

## **CONFIDENCE AND PROFESSIONAL LEARNING: A CASE STUDY OF INDIGENOUS TEACHER ASSISTANTS ATTENDING PROFESSIONAL LEARNING**

Danielle Armour  
*Australian Catholic University, Brisbane*

Elizabeth Warren  
*Australian Catholic University, Brisbane*

Jodie Miller  
*Australian Catholic University, Brisbane*

### **Abstract**

The focus of this paper is to examine the personal impact professional learning had on ITAs within the mathematics classroom. This paper is based on a four-year longitudinal qualitative study called Representations, Oral Language and Engagement in Mathematics (RoleM). The main study focused on the teaching and learning of mathematics of Indigenous students. As part of this study, Indigenous teacher assistants (ITAs) together with their teachers participated in the RoleM professional learning model (RoleM PL). RoleM PL included professional development workshops, leadership workshops and follow-up visits in the classrooms, which were facilitated by researchers. Nineteen Indigenous teacher assistants from remote, rural and metropolitan Queensland participated in this study. Data were drawn from semi-structured interviews conducted at least once a year with ITAs. An analysis of the interview transcripts highlights the beliefs, attitudes and understandings of Indigenous teacher assistants with regard to their mathematical knowledge and confidence in teaching mathematics. The analysis also identifies the difficulties ITAs were having in teaching mathematics, and how the RoleM professional learning model had benefited them in the mathematics classroom. As a result of participating in the RoleM PL, ITAs confidence increased and they gained insights into how to effectively help their Indigenous students learn mathematics.

### **Introduction**

Indigenous Teacher Assistants (ITAs) have been employed in Australia for over 50 years. They were first employed in 1953 in the Northern Territory with all other states in Australia creating ITA roles by 1974 (Winkler, 2009). However, it is believed Indigenous people were committing to unpaid work in schools in the early 1940's (Magill, 2008). The purpose of their employment was to ensure Indigenous people are working in schools providing assistance to Indigenous students, a natural link to the community, and teacher support.

There are now over 2500 Indigenous Teaching Assistants employed across Australia (Winkler, 2009). They work under different titles from state to state although the roles undertaken are very similar. In New South Wales the title Aboriginal Education Assistants was given to emphasise that teacher assistants were in fact Aboriginal (Winkler, 2009). Other popular terms used are Indigenous Education Worker, Aboriginal home school liaison officer and tutors. In addition their duties were significantly different from those of non-Aboriginal Teacher Assistants (Courtney, 1984; More, 1978). For the purpose of this paper, the term 'Indigenous Teaching Assistants' (ITA) is used as the title of these educators. This term encompasses both Aboriginal and Torres Strait Islander teaching assistants. The researchers view the role of the ITA as one of supporting teachers and students. Fundamental to this role is supporting Indigenous learning.

## *Indigenous education*

Historically Indigenous people have been excluded from all education systems in Australia until the 1950's. Furthermore, Dunn and Tatz (1969) and Roper (1969) confirm that Indigenous people were not given the opportunity to participate in or were excluded from participation in all levels of education until the late 1960s. Subsequently in the 1970's the government started to address some of the equality issues relating to Indigenous people and began to emphasise the need for Indigenous people to be given the opportunity to be educated. This resulted in an increase in the number of Indigenous children attending state schools with their participation mainly occurring in the primary years of schooling (The Western Australian Aboriginal Child Health Survey, 2006). The 1971 census indicated only 3.5% of Indigenous students achieved senior secondary and post-secondary education as compared to 29.6% of non-Indigenous students (Beresford, 2003). Despite attending secondary school, a number of Indigenous people still found it hard to gain employment due to a discriminatory labour market. This often meant that the pathway of Indigenous students from school to work was limited to low-skilled occupations with very few students continuing onto post secondary education (The Western Australian Aboriginal Child Health Survey, 2006). The systematic exclusion of Indigenous people in Australia from mainstream society has been extensively documented but has only been briefly touched on for the purpose of this paper. The denial of allowing Indigenous people schooling in the past has had a crippling effect on Indigenous education today.

In addition, the Australian education system has not portrayed the Indigenous people and their culture positively (Matthews, Watego, Cooper and Baturo, 2005). This in turn has impacted negatively on Indigenous students. In many instances their Indigenous identity has been devalued. This has caused Indigenous people to feel disempowered and have minimal voice within education contexts (Matthews, et al 2005; Sarra, 2003). The lack of acknowledgement of Indigenous culture has resulted in most educational efforts endeavouring to assimilate Indigenous students into Non-Indigenous Australian society (Warren & DeVries, 2009). Furthermore, many Indigenous students feel that their culture is not relevant to what is being taught in the Western education system (Bin-Sallik, 2003). As a consequence of this feeling of inadequacy, Indigenous students continue to be the most educationally disadvantaged group of students in Australia (Matthews, et al 2005; Sarra, 2003). The superior positioning of the Western world and the exploitation of Indigenous people in education systems has resulted in a relationship of mistrust between Indigenous peoples and education systems (Matthews et al, 2005). Historically, Indigenous people have faced many racist practices from non-Indigenous people including teachers and principals, and the education systems on the whole have lacked high expectations for their Indigenous students, with little acknowledgement being given to Indigenous ways of learning (Matthews, et al 2005; Sarra 2003).

