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Remote Schools Working Together in the Kimberley: Initial Impact on Teachers' Content-Pedagogic Knowledge and Classroom Practice

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Abstract

Despite concerted effort and expenditure, improving the numeracy outcomes for Indigenous students particularly those in remote regions continues to be a major challenge. There are many factors that impact on the learning of Indigenous students in remote communities. For students, learning mathematics is a complex task when English is their second or third language. Other student factors involve attendance, transience and retention. In Western Australia, many teachers in remote Indigenous communities are new graduates, and as well as being inexperienced in teaching mathematics, they also have little experience being in a remote community with Indigenous people. Some larger schools may have numeracy specialist teachers who can provide mentoring and professional learning support. However in the smaller schools there is an often limited face-to-face professional learning opportunities. In 2010 seven schools in the Kimberley in Western Australia established the Fitzroy Valley Numeracy Project. The project aims to improve the numeracy outcomes of Indigenous students by developing a systematic and co-ordinated approach to teaching mathematics that can be sustained long-term, beyond staff turnovers, transfer of 'expert' teachers, or one-off funding arrangements. A study was commenced to examine the impact of the project on primary teachers' content-pedagogic knowledge and classroom practice. This paper is part of an ongoing larger study. It examines some data from an initial survey and a follow up survey after almost a year of implementation of the project. Twenty one teachers responded to the Initial Questionnaire, twelve teachers responded to the Follow Up Questionnaire, and of that number 8 responded to both. At the end of the year they seemed confident to select a mathematics focus, cater for the range of achievement in their classes, monitor student learning and use classroom management strategies. They seemed less confident in diagnosing student learning, making the mathematics focus of the lesson clear to their students and providing activities that engage their students. The results indicate that dealing with the literacy demands in the mathematics lesson needs more investigation.

Key Words

Mathematics, Indigenous students, content-pedagogic knowledge, classroom practice

Introduction

Despite concerted effort and expenditure, improving the numeracy outcomes for Indigenous students particularly those in remote regions in Australia continues to be a major challenge to teachers, curriculum leaders and policy makers. Jorgensen and Niesche (2010) describe a multitude of factors that impact on the learning of Indigenous students in remote communities. Learning mathematics is a complex task for students for whom English is a second or third language. Factors involving attendance, transience and retention impact on the learning opportunities for these students. Many teachers in remote Indigenous communities are new graduates who have little experience with the remoteness or with Indigenous people. In the smaller schools there are often limited face-to-face professional learning opportunities (Jorgensen, Grootenboer, Niesche & Lerman, 2010).

The National Numeracy Review Report (2007) recommended that exemplary professional programs be extended including the use of specialist teachers, and that enhancing teachers' pedagogical content knowledge be the focus of such programmes. One such recognised program is the Western Australian Department of Education's (WA DoE) Getting it Right - Literacy and Numeracy Strategy (GiR-LNS) (Meiers, Ingvarson, Beavis, Hogan & Kleinhenz, 2006; Ingvarson, 2005). The role of the numeracy specialist has been to work with teachers to plan and model effective teaching strategies in the classroom. The professional learning component of the Getting it Right – Numeracy (GiRN) Strategy is based on the First Steps in Mathematics research, resources and associated professional learning (Commonwealth of Australia, 2008, p. 61). The focus of the professional learning is on developing teachers capacity to make judgements about what their students know, what mathematics the students need to learn next and how to focus the students on particular mathematical ideas during the lesson (Willis &Treacy, 2004, p. 33).

Some larger schools in the Kimberley region in Western Australia have had access to the GiRN Strategy. For reasons related to staffing, funding and housing many smaller remote schools have not had access to a numeracy specialist teacher. Recent policy changes at the district and central office level have reduced even further, opportunities for professional learning or DoE support for their teachers.

