferring understanding of whatever I am trying to teach whether it’s mathematics or whatever other stuff that I am trying to teach. It’s providing the information in a way that is understood by the participants and getting the feedback to know that they have actually understood it. The second thing for me is obviously that I am teaching Indigenous people, so the most important thing for me is to understand their language and their learning style, so that when I am assisting them to learn then I could apply their particular style of learning and adjust my style of teaching (Niwa).

Another participant similarly pointed out that “The first step is to get to know the cultural background of the students. I guess every culture is different so does the approach to tutoring based on these differences” (Longone).

While cultural background was considered critical, other participants had different views. One participant pointed out what could possibly be considered a paradigm shift in understanding the dynamics of teaching and learning. In his view, “personality issues” were more important than cultural. “I do not worry about the cultural aspect so much. I am more worried about the personality of the student”. Even more compelling is his argument as reflected below:

From a mathematical point of view, I find it really hard to accept that the basic rule of mathematics is influenced by cultural differences. Mathematics, by its nature, is the most logical of all studies and two and two makes four in any culture (Thricer).

In a similar vein, another participant responded by acknowledging that Learning Advisers indeed need to understand “individual differences” and the actual



process of “transferring of knowledge”. Equally so was the need to understand students’ confidence levels and establishing rapport.

It depends on the students. They are very different. Some follow the instructions, some develop gradually. Like I have said, my students are very different in background. Some are really young, some are really old. Some have no maths background at all. Some have very good background, so it’s hard to be specific. I’ll tackle them all very different and I try to adapt it depending on the student (Twinker).

The first step is to get to know students’ background and students’ confidence levels. I get the students to know me, who I am. I do not behave like an academic. I do not really stress ... this is the case so that the students can relate to me. I don’t let the students know that I am an assistant, it does not matter what I am called. All I care about is that they have to succeed (Japhet).

These views on what really matters in the tutoring process provide us with insights about Learning Advisers’ own teaching philosophies. While they reflect a popular literature, one thing becomes clear, that despite all the Learning Advisers not being trained professionals in the teaching sector, they do seem to appreciate some of the critical issues in the scholarship of teaching and learning. Although significant differences emerged between students’ background and their individual personalities, the fundamental principles that underpin teaching are largely common understanding even to non-professionals. However, whether their understanding of these issues is directly linked to their involvement in tutoring or whether it is something that they have been holding since their school time, is something that requires further analysis and enquiry.

A further critical issue in tutoring emerged, namely, power relationships. For example in response to the question of “who fits into whose time” one participant succinctly put this issue into perspective:

My tutoring is to calculate it to the students’ requirements and their level of knowledge and understanding. I do not bend the students to take my way of tutoring, I bend my way of tutoring to suit the students and their level of, I guess, comprehension, of what I am saying (Tanya).

This particular observation is not only critical but highlights the intricacies of power relationships which, very often, tend to be ignored in the students-tutor relationship. Further indications of power relationships can be noted in Japhet’s sentiments when he said:

While I know I am a tutor, I ensure that I do not lead in everything I do. I hold the view that these students have some knowledge which I can use to facilitate their learning. Therefore, I am very sensitive to what I do, not to be seen to dominate my students. I want them to understand without me standing in their way (Japhet).

The two sentiments expressed by these Learning Advisers above provide two fundamental ways of understanding power dynamics in teaching. One is the recognition that teaching or tutoring, does not require imposing one’s views, no matter how informed those views are. Second, is the acknowledgment that students can also learn in an environment contrary to the theoretical view of “tutoring”. Fundamentally though, these sentiments do affirm the fact that teaching/tutoring can be marred by power, where students are viewed as objects of a process rather than the subjects of a learning process.

### ■ The tutoring process

The tutoring process, unlike the actual teaching, can be a tricky business. As such, the findings, to a certain degree, present a mixture of both. However, on the processes of tutoring, the findings bear semblance to the many views and issues Learning Advisers hold as critical to the tutoring. The broader picture emerging from the findings seems to suggest that the majority of them do acknowledge the linkages between knowing students’ background and personality and, based on these, establishing a platform for effective tutoring. In addition, there appears to be a general consensus that effective tutoring is not only based on tutors’ thorough understanding of a mathematical concept but also on how clearly, simply and straight-forwardly such concepts are initially explained to the students. The following sentiments consolidate this argument.

