Professional Learning for Teaching Assistants and its Effect on Classroom Roles

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The Swan Valley Cluster of schools for the Make It Count project identified the professional learning of teachers and teaching assistants as a key factor in improving numeracy outcomes for urban Indigenous children. Initial training for assistants began in late 2010 and took the form of workshops based on a modified First Steps in Mathematics Number program. It was continued in 2011 and lead to a pilot program in training assistants to plan for targeted mathematics learning for individuals and small groups of children. This paper reports on the success of the pilot with regard to the improved confidence and ability of the assistants to assume greater responsibility for teaching, as well their development as integral members of professional learning communities.

Introduction

The Swan Valley Cluster of schools was formed in 2009 as part of the Make It Count project that aims to improve numeracy outcomes for urban Indigenous Australian children. The cluster identified a number of factors that were believed might contribute to better outcomes for children. These were to raise expectations of and for children, improve parent involvement, increase student engagement, provide professional learning for teachers and support staff and to target specific aspects of curriculum that were seen as requiring support (Hurst & Sparrow, 2010). The final two points, particularly the one related to professional learning, are the subject of this paper. The notion of targeting specific curriculum areas is necessarily included as this was the specific focus of the professional learning that was implemented during late 2010, 2011 and which is continuing in 2012. This paper discusses the professional learning of Education Assistants (EAs) and Aboriginal & Islander Education Officers (AIEOs) as part of a pilot program conducted during 2011.

Background

Several aspects of teaching are the focus of the research on which this paper is based. They are pedagogical content knowledge and mathematical content knowledge, confidence in teaching mathematics and the development of professional learning communities (PLCs).

Pedagogical Content Knowledge and Mathematical Content Knowledge

Schulman (1986, p. 9) coined the term 'pedagogical content knowledge' (PCK) and he considered it to comprise ". . . the most useful ways of representing and formulating the subject that make it comprehensible to others [and] . . . includes an understanding of what makes the learning of specific topics easy or difficult". Schulman's work has since been developed by other researchers who have interpreted and developed his ideas. Some (Ball, Thames & Phelps, 2008, p. 392) have seen PCK as ". . . a kind of amalgam of knowledge of content and pedagogy that is central to the knowledge needed for teaching" and ". . . a teacher's understanding of how to help students understand specific subject matter" (Magnusson, Krajcik & Borko, 1999, p. 96 cited in Ball et al., 2008, p. 394.)

Ball et al. (2008, p. 395) described mathematical knowledge needed for teaching as the "mathematical knowledge needed to carry out the work of teaching mathematics" and that it

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necessarily involved understanding the content of the curriculum in order to be able to assist children, respond to their questions, plan for their learning and evaluate their work, among other things. Ball et al. arrived at a model based on Schulman's original work and this comprised two parts: First, 'subject matter knowledge' (akin to 'mathematical content knowledge') consisted of two domains – common content knowledge and specialised content knowledge. Second, 'pedagogical content knowledge' consisted of two domains – knowledge of content and students, and knowledge of content and teaching (Ball et al., 2008). Ultimately, it could be said that effective teaching involves knowing what students know and don't know, knowing what they need to know, and knowing how to help them make progress.

Confidence in Teaching Mathematics

Beswick, Ashman, Callingham and McBain (2011) cautiously suggest that there is a positive relationship between teacher confidence and improved mastery of mathematical knowledge. This is based on the outcome of interventions undertaken with final year pre-service teachers designed to improve their capacities to teach various strands of the primary mathematics curriculum. Beswick et al. (2011, p. 3) cited a study by Graven (2004) which concluded that "teachers' confidence appeared to grow as they increased their mastery of new ideas and practices". Specifically, Graven (2004, p. 206) suggested that "confidence [is] both a product (resulted from teacher learning) and process (an explanation of teacher learning)" and that this involved ". . . confidence in their ability to access resources to supplement their learning [and] confidence in their identities as professional competent mathematics educators". These ideas are summarised in Figure 1 that was developed from a graphic presented by Beswick at the 2011 Australian Association for Research in Education (AARE) Conference.