Prior to 2010 seven schools in the Kimberley region located in the Fitzroy Valley had developed a shared language and literacy plan that reflected students Kriol-speaking background and the transient nature of students moving between their schools. The development of a shared numeracy plan was a logical extension to the processes already established as well as an additional way to overcome the difficulties associated with a high turnover of teachers, many of whom are not confident about what and how to teach mathematics to their students. The Fitzroy Valley Numeracy Project (FVNP) was established by school principals, to improve the numeracy

outcomes of Aboriginal students across all phases of schooling by developing a systematic and co-ordinated approach to numeracy teaching across Fitzroy Valley schools.

Literature Review

The demands on teachers' knowledge required to effectively teach mathematics have increased with the move to teach for understanding the concepts rather than on procedural knowledge as may have been the case in the past. In addition, it has been recognised that knowledge about students thinking that draws on research based frameworks is contributing to improved teaching practice and student outcomes (Commonwealth of Australia, 2008). Hill, Ball and Schilling proposed a model of mathematical knowledge required for teaching (2008, p. 377). The dimensions to that model include:

Common Content Knowledge (CCK): Mathematical knowledge and skill used across a range of occupations and not particular to teaching.

Specialised Content Knowledge (SCK): Knowledge required to represent, explain and understand unusual solutions to problems.

Knowledge of Content and Students (KCS): This is knowledge about how students learn particular mathematics content. It includes knowing about common student errors, common computational strategies, interpreting students work as well as developmental sequences of student learning (p. 380).

Knowledge of Content and Teaching (KCT): Butterfield and Chinnapan (2010, p. 111) elaborate this kind of knowledge as knowing how to sequence content; choose between different representations; select appropriate tasks and use probing questions.

For teachers of Indigenous students additional considerations for each of the Hill et al.'s four dimensions of knowledge need to occur. Just as for non Indigenous students, for Indigenous students it is essential to find out what mathematics and skills they know and understand (KCS) in order to plan for learning in a way that builds on their existing knowledge. Indigenous students may enter school with rich knowledge that might not match the early mathematics curriculum expectations (Willis, 2002). Sullivan and Grootenboer (2010) suggest that teachers need go beyond diagnosing the students' mathematical knowledge and skills. They need to be to be aware of their student's attitudes, dispositions beliefs and prior mathematical experiences as well as their interests and lives beyond school if they are to provide relevant and accessible learning experiences. Finding out what students know may be challenging and teachers will need to use specific questioning strategies if they want their students to provide thoughtful answers. In several studies when students were questioned in a large group they tended to call out answers which were often incorrect. Probing incorrect answers may not be appropriate and if students cannot answer a question they may experience a feeling of shame (Warren, Young & de Vries, 2007;

Perso, 2005; Sullivan, Youdale & Jorgensen, 2010). Sullivan et al. (2010) suggest that the use of Kriol for communication between students enhances student to student dialog and allows the students to articulate their thinking. Warren et al. (2007) suggested that students tended to prefer oral communication and were reluctant too write things down. That impacted on how teachers conducted their lessons and would impact how they find out what students know and understand.

Teachers of Indigenous students need a deep understanding of the mathematics (SCK and KCT) if they are to build on what students already know and choose contexts and hands on experiences that are familiar and engaging to students. That same deep understanding is required in order to use representations of mathematics that students can talk about and understand. Warren et al. (2007) examined teachers' use of mathematical representations and language with a group of Indigenous students in far north Queensland. The mathematical focus of the lesson was solving a comparison problem: If Wally is 120 cm tall and Ado is 100 cm tall how much taller is Wally than Ado? After using a range of representations (stick diagrams of Wally and Aldo then two lines with horizontal bars to represent 120cm and 100cm) and physical gestures the students could not understand the problem as a difference problem and use subtraction. The teacher then changed the context to a money context: If you had 120 dollars and gave away 100 dollars how much is left. In the process of moving to the familiar context of money that the students could understand, the mathematics focus of the lesson changed from comparison to a change or take away. A deep knowledge of the mathematics is required if teachers are to link the home environment to the school environment and use real life contexts, as is widely suggested in the literature, while maintaining the intended mathematics focus.