The first step is to understand the concepts which can be explained in a moment. Then the application of that idea or concept in different situations ... that needs practice. I mean the student needs to sit down and be presented with a problem, become more and more connected to real life. There is no way around it unless you apply the concept rapidly to the new scenarios. There is no other way of thinking about how to use it (Niwa).

I basically try hard to work with them if they don’t understand things and if the problem is quite complex. In actual fact, what I usually have done is to try and go through with them the problems they are experiencing until they reach the bit that they get stuck at. Very often students just stop whenever they get stuck. So going through with

them the process of understanding the concept and the problem till it clicks into their mind is my preferred process (Tanya).

Another participant echoed these sentiments, stating: "So at the end of the day it's about explaining the meaning, it's about what sort of words and language that I can use to convert that meaning across" (Longone).

For a long time, mathematics teaching has come under heavy scrutiny, particularly when it comes to reasons why a mathematical problem has to be solved in a particular manner or, why a particular rule is, or a series of rules are, applied to a particular problem:

Like I said it is very hard to explain something without showing them why they should do it and how it all works, what it all means because, as you know, unless you get it to the real life, nobody cares, including me. But, I can understand how and why they feel like that (Twinker).

Mathematics educators (Makuwira, 1997; Stewart, 2002; Warren et al., 2004) have consistently questioned why there is too often, very little explanation as to why we undertake such operations. Furthermore, the debate on the relevance of mathematics to real life situations has equally received much attention (Bender, 2004). It is no surprise that the sentiments expressed above do mirror these discourses. Mathematics as an area of scholarship has a language. How such language is explained is critical to mathematics understanding. These Learning Advisers seem to reflect and consolidate the importance of this debate.

The findings further point out to another equally fundamental aspect in teaching, that is, teachers' flexibility, imagination, and resourcefulness in utilising locally available resources in the teaching process. Very often teachers of mathematics have to be very dynamic and adaptive to the changing circumstances in their classroom, be it within tutoring or more formal teaching environments. This requires quick thinking and imaginative response of the tutor and Lecturer. There is a significant degree of such traits in the findings, as expressed by the following participant:

If the style is not working, for example, if I am doing something on the whiteboard as an example and it's not working, then I might sit down with them rather than a whiteboard approach. It could be a "tell us way" or "draw a picture", until I see that there is a click coming on so that I can fit their learning style (Longone).

These views are similar to those other Learning Advisers whose conviction of what constitutes effective tutoring is founded on the belief that Indigenous

students usually understand mathematical concepts better if they are applicable to real life situations and are consolidated.

[For] a lot of my students it's about applying, it's about learning the rules and applying them and refining the process and applying again and then you find that they get it right. It's about experiential learning – they need to know what the outcome is gonna be and my job is to show them the outcome – it doesn't always work but what I do is to find out where the communication is not getting across (Thricer).

Well, in those situations where I come up against the wall and where I don't seem to be explaining the concepts well, I start by looking for different ways of explaining it. I think it's most important to keep repeating phrase or words to explain some concepts. I actually consciously rephrase things, or, you know, if it is a process that is written on a piece of paper, I try to break it into small units and try and explain each step in more detail, which is something I learnt after high school (Niwa).

However, not every participant was comfortable with this approach. In response to the question; "What are your views in trying to relate mathematics to culture?" one participant shed a bit more light on the complexity of taking things for granted:

Ya, that's a hard one. I do not really have a good answer for that. I suppose that it (mathematics) is very structured and I think some of the students do not go so well with that. They do not like the step-by-step approach. They don't seem to like the tiny little steps ... I don't know whether that's a cultural thing or not, but it is something that is very fundamental to maths obviously but, it is something that they all seem to struggle with (Twinker).

In a similar vein, another Learning Adviser was quick to point out the degree to which he goes in order to help. Very often, and by definition, Learning Advisers are dictated by the student's needs. If, for example, the student is confident to do his/her work alone, the Learning Advisers cannot impose themselves on the students.

Certainly many Indigenous students find it more comfortable with the "sit down" approach where you spend two hours – don't move around approach and where everything is tuned to their experience. I would say that in an Indigenous class, students are more comfortable in talking to each other, moving around and as such I sit around and wait for someone to come and

say, hey I want to start now. Whereas in a non Indigenous classroom I go okay I'm gonna start now ... which I can't do in an Indigenous classroom. All is in their frame of mind (Japhet).