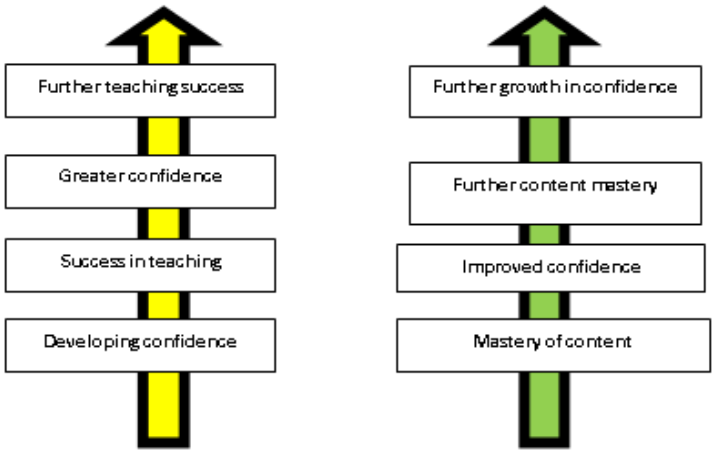


Figure 1. Growth in confidence to teach and mastery of content

Developing Professional Learning Communities

The notion of professional learning communities and their ability to improve outcomes for children have been widely documented in recent times and there is general agreement among various educators as to their characteristics and benefits. DuFour (2004) discusses three key features of PLCs, these being 'ensuring that students learn', 'a culture of collaboration' and 'a focus on results'. These sit well with the framework proposed by Stoll et al. (2005, p. 4) that contains eight features of PLCs, these being "shared values and

vision, collective responsibility for pupils' learning, reflective professional enquiry, collaboration focused on learning . . . professional learning . . . openness, networks and partnerships, inclusive membership, and mutual trust, respect and support". The second of DuFour's points aligns well with the pointers about collaboration, openness, networks, inclusiveness, mutual trust, respect and support. These features are the focus of the research related to PLCs as described in this paper.

Methodology

The study described here sought to answer the following research question:
To what extent does on-going professional learning for EAs and AIEOs enhance their content knowledge for teaching mathematics, their confidence to teach mathematics, and their development as members of professional learning communities?

A group of EAs and AIEOs underwent professional learning in a modified First Steps in Mathematics (FSiM) course in late 2010 and during 2011. Four of them from Valley View Primary School (VVPS) were then selected to form a pilot group, the main criterion for this selection being that VVPS had the services of a Getting It Right Numeracy (GIRN teacher. During the latter part of 2011, this group worked with the GIRN teacher and underwent further training in planning for teaching Indigenous students, either individually or in small groups. This training was based on the FSiM Professional Judgement Cycle. In December 2011, the four members of the pilot group were interviewed. Data generated from the semi-structured interviews were grouped according to emergent themes. Pseudonyms are used for the school and all participants in the research.

Results and Discussion

All quoted comments were made by interviewees during semi-structured interviews conducted on December 7, 2011 at Valley View Primary School. Five themes emerged from the interview data with no one theme being dominant. Also, there were numerous occasions during interviews that a respondent would say something that could fit into more than one theme. A number of ideas were encompassed in each of the five themes which were:

- Pedagogical content knowledge
- Mathematical content knowledge
- Professional learning community
- Indigenous learners
- Confidence to teach mathematics

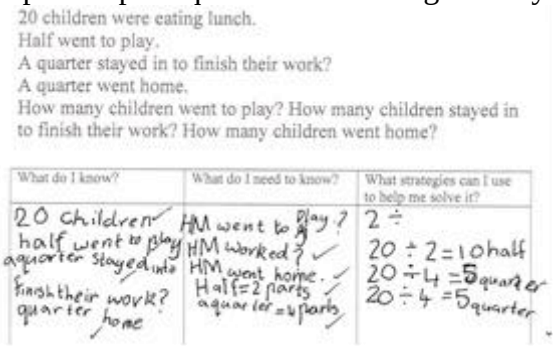
Pedagogical Content Knowledge

The main ideas expressed as part of this theme were increased skill at identifying children's needs and asking questions, making adjustments to teaching to meet needs, and becoming more comfortable with the language of mathematics. All interviewees felt that they had learned a lot about teaching mathematics to Indigenous children. Narelle described how she had learned to ask key questions about identifying what children knew and what they needed to know and indicated that she had begun to develop in the children an ability to pose questions for themselves rather than rely on the teacher. She also mentioned the significance of focusing on the language embedded in the tasks and problems at hand.