Another challenge to teachers when making judgements about the mathematics is recognising that their students may have many more words and ideas that describe certain mathematical situations such as location and compass points (Sullivan & Grootenboer, 2010) or a lack of words or ideas for other situations such as measurement attribute language (Warren et al., 2008). Enabling students to negotiate meaning in their home language yet use appropriate mathematics words in Standard Australian English is one of the many challenges that teachers face as they teach for real mathematical understanding in an Indigenous classroom (Niesche, 2010).

Knowledge of Content and Teaching (KCT) including effective teaching practices and pedagogy have been examined in terms of what works for Indigenous students The National Numeracy Review Report (2008) provides an extensive list of characteristics of programmes that lead to improvement in outcomes of Indigenous students. Some of these include: valuing the culture, language and richness of what students bring to the classroom; valuing different pathways to learning; having high expectation of students; the importance of having first language speakers in the classroom to assist learners to elaborate and scaffold their mathematical thinking;

recognising and paying attention to cultural differences in teaching and learning styles and the use of relevant and meaningful contexts to 'situate' the learning in their students' lives (p. 55). Recent studies have reiterated the need to link the home environment to the school environment with mathematics lessons that are relevant and connect to students' home lives (Sullivan & Grootenboer (2010), p. 2; Jorgenson et al., p. 115; Warren et al., 2007, p. 781). While Perso (2003) provides some practical suggestions, making those connections while trying to focus on explicit teaching of particular mathematics is not an easy task.

Gaffney and Faragher (2010) examined key teaching and learning characteristics and leadership factors necessary for sustained student achievement in numeracy in low SES school communities. They drew on characteristics of effective teaching as identified in the Early Numeracy Research Project (cited in Gaffney and Faragher, 2010). Effective teacher activities included focusing on the important mathematics ideas; using a range of question types; encouraging children to explain their mathematic thinking and drawing out key mathematical ideas during and/or toward the end of the lesson.

More recently, as part of the Mathematics in the Kimberley Project, research has focused on a pedagogical approach termed interactive pedagogies (Sullivan, Jorgensen & Youdale, 2010). "The approach is founded on the belief that all students can learn mathematics when the pedagogy is appropriate" (p. 59). The key elements of the interactive pedagogy include: group work, use of home language, high interactivity in terms of good questions from the teacher and question posing by students; multi –representational; reporting back as part of the lesson and rich tasks and activities. Those tasks and activities are based on what students know and with the teacher having a clear idea about what they are going to teach.

Theoretical Framework

This study requires a framework that draws on the dimensions of content pedagogic knowledge as determined by Hill et al. (2008) but also one that draws on effective classroom practice at the lesson level as synthesised by the Early Numeracy Project. The framework for this project needs to connect to the everyday work of the teachers as well as serve as a tool for analysis of data. The First Steps in Mathematics Resource and the associated professional learning modules has a framework that focuses on all of those elements and is one that teachers are familiar with (Willis &Treacy, 2004, p. 33). Teachers use this framework and make decisions about each component: the mathematics, the students and the pedagogy. They make decisions based on their knowledge, their experience and the evidence they have as they plan for student learning. It is a model that teachers use for long term planning but also as they plan from day to day. This model will be used as a framework for the analysis of the data for this study. (**Figure 1**).

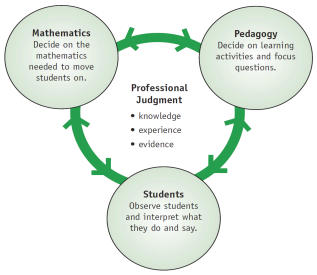

Figure 1 Content-pedagogic knowledge framework

Research question

What is the impact of the Fitzroy Valley Numeracy Project on primary teachers' content-pedagogic knowledge and classroom practice?