Traditionally, non-Indigenous people have envisioned Indigenous learning as informal and non-verbal, in comparison to Western learning (Harris & Harris, 1998). However, Indigenous people have very complex learning and teaching traditions. The teaching of Indigenous knowledge often encompasses the oral communication of contextual stories led by the Elders (Harrison & Greenfield, 2011). Indigenous learning is often based on observations, symbols and images, community and land links, and telling of stories rather than utilising written approaches (Harris & Malin, 1994; Yunkaporta, 2012). By contrast, Western school learning focuses on written and two-way verbal interactions (Harris & Harris, 1988). This difference in education styles and culture has caused Indigenous students to become disengaged in western education. It is only in the last 30 years a more positive, equitable and culturally inclusive approaches have begun to emerge in education systems (Schwab, 2006; Tripcony, 2001). A key to the adoption of these new approaches has been the employment of ITAs within school communities. The primary role of ITAs was seen as being two fold; first, to develop an awareness of Indigenous culture within the classroom; and, second to act as a link between the school and Indigenous community.

### *The introduction of ITAs in school communities*

The first Indigenous Teacher Assistant programs in New South Wales commenced in the late 1960's, and was ground breaking for two reasons. They represented one of few career options for Indigenous people who had no formal education. In addition they opened up the opportunity for Indigenous people who previously were unable to attend any education system to attend universities (Cleverley and Mooney, 2010). However, ITAs who participated in these programs gained no formal qualifications. The programs were fell into the category of 'adult education programs' and thus did not contribute to formal degree or teacher certification (Cleverley and Mooney, 2010). However, as a result of their participation many ITAs gained self-confidence, self-awareness and strategies to use whilst teaching (Cleverley and Mooney, 2010; Warren, Cooper & Baturo, 2004).

At present there are few ITA programs available for Indigenous people that allow them to gain formal training in education. Furthermore, a lot of ITAs have not had any formal education and they feel intimidated to take up the few opportunities that exist (Winkler, 2009). Thus the only training most ITAs receive in the present educational climate is attending professional development days with their schools that focus on a key learning area, and this tends to occur in a very ad-hoc way. A noted exception to this is that in some remote areas of Australia some specific programs are implemented in the community with the specific purpose of assisting ITAs to gain some form of training and development (Kimberley Catholic Schools, 2013). Thus the ITAs role in schools is variable and often not clear.

There is little research to identify if culturally inclusive changes in education systems have had a positive effect on engaging and educating Indigenous students (O'Rourke et al, 2009). Little is also known about the impact the inclusion of ITAs in the classroom has had on the inclusion of culturally appropriate practices in the classroom, and Indigenous students learning and their inclusion in the education agenda.

### *ITAs role in the school*

A fundament of an ITAs role is to assist in facilitating the mixing of Western and Indigenous knowledges. This mixing is seen as allowing students to be empowered in both Indigenous identity and Western education and is termed Two Way Learning. It is perceived that this approach enables students to keep their cultural identity and receive an education (Pearson, 2009). If their identity is strong then students will have the strength to deal with challenges arising in the Western world (Sarra, 2011). Pearson and Sarra, whilst have differing views on how to support Indigenous learning, both purport that 'two way' learning is imperative to promoting culture and supporting educational outcomes for Indigenous students. Furthermore, Two Way Learning allows students to have a different way of understanding, constructing and creating knowledge (Nisbett, 2002). Canadian Indigenous teachers emphasise that Two Way Learning must be experiential, with a hands-on approach and must touch on the everyday living of Indigenous people (St Denis, 2010). Fundamental to this learning is Indigenous people participating in teaching of Indigenous students in the school setting (St Denis, 2010). ITAs can support teachers in implementing hands on and meaningful activities that fit within the curriculum areas. Furthermore, ITAs have the challenge of having to move between both the Indigenous world and Western world in schools, as they have to assist the teacher and support the students in learning.

While the integration of the two knowledges is deemed important, in reality there often exists a discrepancy between ITAs intended role in the school and their actual role. The intended role of ITAs in the school also include supporting Indigenous students in class; building relationships with Indigenous students' family, working with teachers in the classroom, and influencing the educational experiences of Indigenous students. It incorporates many aspects including providing support in literacy and numeracy, providing advice on integrating an Indigenous perspective into the curriculum,

organising regular meetings with parents and community members, following up student attendance and performance, visiting the homes of parents, and assisting teachers in learning about and supporting Indigenous students. At times teachers set up activities for ITAs that have to be delivered the way the teacher instructs it to be (Jude, 1998). However, in many instances ITAs are employed to provide predominantly 'functional support' for the classroom, and because they lack any real authority or leverage within the education system, they are given minor roles in the school, such as, preparing teacher directed activities, providing limited supervision to small groups, and cleaning and tidying the classroom (Warren, Cooper, & Baturo, 2004). Obviously, ITAs fulfilling the latter duties are failing to fulfill their intended role, that is, failing to implement their knowledge of the student's cultural, learning and family background within the classroom context. In these instances their contact with the students and teachers is limited with much of their time being spent in the staffroom with the photocopying machine. While it is acknowledged in education documents that the knowledge of Indigenous people should be highly sought after and valued by teachers as it gives insight into both student's identity and the way they can learn in a Western system, often this does not seem to be occurring in reality.