> I've learned about children as individuals . . . that they learn at different rates and I think I'm becoming more confident with the language that I use . . . breaking things down . . . talking about and working out what sort of number sentence it is . . . picking out the key words of what they know about the sentence.

A lot of them would just read the sentence and then wait for me to prompt them to an answer . . . [now] they have to understand what they're trying to work out and how they are going to go about it. That's quite exciting for me . . . that's probably the main thing that I've learned – it's a new method of approaching what we're trying to solve, having them think for themselves more. (Narelle, EA)

Figure 2 shows an example of a worksheet that Narelle uses with her students and shows how she has been able to help them pose questions and recognize key words.


20 children were eating lunch.
Half went to play.
A quarter stayed in to finish their work?
A quarter went home.
How many children went to play? How many children stayed in to finish their work? How many children went home?

What do I know?	What do I need to know?	What strategies can I use to help me solve it?
20 children half went to play quarter stayed into finish their work? quarter home	HM went to play? HM worked? HM went home. Half=2 parts a quarter=4 parts	2 ÷ 20 ÷ 2 = 10 half 20 ÷ 4 = 5 quarter 20 ÷ 4 = 5 quarter

Figure 2. Student worksheet focusing on questioning and recognition of key information

Sharon indicated that she had become more able at adjusting her teaching to meet specific needs and recognizing exact points of intervention needed with children.

It's been good training because you can go, 'Oh they're not up to that', and we have to go back and make sure that they can count or . . . you can go back a little bit and get another tool or some concrete things for them to see the difference . . . doing the diagram or the pictures of the birds in the trees before you move on to the word sentence. (Sharon, EA)

These sentiments were echoed by Frances whose comments reflect an awareness of the need to build on understanding in small stages, which had been a central theme of the professional learning sessions.

We all have a set plan for what has to be covered but because the group that I had was a bit slower, we had to go at their pace, we couldn't jump ahead because if they missed those basics they've got to learn , they're not gonna get the next ones. (Frances, AIEO)

Mathematical Content Knowledge

The main ideas expressed as part of this theme included knowing the content and being able to break it into manageable segments for children, knowing precise points of understanding and what needs to be learned next, using appropriate resources and representations, and knowing and using mathematical terminology. Sharon spoke specifically of how she was better able to select appropriate resources.

The PDs that we did were of great value . . . being able to see how [things like] matchsticks could be used and being able to use the bead sticks that we made a couple of weeks ago . . . they are a handy tool. You get things and go 'Oh, we could use that for some purpose'. The PD has helped us do that. (Sharon, EA)

Sharon also spoke specifically of knowing more mathematics and knowing how to talk about it with children.

The way I was taught maths was totally different to the 'new' ways and just the terminology and things, you know, things like 'part part whole' – you become more fluent with different things . . . we're using the terminology that Terri [GIRN teacher] uses so there is parity. (Sharon,EA)

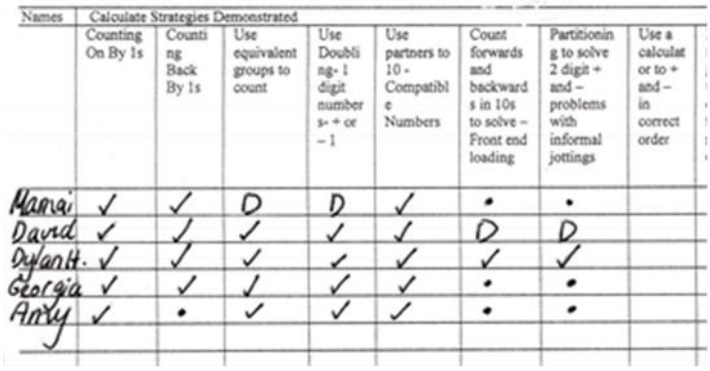
Narelle made similar comments and agreed that she wouldn't have used definitive mathematics terms such as 'decade' a year ago. She made mention of her ability to use

diagnostic tests and recording sheets and showed some examples of how she had used her newly gained knowledge to identify specific needs of children,

> I've been taking copies of things like this [diagnostic record sheet] to see where they're at, regularly, and then building on that . . . they still struggle with the change of decades. (Narelle, EA)

Similarly, Cassie spoke of her increased knowledge and her ability to use it to identify points of error and misunderstanding in children's thinking. She presented a diagnostic recording sheet that she uses (Figure 3). It was evident that these aides are thinking and operating more like teachers since their exposure to professional learning. Cassie stated that she knew much more mathematics than previously and that she felt more confident in knowing what had to be taught to help children understand.