Research Setting and Methodology

This research involves primary school teachers who teach mathematics and includes one district high school and six remote community schools in the Fitzroy Valley. Although the schools are geographically clustered they are not in close proximity to each other. For example one school is an hour's drive from Fitzroy Crossing while the teachers in another school would generally access Fitzroy Crossing via a charter plane. The teachers involved in the FVNP range in the kind of professional support they are receiving. Teachers from the larger schools may have a regular weekly planning time along with one or two lessons with a numeracy specialist teacher working alongside them in their classroom. New graduates or teachers new to those schools may get preference over those that have been in the school longer. Teachers from the smaller schools share a travelling numeracy specialist teacher and so have planning time and classroom time regularly but less frequently. The larger schools have had a specialist teacher for many years. The numeracy specialist teacher for the smaller community schools commenced midway in 2010 (Department of Education, p. 18, 2010).

The specialist teachers have an important role in building on teacher's content pedagogic knowledge while keeping them focused on the agreed FVNP approach to teaching mathematics. The approach is based on making good judgements about the students, the mathematics and the pedagogy (see Figure 1). In order to diagnose students' learning teachers are encouraged to use the First Steps Diagnostic Tasks and the Diagnostics Maps. When deciding on the mathematics to teach their students they are encouraged to use the First Steps Key Understandings. An important tool that the schools use is a Monitoring Tool developed by WA DeE and used extensively in GiRN schools in order to know what the important mathematics is for each year level and to keep track of what students have learnt. In order to make decisions about pedagogy teachers can use the First Steps resource to provide ideas about activities but more importantly think about how they will focus the students on the mathematics and what focus questions they might ask. Even if teachers

do not work directly with a specialist teacher there is agreement between and within schools about the approach described. In early 2010 and 2011 there has been professional learning days that reiterate that approach using the tools mentioned above. The 2010 focus was number, the 2011 focus was measurement.

This paper describes some preliminary survey findings after the first year of implementation. It is part of a larger study that involves both qualitative and quantitative data gathered by using questionnaires, interviews and classroom observations. An Initial Questionnaire was distributed to approximately 35 teachers at a two day workshop that marked the commencement of the project in 2010. A Follow Up Questionnaire was sent to the same group of teachers towards the end of 2010. It is intended that as new teachers arrive into a school they will be provided with as Initial Questionnaire followed by the Follow Up questionnaires towards the end of each year until 2012. These surveys were adapted (with approval) from those used by The Australian Council for Education Research (ACER) for its evaluation of the Getting it Right Literacy and Numeracy Strategy (Meiers, Ingvarson, Beavis, Hogan & Kleinhenz, 2005). Out of 35 teachers participating in the FVNP 21 teachers responded to the Initial Questionnaire. Twelve teachers responded to the Follow Up Questionnaire. Of that number 8 responded to both. Section one of both questionnaires is the same. Results from section one from the Initial Questionnaire and from the Follow Up Questionnaire after the first year of implementation of the project are discussed in the following section.

Results and Discussion

Section one of both the Initial Questionnaire and the Follow Up Questionnaire comprise three questions that deal with teacher's confidence in their ability to carry out particular tasks as well as the extent to which certain tasks are carried out when planning and in the mathematics lesson. Question one of the Initial Questionnaire asks: *You have recently commenced teaching mathematics with a new class of students. From your pre-service education and /or your previous teaching experience how confident do you feel about your ability to…*

a. Choose an appropriate starting point;
b. Diagnose students' mathematics learning needs particularly those that seem to be behind the others;
c. Select a specific mathematics focus for lessons based on your students needs;
d. Ask questions that focus the students thinking on the specific mathematics in the lesson;
e. Help students with the literacy demands within the mathematics lesson;
f. Provide engaging mathematics lessons that enable all students to learn;
g. Monitor student learning in an ongoing way; and

h. Produce a plan of what mathematics you will teach and when you will teach it for the whole year.

The lead in for question one of the Follow Up Questionnaire was … '*Currently how confident do you feel about your ability to …* The Initial Questionnaire results for each item are presented below on the left. The results to the Follow Up Questionnaire items are presented below on the right. The number of teacher responses can be seen within the bars (Figure 2).