It is argued that the effectiveness of how ITAs support teacher and students depends on their level of training and development program participation (Siemon, 2009). Most literature concerning ITAs supports the use of assistants in the classroom to assist in the teaching, learning and well being of Indigenous students (Santoro, 2007; Warren, Cooper & Baturo, 2004). Furthermore, Indigenous parents believe ITAs are best prepared to work with Indigenous students in education (Warren, Cooper & Baturo, 2004). They are the key to non-Indigenous teachers having a better understanding of students and how to work in a cross-cultural environment. However, most ITAs have not received formal training and are unqualified when they are employed (Reid & Santoro, 2006). This is in contradiction to the report to parliament on Indigenous education and training in 2001 that stated that once ITAs were employed they needed to pursue some form of professional development or teacher training (Department of Education, Science and Training, 2001).

While there is a need for principals, teachers and communities to provide support to ITAs to participate in training and development, this often seems not to be occurring or if it is occurring the training is not often 'high stakes' training, that is, training that supports them to be active contributors to the teaching and learning processes. In addition the training that exists is often occurring outside the school times and requires some form of financial commitment by the school. Winkler (2006) reports that the training provided to ITAs does not necessarily teach them the skills required to successfully support the learning of Indigenous students. This may be because ITAs training may be perceived to be inferior to that of their Non-Indigenous colleagues (Jude, 1998; Santoro, 2007) by both the ITAs and their teachers (Warren, Cooper, & Baturo, 2004). Thus a purported outcome of this is that many ITAs lack the personal belief in themselves to be effective within the classroom context.

According to Bandura, self-efficacy is built from the self-system and is made up of a person's attitudes, abilities, and cognitive skills. Self-efficacy is a person's belief in his or her ability to succeed in a particular situation (Zimmermann, 2000). The system plays a major role in how we perceive situations and how we behave in response to different situations. Self-efficacy beliefs have been strongly associated with teacher effectiveness, and in turn teacher self-efficacy contributes to the ability to execute behaviours that allow students to learn (Prieto & Altmaier, 1994). Teachers with a strong sense of self-efficacy:

- View challenging problems as tasks to be mastered
- Develop deeper interest in the activities in which they participate
- Form a stronger sense of commitment to their interests and activities
- Recover quickly from setbacks and disappointments

(Bandura, 1988)

Thus a challenge underlying schools and teachers' capacity to enhance Indigenous students' education lies in teachers developing their own personal and collective efficacy for community engagement. Educators and researchers are challenged to see teacher efficacy as being multi-dimensional including not only their current pedagogical focus on teaching and classroom management (NSW Aboriginal Education Consultative Group Inc./NSW Department of Education and Training, 2004), but also their efficacy to engage with the community and ITAs (Labone, 2004).

There is a paucity of research relating to ITAs self-efficacy and the effect it has on the classroom context. The results of Prieto and Altmaier's study (1994) confirmed higher self-efficacy was evidenced in teaching assistants who had exposure to prior training and previous teaching experience. However, the majority of ITAs who are employed in schools have no formal qualifications or training, are under utilised and are not seen as partners in facilitating mathematics lessons (Cooper, Baturo, Warren, & Grant, 2006). Moreover, following professional learning ITAs confidence grew and they began facilitating mathematics lessons and became more involved in successfully supporting students and teachers (Baturo, Cooper, & Doyle, 2007).

Literacy and numeracy skills are only a small part of the factors that form ITAs self-efficacy. There are other important factors such as successful relationship building, which makes students feel as though they have a sense of belonging, pedagogical approach to delivering lessons, and the development of social skills in children (Macgill, 2008). But many of these factors are not necessarily recognised as necessary outcomes in a world where school budgeting is closely linked to positive student outcomes in literacy and numeracy (Cobb-Clark & Jha, 2013; Closing the Gap on Indigenous Disadvantage, 2009)

The particular aim of this paper is to explore the effect that the inclusion of ITAs in 'high stakes' professional learning had on them and their teachers in classrooms with large cohorts of Indigenous students. In this context 'high stakes' professional learning is learning that engages in exploring the role of ITAs in the classroom in the effective delivery of culturally appropriate learning activities for Indigenous students.

RoleM (Representations, oral language and engagement in Mathematics) was designed to bridge the educational gap in numeracy for young students within some of Queensland's most disadvantaged school contexts. RoleM was a 4-year longitudinal study funded by DEEWR (Department Education Employment Workplace Relations) and commenced in 2010. The project consisted of three interlocking arms: (a) including effective numeracy initiatives aligning with Indigenous pedagogy and beliefs and the principles of quality teaching; (b) building the capacity of ITAs and teachers by supporting them to work together through partnerships, networks; and, (c) developing models of shared leadership which included principals, teachers and ITAs. RoleM funded ITAs to attend professional learning workshops alongside their classroom teacher in mathematics education and leadership. This helped to build collaborative partnerships between teachers, ITAs and community and empowered ITAs to become more respected and effective in supporting students' learning. RoleM also supported ITAs who wanted to participate in further study. This support included budget allocation used to help ITAs to enrol in courses and tutoring and mentoring as required. The tutoring and mentoring sessions often took place after school and included discussing ITAs study progress, helping with assignments, and providing constructive feedback on work they had completed.

