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MAKE IT COUNT

theme 1

Community and School Engagement

Educators are familiar with the maxim that community engagement is an important step towards improving educational outcomes for Aboriginal and Torres Strait Islander students. But what does this mean in the classroom day to day? Translating the general directive to 'engage with community' into purposeful action that generates positive outcomes is a challenge for many schools, especially in mathematics and numeracy.

Some effective, practical engagement strategies gathered by the Make it Count project include:

- Being parent and family focussed, rather than beginning with an intention to engage the whole community;
- Recognising that many Aboriginal and Torres Strait Islander parents and community members have poor perceptions of mathematics in schools and even a fear of the subject, often related to their personal experiences when at school;
- Avoiding and, where necessary, confronting ill-informed generalisations among colleagues and others about Aboriginal and Torres Strait Islander learners, community and culture;
- Overcoming the fear of 'doing the wrong thing' by asking simple questions of a trusted parent or community member before engaging more widely;
- Spending time and effort to develop a strong whole-school rationale and purpose for community engagement;
- Providing opportunities for genuine two-way learning. Members of the community learn from the educators, and school personnel learn from the community;
- Building the 'pedagogical voice' of Aboriginal and Torres Strait education officers who support teaching and learning in classrooms. They often the interface between schools and thecommunity. Their important role in the classroom can be enhanced through deliberate strategies to build their knowledge and understanding of mathemat ics and how it is learnt. In turn, this enables them to help build appreciation of school mathematics among community members;

Building the 'pedagogical voice' of Aboriginal and Torres Strait education officers

Supporting best teaching of mathematics for Aboriginal learners

Supporting best teaching of mathematics for Aboriginal learners

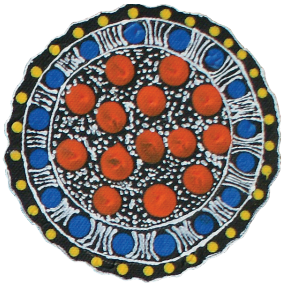
- Focussing on demystifying mathematics in community engagement programs through:
  - Processes and activities that connect the worlds of commu nity members with the world of school mathematic;
  - Careful attention to the language of mathematics in order for parents and community members to have access to the mathematical discourse of their young people's schooling;
  - Cross-age tutoring in which older students teach their younger siblings and peers, and even the adults present if that is appropriate; and
  - Active involvement of community members in special mathematics events involving Aboriginal and Torres Strait Islander students.

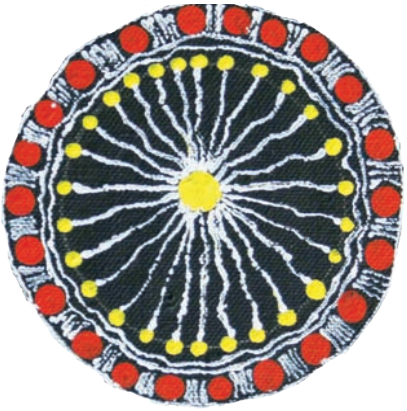
Many incidental opportunities to engage parents and community members become apparent when teachers are tuned in. This occurs when there is a whole-school culture that values and enables strong levels of Aboriginal and Torres Strait Islander community engagement in mathematics.

There is also another dimension to community engagement and that is with business and industry who have priorities in Aboriginal training and employ-ment. It is important for schools to give weight to the long-term opportunities for Aboriginal learners and how mathematics impacts on life choices particularly in employment. Therefore partnerships with business and industry can offer all sorts of possibilities. Closing the gap in learning outcomes has direct implications for closing the gap in employment opportunities and outcomes.

Questions for discussion at a school level about community and school engagement.

1. How do we currently engage Aboriginal parents in our school? Is it effective? How do we know? Is it based on social inclusion of parents only or do they have a say about their children's learning?
2. How can we involve parents in the mathematics learning of their children?
3. What types of approaches or activities could engage educators and parents in two-way learning and dialogue from each other, for example, us learning from them about their perceptions, understandings and uses of maths and them learning from us about the required curriculum outcomes for their children and the different ways we teach maths?
4. How can we work effectively with business and industry to develop mathematics skills to improve employment opportunities for Aboriginal learners?