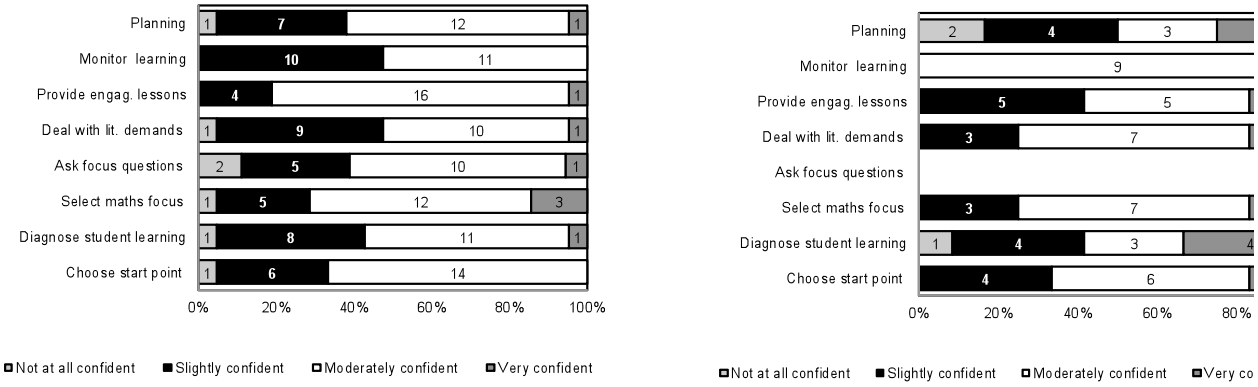

Figure 2. Percentage of teacher responses about their feeling of confidence in their ability to carry out particular activities for the initial questionnaire (left) and the follow up questionnaire (right).

At the commencement of the project teachers appeared to be more confident to:

- Choose an appropriate starting point;
- Select a specific mathematics focus for lessons based on students' needs; and
- Provide engaging mathematics lessons that enable all students to learn.

The items for which they seemed less confident included:

- Diagnose students' mathematics learning needs particularly those that seem to be behind the others;
- Ask questions that focus the students' thinking on the specific mathematics in the lesson;
- Help students with the literacy demands within the mathematics lesson; and
- Monitor student learning in an ongoing way.

The items that appeared to have some gain in teachers' confidence in the short time the project had been operating was in relation to:

- Monitor student learning in an ongoing way; and
- Help students with the literacy demands within the mathematics lesson.

Please note that the question about asking focus questions did not appear in the Follow Up Questionnaire due to a formatting error.

Teachers were introduced to the Getting it Right Monitoring tool at the professional learning days at the commencement of the project. The specialist teachers have incorporated that tool into their work with the teachers and supported them in its use as a way of keeping track of their students learning. Just as the literature suggests diagnosing Indigenous students' learning is a complex task. Diagnosing student learning continued to be a concern for the teachers in this study. This is not surprising given that the smaller schools in the project have had less than a year of specialist teacher professional support. In another section of the Follow Up Questionnaire most

teachers indicated that they found the First Steps Diagnostic Tasks and Diagnostic Map useful or very useful. A small number did not find the Diagnostic Map useful to them. Teachers may benefit from more time and support diagnosing their students' learning in an ongoing way.

It is surprising that teacher confidence in providing *engaging* lessons seems to decrease over the time. In the Follow Up Questionnaire two teachers commented that they found it difficult to 'engage the different levels in one class'. One teacher commented "I don't know how to make maths fun and exciting' while another stated that it was 'always a challenge to come up with interesting activities that the kids can cope with particularly when they cannot read.' While it seemed from question two below, that teachers were able to select activities with a particular mathematics focus they did not feel confident that these activities engaged their students. This concern reflects the challenge noted by Jorgensen et al. (2010, p. 113) of being able to make the lessons relevant and connected to the lives of the students in the mathematic lesson. Designing purposeful lessons that explicitly focus on particular mathematics is a challenge in itself. Taking the extra step of connecting it to student's home lives could take some additional time.