The research this paper reports on is a dimension of the larger RoleM project, a longitudinal study situated in the first four years of schooling in urban, rural and remote contexts in Queensland. The dimension reported in this paper is the Indigenous Teacher Assistants and their participation. The particular focus of this paper is to examine the personal impact this participation had on them within the mathematics classroom. Thus the aims of the paper are to:

1. Explore ITAs confidence in teaching mathematics, and
2. Identify factors that support the development of their personal understanding of mathematics and teaching mathematics

Underpinning the research project was a professional learning model (RoleM PL). This model consisted of four dimensions, namely, teachers participation in professional learning, the provision of mathematics learning activities with accompanying resources ready for classroom implementation, follow up visits in the classroom by members of the RoleM team, and ongoing discussion about effective teaching and learning of mathematics in these contexts. In line with Indigenous methodologies, the Indigenous teacher assistants from participating schools were supported in attending the professional learning alongside their classroom teacher. Their attendance at the Professional learning sessions commenced in 2011, the second year of RoleM. Table 1 summarises the frequency of ITAs attendance at the RoleM professional learning.

**Table 1**  
*Frequency of ITAs attendance at RoleM professional development*

Year	Professional Development 1	Professional Development 2	Professional Development 3	Total
2011	18	9	-	27
2012	15	13	6	34

ITAs attendance at the professional development was at the behest of the Principal. RoleM's commitment to this dimension of the project was financial support for two ITAs from each school to attend each Professional Learning day. This included all travel costs and paying the school the salary of the ITAs for each day they attended. In 2013 the number of ITAs attending the RoleM Professional learning days was almost non-existent. This reflected a belief by many of the participating principals that teachers in these contexts struggled when the ITAs were absent from their school. From the principal data it seems that these struggles related to the lack of relief staff for their teaching and the management of the classrooms in teachers absence. A principal from a school in North Queensland explains. *"It is hard ... to send [our Indigenous] staff off to a PD session at times. I would like to send more but unfortunately I am restrained. You can never get enough relief staff."*

## Methods

### *Participants*

Data were gathered from semi-structured interviews with Indigenous teacher assistants who participated in the RoleM professional learning model. These interviews occurred up to three times each year. Due the remoteness of some of the participating schools not all ITAs were interviewed. One ITA was interviewed four times over a two year period, five ITAs were interviewed twice over one year and 20 ITAs were interviewed once in the year they were involved in the study. Table 2 presents the number of Indigenous teacher assistants that participated in the one on one interview over the four years of the project.

Table 2

*Frequency of ITAs participation in one-on-one interviews*

2011		2012			Total
Semester 1	Semester 2	Semester 1	Mid Year	Semester 2	
9	4	4	2	2	21

*Instrument*

The interviews were designed to probe the beliefs, attitudes and understandings of Indigenous teacher assistants on (a) their own personal mathematical knowledge and confidence in teaching mathematics, (b) difficulties they were having in teaching mathematics in their contexts, and (c) how the RoleM professional learning model had benefited them in the mathematics classroom. The semi-structured interviews consisted of 25 to 30 questions relating to three major themes, namely, teaching mathematics, the knowledge that ITAs gained from the RoleM professional learning model and student learning.

To ensure the reliability of the data gathered from interviews, Indigenous researchers involved in the RoleM project conducted all interviews. Interviews occurred at the schools or via telephone and up to two weeks after ITAs attended the RoleM professional learning. All interviews except one were audio-taped. This particular participant did not want to be audio-taped but did opt to allow the researcher to take notes of the conversation as the interview progressed. All audio-tapes were transcribed, and based on the transcripts a manual coding system was used to extrapolate themes.

In addition to the interview questions, participants were also asked to indicate on a five-point Likert item the degree of their mathematical knowledge and understanding. The format of the scale used was: 1 – Weak; 2 – Fair; 3 – Average; 4 – Good; 5 – Confident. Participants were also asked to justify their answer as to why they believed they were at that level.

Constant comparative methods were used to analyse the interviews and identify emergent themes. This method originated from grounded theory and is now widely used in qualitative research (Coombe, 1975). It is often referred to in the literature as ‘grounded methods of data analysis. This form of analysis allows themes to emerge in qualitative data that are continually scrutinized and categorized. The data were broken down initially using open coding. The interviews were transcribed and the text from the interviews was analysed to identify key words that connected the ITAs beliefs and practices. In line with this method of data analysis, member checks by other researchers were carried out to gauge the authenticity and robustness of the emergent themes and subthemes. Initially, each semi-structured interview was analysed individually and then comparisons were made across all participants’ interviews. Seven major themes emerged from the data. These were:

1. ITAs own personal knowledge and understanding of mathematics
2. The gains that they had made as a result of their engagement in the RoleM professional learning
3. The personal confidence they had gained in helping the students in their classroom learn mathematics
4. *Difficulties they were having in teaching mathematics in their particular contexts*

5. *Their role in the mathematics classroom*
6. *Their perceptions of the students attitudes towards learning mathematics*
7. *Their perceptions of what prevents students effectively participate in mathematics learning.*

This paper reports on the first three themes, those pertaining to their conceptions of themselves as ‘mathematics teachers’.

## Results

As the commencement of each interview across the three-year period, ITAs were asked to ‘score’ their own personal knowledge and understanding of teaching mathematics on the Likert scale and justify their choice. Table 3 presents a percentage frequency of ITAs in each level of the Likert scale together with representative quotes for each group.