> It's about identifying how they're thinking because we use a lot of written language as well so they can understand how they're working it out and we can identify where they're going wrong. I struggled in the past to know where they're not understanding and I would teach the basic things over and over whereas this has helped me to look at other options for how they learn things and shown me other ways of doing things. (Cassie, EA)



Names	Calculate Strategies Demonstrated							
	Counting On By 1s	Counting Back By 1s	Use equivalent groups to count	Use Doubling- 1 digit numbers + or – 1	Use partners to 10 - Compatible Numbers	Count forwards and backwards in 10s to solve – Front end loading	Partitioning to solve 2 digit + and – problems with informal jottings	Use a calculator to + and – in correct order
Mana	✓	✓	D	D	✓	•	•	
David	✓	✓	✓	✓	✓	D	D	
Dylan H.	✓	✓	✓	✓	✓	✓	✓	
Georgia	✓	✓	✓	✓	✓	•	•	
Andy	✓	•	✓	✓	✓	•	•	

Figure 3. Diagnostic recording sheet used by Cassie (EA)

Professional Learning Communities

The main ideas expressed as part of this theme included equity in relationships with teachers, genuine team work and a sense of harmony, and pre-planning and post-lesson reviews with the GIRN teacher. Frances made the following comment that indicates the development of genuine teamwork with her teacher.

> When we're in the class as a whole, when we're doing something together, they [children] know that they can put their hands up and either me or Roslyn [class teacher] will give them exactly the same answer – we're kind of in harmony. We're using the same approaches. (Frances, AIEO)

All interviewees were of the view that they were valued as equals by the GIRN teacher and class teachers. Cassie noted that she would meet with those teachers on a weekly basis and that she had found the help and advice invaluable.

> I was definitely valued as an equal member of staff . . . I've always struggled with maths and I've not gone into as much depth and I haven't been able to try new stuff and been able to put as much time into it. This has really changed my thinking of maths . . . seeking help made me feel silly before [but] having the planning meetings to feed off – she [Terri] constantly checks how you're going and looks at your planning. . . it opens your mind up to a lot more and makes you feel more comfortable with it. (Cassie, EA)

The following exchange between the researcher (interviewer) and Narelle (EA) indicates the level of confidence shown by the aides in seeking help as well as the quality of the relationship.

INT – So you know that this [planning document] is available and you know which bit to use to solve a problem?

NARELLE – Yeah and if I'm not sure, I go to Terri [GIRN teacher] and say 'Help me'.

INT – But you're quite happy to go and ask?

NARELLE – Oh yeah [emphatically] I always ask them . . . I touch base with them about where I'm at because I don't want them [children] to be in a spot where they're not succeeding.

Indigenous Learners

The main ideas expressed as part of this theme included the building of relationships through empathy and connection, building of learner confidence, and the breaking down of a fear of failure. The most significant comments were made by Frances (AIEO) in describing the work she had done with a Year Seven boy, Eric, and the dramatic improvement in his achievement over three months. It is suggested that this improvement resulted from the regular contact he had had with Frances and the steady building up of a relationship between child and aide that was enhanced by the growth in Frances' level of knowledge and confidence. In August when Frances began to work with him, Eric was achieving at a very basic level with poor reading, writing and number skills.

He didn't even know how to write the numbers so I had to practice with him. This was some basic stuff, right at the start of it. Even when he was filling the sheet in, he noticed the pattern [for doubling] – he was following the pattern but he didn't recognize the numbers. He was just copying [the pattern] – he wasn't doing the actual work – he didn't have the understanding. (Frances, AIEO)

Frances also showed some work samples (Figure 4) that demonstrate the growth Eric has made and she commented about his increased application and confidence.