Question two focuses on the extent to which teachers carry out certain activities as they plan and during their mathematics lessons. It asks: *Currently when planning and carrying out your mathematics lesson to what extend do you …*

a. Use data for example, from diagnostic tasks or other records to decide on the mathematics needed to move your students forward;
b. Clarify in your own mind and state clearly the mathematical focus of the lesson;
c. Select activities that provide opportunities for your students to learn specific mathematical ideas;
d. Use focus questions to draw out the main mathematical idea or idea;
e. Make the mathematical focus of the lesson clear to students;
f. Plan for and cater for the range of student achievement levels in your lesson so that everyone is challenged;
g. Focus on the literacy demands within the mathematics lesson;
h. Use a range of classroom management strategies that will enable students to participate effectively in the lesson;
i. Make judgments about students' achievement of specific mathematics based on valid and reliable evidence; and
j. Seek advice from the Aboriginal or Islander Education Officer (AIEO) as to the suitability of a resource or activity for the class.

The Initial Questionnaire results for each item are presented below on the left. The results to the Follow Up Questionnaire items are presented below on the right. The number of teacher responses can be seen within the bars (Figure 3)

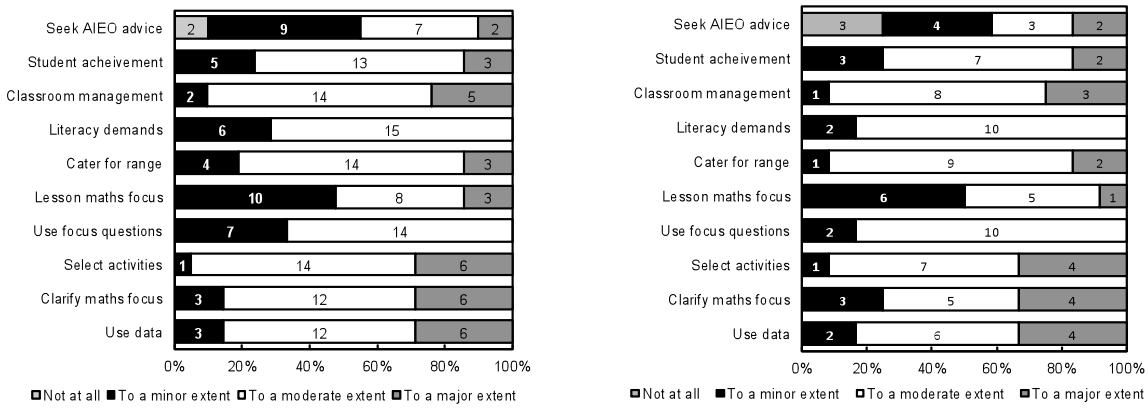

Figure 3. Percentage of teacher responses about the extent to which they engage in particular activities when planning and carrying out their mathematics lessons for the initial questionnaire (left) and the follow up questionnaire (right).

The activities that were carried out to a moderate or major extent at the commencement of the project included:

- Use data from diagnostic tasks or other records to decide on the mathematics needed to move your students forward;
- Clarify in your own mind and state clearly the mathematical focus of the lesson;
- Select activities that provide opportunities for your students to learn specific mathematical ideas;
- Plan for and cater for the range of student achievement levels so that everyone is challenged; and
- Use a range of classroom management strategies that will enable students to participate effectively in the lesson.

The activities that seemed to be carried out less at the commencement of the project included:

- Use focus questions to draw out the main mathematical idea or ideas;
- Make the mathematical focus of the lesson clear to students;
- Focus on the literacy demands within the mathematics lesson; and
- Seek advice from the AIEO as to the suitability of a resource or activity for the class.

There were a number of items that appeared to increase from the commencement of the project to the end of the first year. They included:

- Use focus questions to draw out the main mathematical idea or idea; and
- Focus on the literacy demands within the mathematics lesson.