Table 3

### *Percentage frequencies of the ratings ITAs gave to their Knowledge and Understanding of Mathematics*

Year	Confident	Good	Average
Sem1 2011 (n = 11)	36% <i>In the lower years I am fairly confident about my maths knowledge</i>	27% <i>A bit more than average now that RoleM is in it</i>	27% <i>I was never good at maths, I’m a 3 midway. The PD is helping me.</i>
Sem 2 2011 (n = 4)	100% <i>I feel confident to help. I have a better understanding of how it works</i>		
Sem 1 2012 (n = 4)	25% <i>I am not very good at maths but from the workshop I would probably say a 5 because it was very easy to understand</i>	25% <i>I think my knowledge is good but from the PD my knowledge has broadened</i>	50% <i>I’m average. I have always loved mathematics</i>
Midyear 2012 (n = 2)			100% <i>I’m around the three mark. Average</i>
Sem 2 2012 (n = 2)		50% <i>I have adequate knowledge. There is so much to learn. I guess we chop and change and we find different strategies</i>	50% <i>I would probably say average</i>

Before the RoleM professional learning (PL), ITAs indicated they had limited knowledge of mathematics. They often lacked confidence in their mathematical knowledge and generally most did not like mathematics. Moreover, ITAs believed they had knowledge and confidence to teach mathematics in the lower grades at school but they felt they lacked knowledge and confidence to teach in the older grades. They were embarrassed to have limited knowledge of mathematics. After attending the professional learning session, ITAs acknowledged that their knowledge and confidence had been strengthened and broadened. They became confident in mathematics and furthermore their embarrassment of needing to learn more about mathematics became less evident. The PL also gave the ITAs the opportunity to see things in a different perspective and this enabled them to successfully support their students in mathematics. *“The PL has helped me feel more confident in supporting students in learning mathematics.”*

Theme 2, the gains that ITAs made as a result of their engagement in the RoleM professional learning, comprised four subthemes. These were: Accessing culturally appropriate and engaging materials for use in the classroom; Learning new strategies to teach mathematics; Increasing their confidence in teaching mathematics; and, Understanding the importance of oral language to the teaching of mathematics. Table 4 presents the percentage frequency of ITAs in each subtheme together with representative quotes from the interviews. The subthemes are presented in order from strongest to weakest.

Table 4

*Percentage frequencies of Gains from the Professional Development*

Year	Accessing culturally appropriate and engaging materials	Learning new strategies to teach mathematics	Increasing their confidence in teaching mathematics	Understanding the importance of oral language
Sem1 2011 (n=11)	45% <i>The very exciting resources gave me much to think about regarding student learning and the different ways they could be used within the classroom.</i>	27% <i>Because I'm doing maths at the moment with the kids and I didn't like maths when I was at school. This program has helped a lot to explain things that I could have been doing. It has not only helped me professionally but personally as well.</i>	36% <i>I learnt different strategies but mainly gained confidence to facilitate math learning in small groups.</i>	18% <i>I never knew that what I was doing in the classroom was developing their oral language. When I have a group with me I'm using words and helping them understand and use them.</i>
Sem 2 2011 (n=4)	-	50% <i>Yes I have learnt different ways of doing maths from what was learnt when I was at school.</i>	50% <i>I have a better understanding of how it works. I don't have to ask Lyn (pseudonym) how it's done again.</i>	-
Sem 1 2012 (n=4)	50% <i>I actually like all the activities and how they</i>	50% <i>I found the materials were easy to</i>	-	-

	<i>set it out. It's really easy to follow. The activities are easy and I actually really like it because its hands on for our kids and they can manipulate and play. I like the hands on stuff. It's explained a lot easier instead of a textbook.</i>	<i>understand and use. Because they are just so common and basic.</i>		
Midyear 2012 (n=2)	100%	-	-	-
	<i>Simple hands on activities and how fun and easy it was to do and operate.</i>			
Sem 2 2012 (n=2)	50%	50%	-	-
	<i>The learning experiences were pretty hands on and hands on for the kids they make it easier to understand</i>	<i>I like the way it built my confidence up with like I said before teaching the kids how to do this in the classroom and how it is hands on for the kids.</i>		

---

The most frequently mentioned subtheme was accessing culturally appropriate and engaging materials. They were particularly supportive of the hands-on approach of RoleM as they felt that this was not only more appropriate for their Indigenous students but also was 'easier for them to understand'. In addition, ITAs indicated RoleM PL provided them with more strategies to teach students in the classroom. They reported that these strategies helped them to teach more hands on lessons, which proved to be more engaging for students than working from a textbook. The final two sub-themes related specifically the ITAs who participated in the first year of RoleM professional learning, 2011. After attending the RoleM PL, these ITAs indicated that they had become more confident in teaching mathematics. For them the oral language component of the RoleM PL gave them an awareness of the mathematical language they needed to be using in lessons to build students' vocabulary. Some of these ITAs were unaware that they needed to develop students' oral language in the mathematics classroom until after attending the RoleM PL.

The final theme reported in this paper specifically pertained to the personal confidence ITAs had gained in helping the Indigenous students in their classroom learn mathematics. The data relating to this theme is split into two main subthemes: feeling confident in supporting student learning and, not feeling confident in supporting student learning. Table 5 presents the percentage frequency of agreement to each subtheme together with representative quotes from the interviews.

