

Whole of site commitment 1

Leader Story

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The cluster story: (school) curriculum change, pedagogy, content and teacher practice to improve mathematical learning for Aboriginal students.

2009: Our original inquiry was to build numeracy language and mathematical thinking through using the previously successful scaffolded pedagogy of Accelerated Literacy to accelerate numeracy for Aboriginal students.

- consistent and supportive lesson routines and structures
- learning within “the zone of proximal development”
- each lesson with a learning and behaviour goal
- one hour of uninterrupted maths per day, four days per week
- scaffolding students in the language of numeracy
- developing a whole of site agreement
- focus on Year 3-5 students and their teachers
- focus on the number strand only for manageability.

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2010–Phase 1

Very quickly we found there were not enough Aboriginal children in this cohort across our cluster and not enough teachers willing to participate in the trial to make it a viable research project. Early lessons were very good literacy lessons using the language of maths but were maths content poor.

Because our inquiry focussed on pedagogy and the explicit teaching of maths we struggled with how to include cultural competencies work with our teachers. Now we understand that our pedagogy uses a process that is culturally responsive. Our scaffolded approach of multiple iterations of the stages of the learning helps students who have been absent to ‘catch up’. Mathematics lessons are about maths and are not diluted by the cultural competency debate. The utilisation of the concrete materials, questioning, discussion and meaning making allows all children to participate at their own rate and the teacher to assess their understanding in the process as it occurs. Our critical friend challenged us to think about efficiency in mathematics and questioning students so they understand what ‘good’ mathematicians do and how they think about maths.

We videoed teachers delivering the planned lessons and critiqued them together for improvements. Participants demonstrated they were willing to move into uncomfortable, unknown pedagogy. The four lead teachers; Marie Wright, Anna Collins, Carly Shiel and Rosy Wilkinson then ‘backwards planned’ to improve the sequences. It soon became apparent injecting deep levels of mathematics into the lesson plans required deeper content knowledge of maths. The delivery pedagogy was not enough on its own. To guarantee tasks were within the learners’ ‘zone of proximal development’ meant a teacher needed to have a clear map of what foundational learning comes before and what would come next. Teachers were not confident with

the content. To build rigour considerable time was spent mapping the content against the Australian Curriculum and cluster writing and discussion days continued. All staff in the two sites were trained in Big Ideas in Number with Di Seimon.

Data collection and evaluation was an issue. We trialled surveys and found that younger students all thought they were fabulous at maths and answered in the affirmative to all questions. A number of diagnostic data collection tools did not assess what we required. PATmaths was chosen and data collection was initially collected off-line.

The ongoing presence of our critical friends, Allan Bishop, Bronwyn Parkin and Project Manager Katy Morris were pivotal in providing us with learning, challenging us, pointing us to research, asking clarifying questions, summarising our thinking and steering us to rigorous research processes. Their role helped the cluster to persist when faced with project challenges. Their 'big picture' view of the project helped in clarification when we were struggling with multiple challenges.

At the end of the year a number of participating teachers involved indicated they would no longer be in their site in 2011. To address this issue draft work was completed and published into a teacher resource before 2011. This was the first of comprehensive materials including example lesson sequences, alignment to Australian Curriculum tools, planning proformas, diagnostic tools and the provision of concrete materials in resource boxes for each classroom teacher.

2011–Phase 2

Funds from the project were used to appoint a cluster coordinator as the role was deemed necessary for the breadth of work. New sites were invited to participate in the project with three teachers from each site to increase sustainability. The two phase 1 sites agreed to implement the sequences across the whole school. All participating sites agreed to use PATmaths on-line to collect project data for Aboriginal students.

On cluster days, teachers grappled with the Big Ideas in Number and teaching students Number from the introduction, "Trusting the Count" through to "Partitioning". Intense discussion led to clear sequences and rigorous implementation. With repeated implementations, the efficiency of groups of students was considered. The finding was that a group greater than two meant that students could become 'passengers' in the learning, whereas a group of only two meant that both students had to do the mathematical thinking. This was true even when their ability level was quite different. This social constructivist approach supports both learners, with the more able consolidating their learning by teaching and the other consolidating through repeated practice.

"Questioning throughout the lesson allowed the teacher to ascertain student understanding and change course when needed."

Teachers improved their ability to synthesise the maths and target one goal for the lesson rather than trying to teach too many concepts at once. Questioning throughout the lesson allowed the teacher to ascertain student understanding and change course when needed, or re-visit the learning or re-frame students' description of their thinking into mathematical language. Questions were critical at the end of the lesson when students shared problem solving strategies and verbalised their learning. The responses enabled the teacher to determine if concepts required repetition in the next days' lesson. Use of concrete materials was vital from R-7 even after students had moved to the abstraction of concepts. This was challenging for upper primary teachers wanting to move students to paper and pencil before learning was consolidated.

Presentation at the AAMT MERGA 2011 conference clarified the thinking of the project participants.

2012–Phase 3

The focus was whole school implementation across the phase 2 sites and sustainability of the project. Only one participant per site continued in 2012. These participants took on a leadership role in their site. Retrospectively, this on its own was a mistake. Considering the transient nature of staff in our sites in the future three participants per site would be ideal with one taking on a lead role.

With staff turnover, a model to continuously induct new people was required. They were trained in Big Ideas in Number by the cluster coordinator and introduced to the sequence. Initially this took a full day but now only half a day. As part of the training experienced scaffolded maths teachers demonstrated a lesson to those learning. This de-privatisation of classrooms strengthened sharing and built teacher confidence. Continuing presentation at conferences broadened the interest, opened us up to being challenged and made us think deeply about our practice. It also opened our classes to observations by teachers from outside our cluster.

Further training by Thelma Perso unpacked the language of NAPLAN and... numeracy. Rosemary Callingham worked with staff on statistics and probability. Both provoked teachers to think about, "Where to next?"

To ensure resistant teachers were engaging in the pedagogy observation tools and processes were implemented including leader and peer to peer observation and feedback. (Refer to our Leader's Story by Gaynor Steele.)

Initially, only one Principal was a continuous participant. When a second Principal took an active role their sites' involvement continued to grow. Having Principals highly involved throughout would have ensured greater success and sustainability.

For the future

- Development of whole school agreements and policy to embed the practice for the future.
- Utilising the pedagogy to develop sequences for other strands of maths i.e. measurement and geometry, statistics and probability.
- Sharing the learning and pedagogy with our feeder high schools and preschools.
- Scaffolding students in applying numeracy across the curriculum.
- Teachers using the pedagogy to plan other curriculum areas.
- Continue to network with current cluster of teachers and adding new teachers and sites.
- Continue to work on the 'meaning making' and 'handover' component of the lesson sequence.

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The project's aim of improving mathematical understanding for Aboriginal learners was significant especially for younger students. It has provided comprehensive foundations for them in maths. All students understand themselves as mathematicians. Their repertoire of technical mathematical language has grown to allow them access to problem solving without the cognitive overload caused previously by literacy demands in maths. Teachers will continue to use this successful scaffolded approach. The deep teacher content knowledge and this scaffolded approach has hugely increased teacher confidence and quality in teaching maths.



Finding 6.7: Collaborate

Focus on a specific area of professional learning and collaborate through professional relationships on a common goal.



Finding 6.8: Research

Develop pedagogy through site-based, whole-school, collegial, data-driven professional learning that builds on a strong established research base. For teachers, lesson observation and feedback is at the heart of sharing professional knowledge.