There were a number of items that did not appear to increase. They included:

- Make the mathematical focus of the lesson clear to students; and
- Seek advice from the AIEO as to the suitability of a resource or activity for the class.

As specialist teachers work with teachers to plan lessons they use the First Steps Key Understandings to decide on the mathematics focus as well as questions that they can ask in order to focus students on that mathematics. In another section of the Follow Up questionnaire all teachers responded that they found the First Steps Key Understandings useful or very useful and most used them often or everyday. Asking focused questions during the lesson is an important aspect of the specialist teacher modelling as they work alongside teachers. The purpose of asking focus questions is to have students talk about and listen to others talk about their thinking. It appears from this limited data that while teachers feel they are getting better at asking focused

questions they still do not feel that they are really making the mathematics focus of the lessons clear to the students. Making the mathematics focus of the lesson clear to the students during the lesson is an aspect of their pedagogy that may have received more attention since they have worked with a specialist teacher. It would be helpful for specialist teachers and teachers to continue to work on ways to make the mathematics explicit to their students. It would seem from this preliminary data that AIEOs are not being used to their full potential. It is worth noting that six out of the twelve teachers responding to the Follow Up Questionnaire did not have support from an AIEO. Many AIEOs attended and participated in the professional learning days. This is preliminary data and needs further investigation.

From questions one and two it seems that teachers' confidence and the degree to which they deal with the literacy demands within the mathematics lesson increased over the year. A small number of items were selected from question three in order to further explore that idea. The lead in question asks: *Currently during your lessons how often do you provide your students with opportunities to do the following…*

a. Code switch and/or talk about the meaning of mathematical words that will be encountered in the lesson;
b. Clarify what they need to do to complete mathematics tasks;
c. Listen and talk to the AIEO in home language to make sense of words, problems and tasks;
d. Practice using mathematical language in context;
e. Talk or write about the mathematics they have learned and what they still need to learn;
f. Work in pairs or small groups to solve problems;
g. Work in pairs or small groups to share how they solved problems; and
h. Listen and talk using home language during student to student discussions.

In presenting the results for each item the results to the Initial Questionnaire are presented below on the left. The results to the Follow Up Questionnaire items are presented below on the right. The number of teacher responses can be seen in the bars (Figure 4).

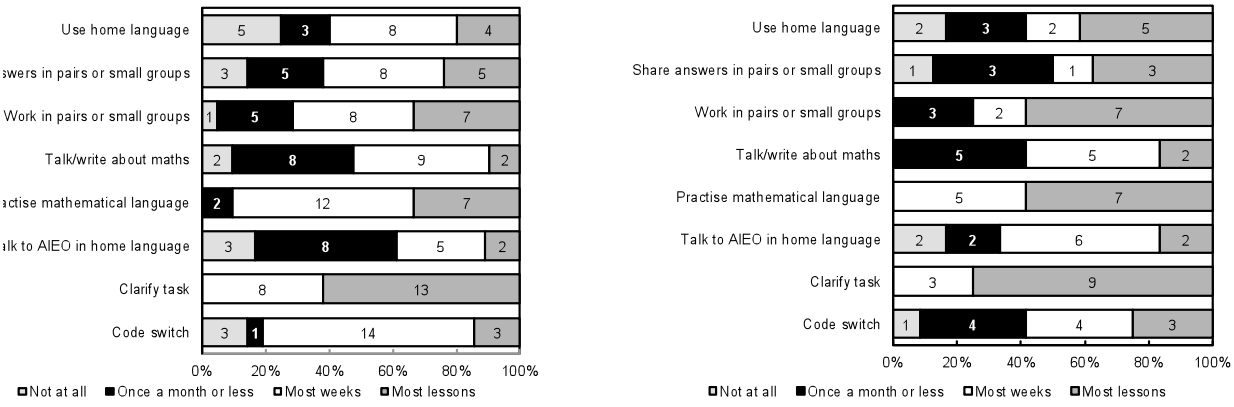

Figure 4.Percentage of teacher responses about the extent to which they engage in certain activities during their mathematics lessons for the initial questionnaire (left) and the follow up questionnaire (right).