Table 5

*Percentage frequencies of ITAs Confidence in supporting Student Learning after attending the RoleM PL*

Year	Feels confident in supporting student learning after RoleM PL	Does not feel confident in supporting student learning after RoleM PL
Sem 1 2011 (n=11)	90% <i>Yes, because the learning is relevant to what is being taught. I feel better equipped to know how to support the classroom teacher in her goal of moving individuals and groups along the mathematical knowledge continuum.</i>	10% <i>Depends what year level I am helping.</i>
Sem 2 2011 (n=4)	75% <i>I feel more confident to help</i>	Only 3 of the 4 answered the Q
Sem 1 2012 (n=4)	100% <i>Definitely. Because it made it more clear and understandable. The materials and the concepts are very simple.</i>	-
Midyear 2012 (n=2)	100% <i>Yes definitely. There are still things I will check with the teacher but she is like yeah you know what you're doing. I am pretty confident after getting everything shown to you.</i>	-
Seme 2 2012 (n=2)	100% <i>Yeah I do feel more confident.</i>	-

After attending the professional learning sessions all but one of the ITAs reported they were more confident in supporting student learning in their classroom. ITAs felt they were better equipped to support teachers in the classroom and had a good understanding of the mathematical concepts learnt at the RoleM PL. They reported that the confidence gained from attending the RoleM PL had enabled them to facilitate mathematics lessons and increase students' mathematical knowledge. The role that

ITAs played in student learning in the classroom shifted with their increased confidence.

Teacher data was also collected on the ITAs and the resultant changes they saw in the classroom. Below are representative quotes from teachers with regard to ITAs changed attitudes and confidence after attending the RoleM PL. Teachers saw significant changes in their ITAs after attending the RoleM PL. They saw PL as meaningful to ITAs as they were a part of it and knew what role they needed to play in the classroom. Teachers described their ITAs as taking a more active role in the classroom. This links to the confidence they gained from attending the PL. One teacher commented, *She has changed herself. She is taking more of an active role and understands the importance of what she needs to do and where she needs to go mathematically.* Furthermore, this new confidence resulted in teachers allowing ITAs to be more active in the classroom. For example, some teachers are now permitting ITAs to engage in small group teaching. One teacher shared, *ITAs have more confidence in being able to do small group work without just having to do behaviour management things. Having targets to meet and set things to do. It has been a really good focus for them.* Another teacher commented that, *In the classroom the TA is just like the teacher – very focused on language. The other one is very hands-on and works very co-operatively. Having gone to the PL they have ownership now-without them we would not be able to run the activities in the classroom.* Teachers found that their ITAs exhibited greater ownership of what they did and in the classroom and were more confidence. This confidence followed through in the classroom even when teachers were absent. One teacher explained, *Last term she was irregular, but this term I gave her activities and I could not come (to work) and it was really great that she did the activities with the students. She knew what she was doing in the groups as well. We were in groups today and she knew what to ask, like “how many repeats can you see?” She was implementing those questions.* This provided limited interruption for the students with regard to their learning of mathematics. Thus from teachers’ perspectives the three of the main gains ITAs made through ITAs attendance at the RoleM PL were: increased confidence, greater commitment to working in the classroom, and greater ability to support the ‘teaching of mathematics’ to the Indigenous students.

## Discussion and conclusion

There are three main conclusions that can be drawn from these results. First, the findings of our research paper show that the RoleM professional learning sessions improved ITAs’ own perceptions of their mathematics knowledge, their pedagogy, and their personal confidence in teaching mathematics. All participating ITAs shared that they felt more valued within the mathematics classroom setting after attending the PL. It is conjectured that these gains were maximised by treating teachers and ITAs as equal contributors to the learning of their Indigenous students in the design of the PL. The PL allowed them to have meaningful dialogue about working effectively together, and the provision of the RoleM resources facilitated the discussion about the specific roles they could take in implementing the activities in their classrooms. Thus, there is a need to ensure that ITAs are included in professional learning sessions with their classroom teachers (Baturo, Matthews, Underwood, Cooper & Warren, 2008). The extent that this needs to occur requires further investigation, but it needs to extend beyond issues relating to behavior management. The PL also gave the ITAs the opportunity to see things in a different perspective and learn different teaching strategies. Furthermore, this enabled them to successfully support their students in mathematics. The ITAs have shown with professional learning they have the potential to be the major sustainable provider of quality mathematics education to their schools. This is an important factor considering the high turnover of

teachers in their schools.

Second, ITAs were particularly supportive of the hands-on approach delineated in the RoleM resources. They felt that this was not only more appropriate for their Indigenous students but also was 'easier for them to understand' (St Denis, 2010). This in turn helped ITAs to contextualise mathematics instruction for their students. The RoleM professional learning provided the ITAs with knowledge and skills to teach successfully in classrooms thus boosting their status and confidence within the classroom (Foucault, 1991; Smith, 2002). This in turn resulted in ITAs having more confidence and status in the classroom and contributes to them having a higher self-efficacy. In addition, the participating teachers saw this as a positive and not as a threat to their own status within these contexts.