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MAKE IT COUNT

theme 2

Supporting best teaching of mathematics for Aboriginal learners

Leadership for School Change

It is well documented that leadership is a key factor in school change. However, despite the recognition that leadership of mathematics at the school level is important and the development of some strategies, there is no national program specific to leadership in mathematics education for Aboriginal students. Nonetheless, some teachers, principals and schools are working successfully at the intersection of Aboriginal education and mathematics education. Some characteristics of their approaches are:

- Vision and drive of the principal around the changes needed in the school;
- A culture of high expectations – of Aboriginal students, and of their teachers;
- Investment in Aboriginal Education Assistants as mathematics educators and as leaders in the school and the community;
- Establishing, maintaining and supporting purposeful relationships between those involved in the education of each child through a shared vision and commitment;
- Planning and practice that is informed by the collection and analysis of data. School leaders must develop the capacity to analyse and interpret data, and use these interpretations to inform decision-making;
- The challenges of the 'achievement gap' in mathematics for Aboriginal students are so profound as to warrant special attention to generating, gathering and analysing data on Aboriginal student outcomes in the subject;
- A culture of expectation that pedagogy is constantly evolving, with teachers continually monitoring, refining and reflecting on their work in the classroom. This is a recognition of an understanding that there is no single universal answer to the question of how to teach mathematics to Aboriginal students;
- A program of practical support for quality teaching such as provision of resources (including curriculum and assessment resources) and teachers supporting and mentoring one another;
- An emphasis on the proficiencies in the implementation of the Australian Curriculum: Mathematics;
- Confronting and examining the assumption of some teachers that, *'Some kids can't learn maths'* or, indeed, that '*Aboriginal and Torres Strait Islander kids can't learn as well as other students*'. Most times this requires

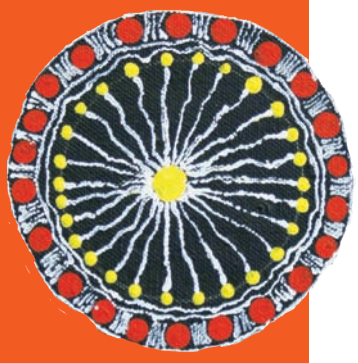
Confronting and examining the assumption of some teachers that 'Some kids can't learn maths' or indeed that 'Aboriginal and Torres Straight Islander kids can't learn as well as other students'.

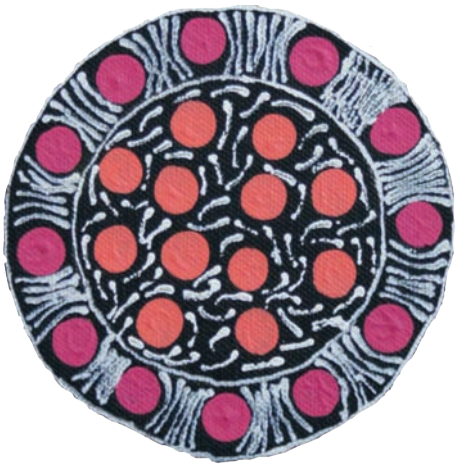
courageous conversations between principal and teacher, or teacher and teacher – conversations about deep personal issues such as deficit assumptions and beliefs about students, the community etc.

- Implementing strategies around absenteeism/transience/lack of retention, because these factors create particular problems of continuity in learning mathematics;
- Increasing teachers' levels of pedagogical and mathematics content knowledge.
- Engaging outsiders through, for example, practitioner-researcher partnerships.
- Mentoring and supporting new staff, including principals and leaders, with the consistent message, 'This is what we do in mathematics and why we do it in this school'.
- Supporting Aboriginal Education Assistants to do their work in mathematics, community and school leadership.
- Establishing professional learning communities that off a powerful mechanism when they are well-constructed and supported, collaborative and inquiry-based, simultaneously challenging and safe for those involved. Time and funding are essential for leaders, teachers and Aboriginal Education Assistants to participate in these communities. These communities offer a space for addressing many of the issues outlined above.