Although students will behave differently during the tutoring process, the findings indicate that the most popular way of tutoring is to sit down with a student, identify the problem and then begin working on it by way of explaining its intricacies. However, there can be a major challenge with this approach. One participant observed that, very often, Indigenous students tend to process information from inside out, rather than outside in. This observation further extends the debate on how tutoring should be approached:

My experience with Indigenous students, not all of them but a lot of them, is that they feel the information has to be in the head already and all they are doing is searching for it. Now, I shall try to explain it another way. It's almost like they don't want to take the information from outside, assimilate it and use it to work with. It's almost like they are expecting to have the information inside them and therefore, if I am teaching them they get frustrated because they go, "Okay I don't know about that". But it's me saying, "Okay you don't know it but you are here to learn" (Thricer).

As with any teaching process, there are times when students are slow to understand the process. It is at this point when teachers and/or tutors have to exercise caution, as two things may happen. First, there might be a backlog of frustration due to the fact that the concept or methodology is confusing to the learner. Second, there might simply be an information overload. As one participant noted, it is at this point in time that the best way is to take a break and refresh the mind:

I also watch students about their feelings on what they are writing. It can be very stressful at times. But what I usually do is call a break when I feel that students cannot proceed because of information overload. Sometimes we go for a short walk, come back when students feel that they have had a bit of a break to reflect on the process (Tanya).

Another emerging issue, critically important to tutoring, is "honesty" on both the student and the Learning Advisers. It has emerged from this study that very often students tend to pretend that they understand the problems and processes when, in actual fact, they do not. For Tanya, her approach is crucial in ensuring that students gain the best from her work. Her sentiments highlight this critical issue when she observes:

I do not bend the students to take my way of tutoring, I bend my way of tutoring to suit the students and their level of, I guess, comprehension of what I am saying. But I try and watch the students for a long time so that even if they say, "Yes, I understand" I watch them and sometimes find that no, they do not really. So I tell them the ability to say, "I have made a mistake, that was silly of me, that was silly of me," and that they should not feel very embarrassed of their mistake or that they are stupid, because the only way to learn is by learning from our mistakes (Tanya).

While this approach may provide a platform for more learning, it is equally questionable when it comes to dealing with Indigenous students and, perhaps, non-Indigenous students as well. Forcing students to admit their mistakes may not be the right way. In some cultures, embarrassment, humiliation and/or failure are socially and culturally unacceptable. Shaming is a powerful sanction in most small-scale societies. Based on my own personal observation, very often many students, despite the need to engage a Learning Adviser, will opt to deal with the course coordinators. Engaging the Learning Adviser may be seen as an acknowledgment of failure. Again this reflects the question of power and certainly raises many interesting questions in relation to the conduct of tutoring.

Adding to the complexity, there are those participants who believe strongly in the principle of "known to unknown". In reference to the consolidation of the mathematical concepts, some Learning Advisers are of the opinion that "practice makes perfect". It is seen as much easier to begin with simple concepts and problems and complex ones, in the tutoring process. As noted before, this process is viewed as empowering and likely to boost confidence and self-esteem.

#### ■ Challenges to tutoring

The findings of this study have illuminated challenges that are broad and cultural in nature. First, is the challenge of differentiating formal lecturing/teaching from tutoring in a program such as TEP. Teaching, by itself, is neither easy to define nor quantify. However, when it is defined as mere facilitation of a learning process, it may imply that while knowledge transfer is in no doubt important, it may be important only in relation to the quality of the learning that it triggers. If, for example, the teaching activities do not result in learning, then it can be argued that there has been no teaching. Similarly, if the learning process lacks quality, then it can equally be argued that the teaching is unsuccessful to that extent. Finally, there are modes other than that of knowledge transfer which can play a more effective role in the triggering of learning. Hence, an excellent teacher needs to go beyond excellent lecturing or excellent knowledge dissemination.

Second, as with teaching, tutoring is equally a confusing concept with an embedded message of teaching in it. For example the Oxford Advanced Learner's Dictionary defines a tutor as a "private teacher, especially one who teaches an individual student or a very small group" (Hornby, 2000, p. 1400). Argued from its purpose, tutoring is fundamentally pivotal in assisting students to help themselves, that is, guiding them to a point where they become independent learners, thus no longer in need of a tutor or Learning Adviser.