Third, any professional learning to educate ITAs has positive effects on ITAs supporting student learning. Not only does it help students but also it improves ITA confidence and authority in the classroom (Baturu, Cooper and Doyle, 2007). The RoleM professional learning sessions help ITAs gain more understanding of how to contextualize mathematics learning within their cultural context, a greater belief in their ability and confidence to work with the teacher, and this resulted in improved mathematics outcomes for their Indigenous students (Matthews et al., 2005; Sarra, 2003; Warren, Cooper, & Baturu, 2004).

The literature pertaining to two-way learning focuses primarily on the divide between Indigenous and Western knowledge, and ways of knowing. It acknowledges that both are needed as one empowers Indigenous students in their identify and the other allows them to effectively participate in Western education. It seems that in order to accomplish two-way learning ITAs and teachers are often delegated to two disjoint roles, with the ITA being 'seen' as the 'culture expert' and the teacher as the 'learning expert'. We are suggesting that this needs to be seen through an additional lens, one where ITAs and teachers have active responsibility for and input into both. It is well recognised that ITAs gaining skills is fundamental to Indigenous student learning as it is important to have Indigenous people participating in teaching of Indigenous students in the school setting (St Denis, 2010). It is the nature of these skills that needs further elaboration. Our results begin to suggest that to suggest ensuring that teachers and ITAs participate together in 'high stakes PL' start to facilitate this shift. But the question is, as new teachers (and often newly graduated teachers) move in and out of these communities how can this shift be maintained?

## References

Australia Department of Education, Science and Training (2002), The national report to Parliament on Indigenous education and training, 2001, Department of Education, Science and Training, Canberra.  
Australian Government, (2009) *Closing the Gap on Indigenous Disadvantage: The Challenge for Australia*, Australian Government, Canberra.

Bandura, A. (1988). Perceived self-efficacy: Exercise of control through self-belief. In J. P. Dauwalder, M. Perrez, & V. Hobi (Eds.), *Annual series of European research in behavior therapy* (Vol. 2, pp. 27-59). Amsterdam/Lisse, Netherlands: Swets & Zeitlinger.

Baturo, A., Matthews, C., Underwood, P., Cooper, T., & Warren, E. (2008). Research empowering the researched: Reflections on supporting Indigenous teacher aides to tutor mathematics. In O. Figueras, J. L. Cortina, S. Alatorre, T. Rojano, A. Sepulveda (Eds.), Vol. 2. Proceedings of the 32nd International Group for the Psychology of Mathematics Education, (pp.137-144). Mexico: PME

Beresford, Q. (2003). Crime, justice, and Aboriginal youth. In Q. Beresford & G. Partington (Eds.), *Reform and resistance in Aboriginal education: The Australian experience* (pp. 185-207). Perth: University of Western Australia Press.

Bin-Sallik, M. (2003). Cultural safety: Let's name it! *Australian Journal of Indigenous Education*, 32(1), 21-28.

Catholic Education Office of Western Australia. (2013) *Upskilling Kimberley Aboriginal Teaching Assistants*. Catholic Education Office Western Australia.

Cleverley, J., & Mooney, J. (2010). *Taking Our Place: Aboriginal Education and the Story of the Koori Centre at the University of Sydney*. Sydney: Sydney University Press.

Cobb-Clark, D., & Jha, N. (2013) Educational Achievement and the Allocation of School Resources. Melbourne Institute of Applied Economic and Social Research University of Melbourne Australia, Institute for the Study of Labor (IZA), Bonn Germany.

Cooper, T., Baturo, A., & Warren E., & Grant, E. (2006). Aim high –beat yourself: Effective mathematics teaching in a remote Indigenous community. In J. Novotna, H. Moraova, M. Kratka & N. Stehlikova (Eds.), Vol. 2. Proceedings of the 30th Conference of the International Group for the Psychology of Mathematics Education, (pp. 369-376). Prague, Czech Republic: PME

Courtney, F. (1984). Profile: Betty Wright Aboriginal teachers' aide. *The Aboriginal Child at School*, 12(5), 3-6.

Baturo, A. R., Cooper, T. J. & Doyle, K. (2007). Authority and esteem effects of enhancing remote Indigenous teacher-assistants' mathematics-education knowledge and skills. In J. Woo, H. Lew, K. Park, & D. Seo (Eds.), *Proceedings of the 31st Annual Conference of the International Group for the Psychology of Mathematics Education*. Seoul, South Korea: Seoul National University.

Courtney, F. (1984). Profile: Betty Wright Aboriginal teachers' aide. *The Aboriginal Child at School*, 12(5), 3-6.

Dockett, S., T. Mason, and B. Perry. 2006. "Successful Transition to School for Australian Aboriginal Children." *Childhood Education* 82 (3): 139–144. doi:10.1080/00094056.2006. 10521365.

Dunn, S. S., & Tatz, C. M. (Eds.). (1969). *Aborigines and education*. Melbourne: Sun Books.

Harris S and Harris J 1988. 'Aboriginal communication styles, assessment, and social change'. In G Davidson (ed), *Ethnicity and Cognitive Assessment: Australian Perspectives*. Darwin Institute of

Technology, Darwin.

Harris, S. & Malin, M. (Eds.) (1994). *Aboriginal children students in urban classrooms*. Wentworth Falls: Social Science Press.