Questions for discussion

1. How well do the relationships at a professional level in my school and between my teachers and their Aboriginal students, Aboriginal education assistants, and families support Aboriginal students in their learning of mathematics? Am I taking a lead role in a 'pedagogy of relationship' that informs and supports best teaching of mathematics for Aboriginal learners?
2. What am I doing to ensure that mathematics pedagogy is constantly evolving and being evaluated in ways that informs how and what mathematics is taught?
3. Are all of those teaching mathematics doing so in ways that inspire students? If not, what are the barriers? How can I inspire my teachers to be passionate about the teaching of mathematics given how important this is in the development of positive attitudes and dispositions towards mathematics?
4. How can I develop leadership capacity in teachers and Aboriginal educators who are working at the intersection of Aboriginal education and mathematics education?
5. Am I an advocate who can influence others outside my school, in particular, other leaders? How can I work with them? How can our school work with relevant people in industry and business who have strategies to train and employ Aboriginal school leavers?





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theme 3

Pedagogy and Classroom Practices

Teachers need to implement approaches that build on Aboriginal and Torres Strait Islander ways of knowing, learning and doing mathematics. This inevitably means moving away from a 'transmission' model to an approach that is more responsive. It requires creative and thoughtful use of each teacher's repertoire of professional skills, and a careful consideration of context.

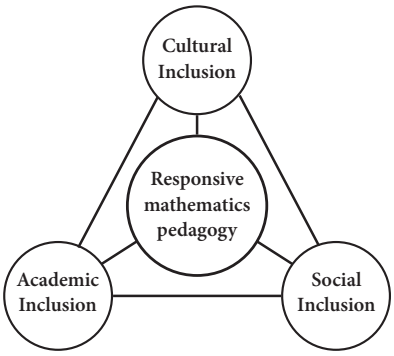
There is an increasing body of evidence that pedagogy and related classroom practices in mathematics that are successful for Aboriginal and Torres Strait Islander students also work well for other students, but the reverse is not necessarily true: what works for other students may not work well for Aboriginal and Torres Strait Islander students. It should also be noted that Aboriginal and Torres Strait Islanders students seem more vulnerable to 'bad' pedagogy than their non-Aboriginal and Torres Strait Islander counterparts.

Practices in mathematics that are successful for Aboriginal and Torres Strait Islander students also work well for other students, but the reverse is not necessarily true.

There is no single answer to the question of appropriate pedagogy for Aboriginal and Torres Strait Islander students, but appropriate pedagogy – and associated classroom practices – is characterised by being responsive to diversity in order to meet each student's learning needs.

Responsive pedagogy in mathematics

When responsive pedagogy in mathematics for Aboriginal and Torres Strait Islander learners occurs, the teacher identifies and works with students' world views and ways of knowing, working and learning. For some students this will include connection to 'country'; for others it will not.



Knowledge of individual students and a connection with families and the wider Aboriginal and Torres Strait Islander community is important. Teachers can fear 'doing the wrong thing' culturally, and need strategies to learn about the community context. Feeling the fear is not sufficient reason to shirk your duty as an educator to connect with families and students. However, learning outcomes in mathematics can be compromised or even lost if there is not a balance between cultural, academic and social inclusion approaches.

Supporting best teaching of mathematics for Aboriginal learners

Supporting best teaching of mathematics for Aboriginal learners

Using story-based learning is one way of drawing Aboriginal and Torres Strait Islander students into the learning conversation. This links to using mathematics as a way of communicating, where it is seen as an abstraction of reality with symbols that are telling a story.

Structures in the classroom that support learning of mathematics

It is important that teachers make the learning goals (for the lesson, for the unit of learning etc.) intentional, explicit and understood by all students.