A broader issue that has emerged in relation to the tutoring process is assisting Indigenous students to see the value of education and learning:

I think the major challenge is to make students understand the value of education, that's one of the major challenges. Some of them can't see the value of learning. Because I, as a tutor, have to encourage them that there is no reason why they can't learn maths (Longone).

This paradox is further compounded by the way mathematics is approached. This is clearly seen when tutoring and teaching is approached from a Western perspective:

The second challenge is to make them understand that what we are teaching is the white man's maths, and therefore we have to use the white man's process to a certain degree to approach that. But we also have to adjust that to suit their style of learning. It is very complex. Look at it this way ... if I went to learn in an Aboriginal community they would teach me their culture in their particular style and that would be the most perfect way to learn it and when we are going into a classroom setting and we are teaching university level of maths, primarily your level of maths comes from the English and white tradition and so the idea is to not just show the value of education but also to help them learn the white man's way of learning (Longone).

These views make teaching or tutoring Indigenous students even more problematic when they cannot make sense of the connections between the nature or type of mathematics and the real life situation: "I have frequently been asked by students – not only Indigenous but also non Indigenous, about how and when, in my life am I gonna use this mathematics" (Niwa). Linked to this challenge is the issue of content. To what extent does the content reflect the cultural milieu? Many of the participants raised their concerns that the course provided, while it captures the broader mathematical concepts, does fall short in essentially capturing the type of mathematics that may be useful in the Indigenous students' future.

Algebra stood out to be the case in point. However, despite this, participants had difficulties in providing specific topics which they considered important, highlighting, on occasion, the tutor's inadequacy in this field of scholarship.

Further challenges included shyness and fear of failure. The inextricable link between the two highlights how culture is so entrenched in learning.

I think a few, if not most of them, have been quite shy at first, and then they'll open up. I don't think it's a cultural thing. Like I am not an Indigenous person myself but I do not think that's an issue. But then again, that's personality, not a cultural thing (Thricer).

This observation further highlights the tutor's lack of cultural awareness and its importance in the tutoring and/or teaching process. It further complicates matters when one even fails to recognise the influence of one's own culture to the learning process and, hence, cements the argument that teaching, devoid of power dynamics, can affect how effective students participate and enjoy the learning process.

## ■ Conclusion

This study, albeit small in magnitude, has illuminated salient issues in the teaching and learning of mathematics, especially within the context of Indigenous Australians. Of vital importance to the conclusion is the question of the role of the Learning Adviser in a specialised TEP. Indeed, while the broader debate gravitates around facilitation of learning, this study has added another important facet to this view. Tutoring is also enhanced when we understand and enhance relationship-building. This point, however, can only yield positive results when it is understood from a cultural perspective. Learning Advisers should possess at least rudimentary understanding of ethno-mathematics theory and practice, cultural awareness and sensitivities, which will equip them to handle any eventualities in their tutoring processes.

Directly linked to the issues of facilitation of tutoring and/or learning through relationship building is the ability to break the "shy factor" in ATSI students. Although this issue has not comprehensively been canvassed, it emerges from the research, as an issue of utmost significance. Confidence-building is key to solving students' low esteem, which is often a trigger for shyness. However, given the relative lack of comprehension of mathematics by some of the Learning Advisers, this problem may require a dual approach. First, the research indicates that the Learning Advisers may require an intensive induction in order to familiarise themselves with a range of pedagogical issues in the teaching of mathematics to ATSI students. Second, Nulloo Yumbah needs to



develop an initiative where awareness workshops about socio-cultural issues are promulgated to potential Learning Advisers and students. Tied to this process is the need to cement the message of "success" rather than "failure".

Lastly, this small project reveals that there is need for comprehensive research in this issue, perhaps at a national level. Critical issues in Indigenous mathematics education require immediate attention. Among these the research to be undertaken should focus on students' perceptions of their tutors of mathematics, effective tutoring processes, and rapport-building in the tutoring of mathematics. Tertiary Entry Programs across Australian universities provide a niche that requires further academic enquiry in various disciplines. This study may be used as a building block to uncover some of the many issues affecting teaching and learning of mathematics and many other subjects.

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