Harrison, N., & Greenfield, M. 2011 Relationship to place: positioning Aboriginal knowledge and perspectives in classroom pedagogies. *Critical Studies in Education*, 52:1, 65-76, DOI 10.1080/17508487.2011.536513 <http://dx.doi.org/10.1080/17508487.2011.536513>

Jude, S. (1998). Aboriginal education in urban secondary schools: Educating the educators. *The Australian Journal of Indigenous Education*, 26(2), 13–17.

Labone, E. (2004). Teacher efficacy: Maturing the construct through research in alternative paradigms. *Teaching and Teacher Education*, 20, 341–359.

MacGill, B. (2008). *Aboriginal Education Workers in South Australia: Towards equality of recognition of Indigenous ethics of care practices: A dissertation submitted in fulfillment of the requirements for the degree of Doctor of Philosophy*. School of Australian Studies, Faculty of Education, Humanities, Law & Theology, Flinders University.

Matthews, C., Watego, L., Cooper, T., and Baturo, A., (2005) Does mathematics education in Australia devalue Indigenous culture? Indigenous perspectives and non-Indigenous reflections. In Clarkson, P., Downton, A., Gronn, D., Horne, M., McDonough, A., Pierce, R., and Roche, A., Eds. *Proceedings 28th conference of the Mathematics Education Research Group of Australasia* Vol. 2, pages pp. 513-520, Melbourne, Australia.

Mikolyski, Dawn, "Self-efficacy, identity, career knowledge, and interests in adolescents" (2008). Master's Thesis. Retrieved from San Jose Scholar Works Paper 3541.

More, A.J., (1978) "The Aboriginal Teaching Assistants' Training Program: An Evaluation". *Aboriginal Child at School* 6, 3-3-21

NSW AECG (Aboriginal Educational Consultative Group Inc.) & NSW DET (Department of Education and Training). (2004). *The Report of the Review of Aboriginal Education - Yanigurra Muya: Ganggurrinyama Yaarri Guurulaw Yirringin.gurray - Freeing the Spirit: Dreaming an Equal Future*. Sydney NSW

O'Rourke, V. & McInerney, V. (2007). No need to fail: Personal and institutional barriers to success for Indigenous university students. In N. Parbury & R. Craven (Eds) *Aboriginal studies: Making the connections – collected papers of the 12th National ASA Conference* (pp. 123-134). Bankstown, Australia: Aboriginal Studies Association.

Pajares, F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62, 307-332.

Prieto, L.R., & Altmaier, E.M. (1994). The relationship of prior training and previous teaching experience to self-efficacy among graduate teaching assistants. *Research in Higher Education*, 35(4), 481 - 497.

Reid, J., and Santoro, N., (2006) Cinders in snow? Indigenous teacher identities in formation, *Asia-Pacific journal of teacher education*, vol. 34, no. 2, pp. 143-160, Carfax Pub. Co., Abingdon, England  
Roper, T. (Ed.). (1969). *Aboriginal education: The teacher's role*. Melbourne: National Union of Australian University Students.

Santoro, N. 2007. 'Outsiders' and 'others': 'Different' teachers teaching in culturally diverse classrooms. *Teachers and Teaching: Theory and Practice* 13, no. 1: 81–97.

Sarra, C. (2003). Young and black and deadly: Strategies for improving outcomes for Indigenous students. In Australian College of Educators (Eds.), *Practitioner Perspectives* (Quality Teaching Series). Deakin, Vic: Australian College of Educators.

Schwab, R. G. (2006). *Kids, skidoos and caribou: the junior Canadian ranger program as a model for re-engaging Indigenous Australian youth in remote areas*. The Centre for Aboriginal Economic Policy and Research, The Australian National University: ACT.

Siemon, D. E. (2009). Developing mathematics knowledge keepers—Issues at the intersection of communities of practice. *Eurasia Journal of Mathematics, Science & Technology Education*, 5(3), 221–234.

St. Denis, V. (2010). *A study of Aboriginal teachers' professional knowledge and experience in Canadian public schools*. Prepared for the Canadian Teachers' Federation and Canadian Council on Learning.

Tripcony, P. (2001). Indigenous Australian education: A new millennium, a more focused approach. Paper presented at National Education and Employment Forum, 2000.

Warren, E., Cooper, T., & Baturo, A. (2004). Indigenous students and Mathematics: Teachers' perceptions of the role of teacher aides. *Australian Journal of Indigenous Education*, 33, 37- 46

Warren, E., & DeVries, E. (2009). Young Australian Indigenous students' engagement with numeracy: Actions that assist to bridge the gap. *Australian Journal of Education*, 53(2), 159 -175.

Winkler, M. (2006). Hidden treasures: Recognising the value of Indigenous educators. *Education Horizons*, 9(2), 18-19.

Yunkaporta, T., (2009) *Aboriginal Pedagogies at the cultural interface*. PhD thesis, James Cook University. Accessed from <http://eprints.jcu.edu.au/10974>

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, 25, 82–91

Zubrick SR, Silburn SR, De Maio JA, Shepherd C, Griffin JA, Dalby RB, Mitrou FG, Lawrence DM, Hayward C, Pearson G, Milroy H, Milroy J, Cox A. *The Western Australian Aboriginal Child Health Survey: Improving the Educational Experiences of Aboriginal Children and Young People*. Perth: Curtin University of Technology and Telethon Institute for Child Health Research, 2006.