Establishing a learning environment that is predictable (for students, parents and teachers) through structures and routines, and setting out clear expectations are valuable strategies. Part of this strategy involves giving clear and well-known processes for scaffolding students' learning in mathematics. An 'apprentice model' can provide the overall framework for this consistency such as: I do – you watch; I do – you help; You do – I help; You do – I watch.

It is essential that teachers give consistent and explicit attention to the language demands inherent in learning mathematics, remembering that the language of Western mathematics may vary greatly from students' home language of mathematics.

Strategies for providing multiple modes of learning mathematics for Aboriginal students

- Students watching as teachers (or others) model the mathematics ie doing it, articulating it, applying it.
- Providing means for student control and choice within their learning.
- Providing time for students to reflect on their learning.
- Giving opportunities for independent and collaborative learning.
- Students interacting with mathematics through 'body-hand-mind'.
- Establishing effective ways of capitalising on the potential of Aboriginal and Torres Strait Islander education officers in schools to contribute to the development of pedagogy for mathematics, such as a two-way approach to teaching and learning.

NOTE: Individual teachers can make a difference in Aboriginal and Torres Strait Islander students' learning and take a leading role, but systematising good teaching across the school can only come through whole school approaches.

Questions for discussion at a school community level:

1. Am I considering the social, contextual and cultural aspects and implications of learning for Aboriginal learners? Am I applying these to my teaching of mathematics and numeracy? How might I do that? How effective am I and how do I know?
2. Do I have a deep knowledge of the mathematics that needs to be taught/learnt?
3. Am I working closely with others, such as Aboriginal education assistants, to find and create stories that can 'hook' students into the learning?

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MAKE IT COUNT

theme 4

Research

It is self-evident that research in the area of mathematics education for Aboriginal and Torres Strait Islander students is important. Most research projects are short term and are funded through the Australian Government's Closing the Gap, Smarter Schools National Partnerships or Australian Research Council initiatives. Many are about testing 'good, mainstream mathematics' with Aboriginal and Torres Strait Islander learners and adapting these to suit local contexts.

A lot of the current research is focussed on primary education and is state or locally based, with a leaning towards more remote locations. There is a reasonably heavy emphasis on research associated with students not reaching agreed benchmarks in mathematics.

An over-arching issue for schools is the 'evidence-based' emphasis in contemporary education. In the field of Aboriginal and Torres Strait Islander students' learning of mathematics, there is currently a relatively small body of research that can inform practice, which means that schools and even systems can struggle to identify practices and approaches that have a sufficient evidence base. There are also issues around the dissemination of research findings for widespread effectiveness. Coherent, purposeful sharing of research and research findings is currently limited, resulting in a lack of impact nationally.

...the establishment of an inclusive research network that welcomes and promotes dialogue between members from Aboriginal and Torres Strait Islander education and from mathematics education.

A further issue is the tendency to stereotype Aboriginal and Torres Strait Islander students' learning of mathematics, arising from inappropriate generalisations of other findings.

The AAMT, though the *Make it Count* project, identified the need for the establishment of an inclusive research network that welcomes and promotes dialogue between members from Aboriginal and Torres Strait Islander education and from mathematics education.

Governments, researchers and professional organisations need to collaborate to develop a research agenda with priorities (short, medium and long term). Some general considerations for this research agenda are:

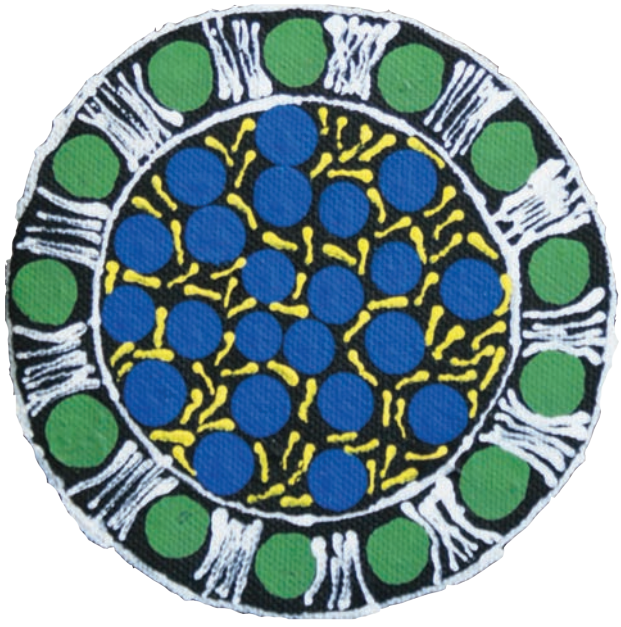
Supporting best teaching of mathematics for Aboriginal learners

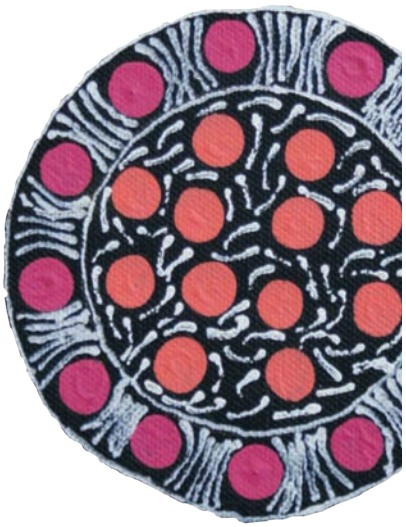
- Identifying, developing and defining effective (valid and reliable) data tools;
- Relationships that impact on teaching and learning;
- The role of language in mathematics, including how to develop effective pedagogy to build a bridge between specialised mathematical language and dialects of Aboriginal and Torres Strait Islander English, and Aboriginal and Torres Strait Islander languages;
- The role of questioning in the mathematics classroom;
- Critical evaluation of current mathematics programs that are being used or developed in schools; and
- Drawing on Aboriginal and Torres Strait Islander pedagogies and exploring the implications for mathematics.

There is still a lot of work to be done in this area and huge scope for research. The key will be to get existing and future research efforts operating in some sort of coordinated way, with Australia-wide sharing of information and informed discussion about the implications of research findings.

Questions for discussion at a school level about research

1. Are we participating in communities of practice with that are focussed specifically on improving pedagogy? Do pur data tools and collection strategies truly and fairly measure the mathematics learning outcomes of Aboriginal learners in our school/s?
2. Are we accessing people and resources to support our research so we our building a strong evidence base to inform what we teach and how we teach?
3. Are we critically evaluating our current mathematics programs?





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MAKE IT COUNT

theme 5

Professional Learning

Professional learning about Aboriginal students and mathematics is mostly confined to individual projects and some system initiatives, and is unfamiliar territory for many teachers. This area of professional learning is important, not least because the focus on literacy in recent years has sometimes been at the expense of numeracy. Turnover of staff in schools can lead to a lack of continuity of knowledge and experience, including that developed through professional learning, so it is vital that educators are continually given opportunities for development in this specific area.

There is a clear appetite for effective professional learning for teachers, Aboriginal and Torres Strait Islander education officers, and leaders to increase their knowledge, understanding and skills. Many educators are specifically eager for professional learning in mathematics content and pedagogical content knowledge and/or in working effectively with Aboriginal and Torres Strait Islander students, parents, families and communities.

Professional learning communities can be an effective instrument in this regard. They can be vehicles for:

- Professional learning;
- Mentoring people new to the school; and
- Peer to peer support.

...professional learning must have a focus on putting the learning into practice, supported by time for appropriate follow-up and reflection by those involved.