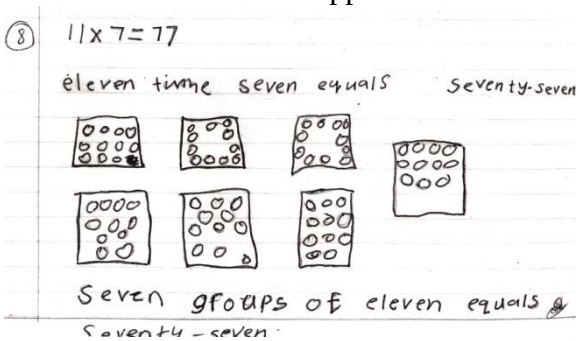


Figure 4. Sample of Eric's work after 3 months of intervention

- Yeah, can't stop him now … doubles, doubles plus one … this was the Year Seven who couldn't read or … you know struggling, always gettin' kicked out of class. He's come a long way. He's much happier … before, we had to go off looking for him – he'd get lost between the Year Seven classroom and the C Block [location of the Maths activity room]. He'd be wandering around … he'd go into the toilet block, go to the next toilet block, and we'd be lookin' 'round for Eric – couldn't find him anywhere. Now when it's Maths, he's the first one in there. (Frances, AIEO)

Frances also felt that the relationships built up between aides and teachers and the Indigenous students were helping a great deal.

There's been a big improvement – they've wanted to be there so their attendance has improved because we're focusing on that group [Year 6/7] and them as individuals. (Frances, AIEO)

Narelle expressed similar sentiments about relationship building and how this was helping the Indigenous children.

You just build relationships all the time and you just get to know the children more and they feel confident and they trust you and with these little extra things that I learn, I feel more confident. So as

> time goes on, you improve and you see them improve and it's constantly reassuring them that they're doing a great job … have a go, don't be afraid to say the wrong thing – that's constantly reassuring, building the confidence up, no matter what, if they get it wrong … building of the trust and relationship is so important – you can't function without that can you? (Narelle, EA)

Sharon also made mention of the on-going value of the relationships being built in that children with whom she works for mathematics, are approaching her more regularly when they want assistance for a variety of reasons as they feel that there is no stigma attached to seeking help.

Confidence to Teach Mathematics

All interviewees were emphatic about having greater confidence to teach mathematics and the main ideas expressed included confidence being derived from knowing more content, from knowing how to help children, and having success in teaching. Each interviewee was presented with the graphic shown in Figure 1 and all agreed that it accurately represented their own situations. That is, that mastery of mathematics content led to greater confidence, which in turn led to further mastery and then greater confidence. They believed that this linked well to the other element in that, as they became more confident, they had more teaching success, which led in turn to greater confidence and further teaching success. Since the professional learning that the aides underwent was focused on increasing the levels of pedagogical and mathematical content knowledge and ways to use this knowledge in planning, this indicated a measure of success for the professional learning intervention. The following comments underline this point.

> I'm getting the confidence as I go along and I'm still learning, myself, every day and I always take notes about how they [teachers] go about teaching so I need to be mimicking what they do. I really do enjoy what we do and it's so rewarding to see when they get it. (Narelle, EA)

> I actually now enjoy teaching maths whereas before I used to fear it. I struggled to find ways to teach it because I haven't got a maths brain … I'd put up a wall or barrier and I wouldn't seek help, like I said. Now, with all this, I'd like to continue with this [learning]. It's fantastic, I'm learning it and I can teach it and it's making me feel more confident. Usually, with Maths, I'm petrified of it, but this has been the best thing that I've done (Cassie, EA)

Conclusions and Implications

Several conclusions can be drawn from the pilot phase of this on-going study. Generally, they indicate that involving the EAs and AIEOs in targeted professional learning has been successful on a number of fronts. As a result of the professional learning, it could be said that the EAs and AIEOs:

- Increased their pedagogical and mathematical content knowledge and applied it to their roles
- Became more knowledgeable about helping Indigenous learners and more confident in their ability to do so
- Became more effective and equal members of professional learning communities in planning and implementing targeted learning for Indigenous children
- Began to think, talk, and work like teachers

The success of the pilot study described in this paper has prompted the Swan Valley Cluster of the Make It Count project to expand the professional learning for teacher assistants (EAs and AIEOs) to involve over forty assistants in four schools during 2012. This program has already begun and will continue throughout 2012.

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