The activities that occurred more frequently at the commencement of the project included:

- Clarify what they need to do to complete mathematics tasks;
- Practice using mathematical language in context;
- Work in pairs or small groups to solve problems; and
- Code switch and/or talk about the meaning of mathematical words that will be encountered in the lesson itself.

The activities that were carried out less frequently at commencement of the project included:

- Talk or write about the mathematics they have learned and what they still need to learn;
- Listen and talk using home language during student to student discussions; and
- Listen and talk to the AIEO in home language to make sense of words, problems and tasks.

The opportunity to talk to the AIEO seemed to increase by the end of the year.
There were a number of activities that did not seem to increase from the commencement of the project to the end of the first year. They included:

- Talk or write about the mathematics they have learned and what they still need to learn; and
- Listen and talk using home language during student to student discussions.

Also it seems from this data that the extent to which code switching took place reduced as the year went on. There is a tension between using precise mathematical words and being able to talk to each other in home language in order to negotiate meaning of the concepts (Niesche, 2010). This issue needs further investigation through the interview and classroom observation aspect of the larger study.

Conclusion

In relation to the teachers' participating in this study some insight into their confidence and ability at the commencement of the project and how that may have changed in the short period of the project can be gained. In terms of making judgements about the students they seem confident that they can monitor learning when it occurs through the use of the DoE Monitoring tool. There are indications that at this stage they need more support in diagnosing student learning.

In terms of the mathematics, teachers seem confident to select the mathematical focus of the lessons and seem clear about what that mathematics means. They have indicated the usefulness of the First Steps Key Understandings in making such decisions.

The pedagogy component is as complex to analyse as it is to effectively implement in practice. In a non indigenous class the challenge for teachers is to be able to focus students on the mathematics using suitable activities, lesson structure and focus questions. As the research suggests more complex pedagogical decisions are required in an Indigenous classroom. The extent to which teachers seem to be attending to the literacy demands in the mathematics lesson has increased and all teachers in the study gave their students an opportunity to practice using mathematical language. Further opportunities for students to talk to each other in pairs or in small groups using home language could assist build their mathematical understanding. It seems that teachers' confidence and ability to make the mathematics focus of the lesson clear to the students

may not have increased over time. Also their confidence in providing engaging activities seemed to decline as the year went on.

The implications that can be drawn at this stage of the study suggest that the important work of the specialist teacher has and is having a positive effect on teachers' content-pedagogic knowledge and classroom practice. One only has to glance at the list of what teachers feel confident with along with the extent to which they are carrying out certain activities to be able to see that. This study can only suggest that this important work needs to continue and perhaps provides some suggestions for continued focus. There is a need to continue to focus on diagnosing student learning in an ongoing way. Planning activities that focus on specific mathematics but that are also relevant, draw on contexts from their home life and are engaging for students is a continuing challenge. There may be opportunities to involve the AIEOs further with this task. The shoulder to shoulder work together in the classroom experimenting to make the mathematical focus of the lesson explicit to the students is another challenge. Implementing instructional strategies that provide more opportunities for students to talk to each other and the AIEO in home language may help build a deeper understanding of the mathematics. It would be helpful to investigate further, the role of the AIEOs in how they can assist both the teacher and the students in the mathematics class.

This is a study in progress. There are limitations which make it difficult to draw conclusions from the data. At the time of the Follow Up Questionnaire the project had been running for less than a year. It was challenging to have teachers complete a questionnaire at the end of year. The number of teachers completing both questionnaires was very small. For that reason it can only provide some initial findings. It is hoped that as the larger study progresses, questionnaire, interview and classroom observation data gathered at the end of 2011 and 2012 will provide more robust findings about the effect of the FVNP on teacher's content-pedagogic knowledge and classroom practice?

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