Professional learning communities can be formed in a variety of ways, providing flexibility in the ways they function. Their foci can support effective pedagogy, community engagement and/or school change to support mathematics. They can incorporate educators from different systems, sectors and locations. As such, they are one method of bridging the divide that can exist between primary and secondary sectors in relation to how and what mathematics is taught, which can create or exacerbate transition
issues for students. Remote locations can incorporate a clustering approach for professional learning through the use of technology, capitalising on the increasing availability of high speed internet connections.

All professional learning approaches require sustained commitment to the known principles for effective professional learning (for example, closely related to the classroom; ongoing; support from systems and leaders; peer to peer support). In the face of the complexity of issues faced by many teachers and schools, professional learning must have a focus on putting the learn-

Supporting best teaching of mathematics for Aboriginal learners

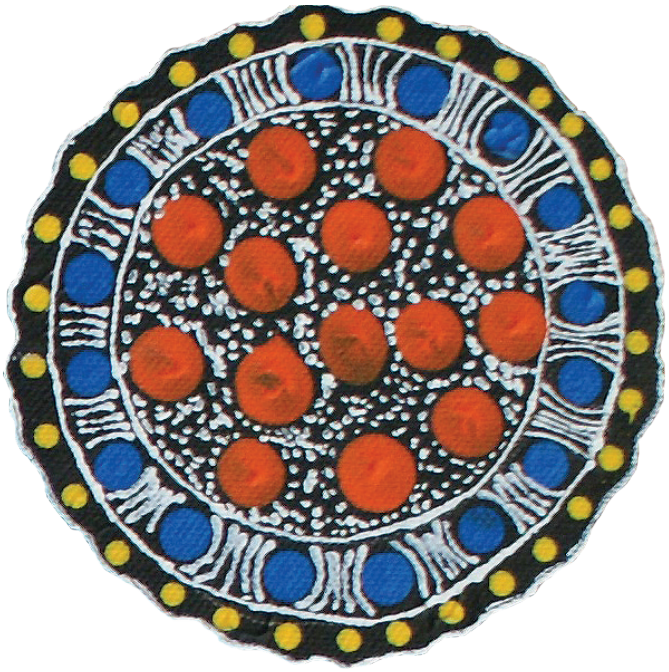
Supporting best teaching of mathematics for Aboriginal learners

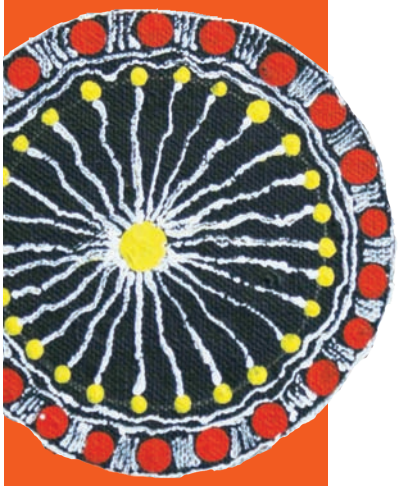
ing into practice, supported by time for appropriate follow-up and reflection by those involved. There is also the need to build excitement about improved mathematics outcomes for Aboriginal and Torres Strait Islander students through sharing approaches and celebrating successes.

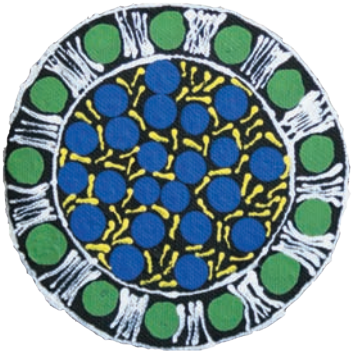
Professional learning should be expanded to include purposeful engagement of and with parents and community around mathematics, including strategies for learning about Aboriginal and Torres Strait Islander students, families and communities.

Questions for discussion at a school community level

1. What are the professional learning needs of educators in our school in mathematics and numeracy education for Aboriginal learners? What resources are available and how well are they used?
2. What are the possibilities in establishing or joining a community of practice that is specifically focussed on improving mathematics outcomes for Aboriginal learners? Who can help?
3. How can we collaborate with other schools close by or further afield, for example through the use of technology?







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