



Aboriginal and Torres Strait Islander Mathematics Alliance

Culture, identity and confidence

Where are we now?

Aboriginal and Torres Strait Islander parents, families and Communities want their children and young people to be successful in the western school system AND they want them to know their own culture and have a correlating strong and rich identity. For many students their connections to Country and Community are deep and real. There are students who are succeeding with 'a foot in both camps' even when the disparity between their home-lives and mainstream-lives can be extreme.

There are many differences between Aboriginal and Torres Strait Islander communities, cultures and contexts but also many similarities. Culture and identity is itself a diverse issue, for example, between urban and remote environments. For some students this will be about reconnecting with culture and identity and developing their pride as Aboriginal and Torres Strait Islander people and, for others, it will be about experiencing an education and a work environment that values their culture.

Although it is recognised that there are many differences between the contexts in which Aboriginal and Torres Strait Islander learners come from, for many students (strong) language is central to confidence and identity and students can thrive when teachers support the languages students bring to school.

Students find mathematics (and science) to be relevant when it relates to their lives and their culture, when it is useful, purposeful and contextual, has 'felt meaning', and can be projected into the future.

...recognise mathematics in culture, celebrate and validate culture, and recognise culture as mathematical.

What are the issues?

The issues are mostly around the two aspects of culture and curriculum:

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1. Elders want students to be successful not at a cost to their language and culture and if family still comes first. Communities are concerned that kids will become 'alien' to their 'first lives'. Some cultural practices such as independence can clash with western education.
2. There are many issues around homesickness and being separated from Country and community when students live away from home and/or Community.
3. The disparity in learning outcomes will not reduce while the curriculum does not integrate Aboriginal and Torres Strait Islander perspectives skilfully and sensitively.
4. Positive cultural identity in schools must be nurtured. Students should not have to defend their culture in a school setting.
5. There is a linear ideology that exists in western education which is not the case for Aboriginal and Torres Strait Islander students. Students can lose their sense of mathematical self through the school system, for example, when western education does not validate different ways of problem solving as a way of engaging students
6. The linear education system does not accommodate attendance issues.
7. Limited, narrow or negative perceptions of what mathematics is and mathematical identity and confidence.

What are some ways forward?

How can schools change? Can employers change too? Any ways forward must engage with Community. Fundamental to making a difference is:

1. An eco-system of relationships – between Community, school and business; leaders, teachers, mentors, professionals etc - which can support students in different ways including:
 - The issues around homesickness for students who move to other areas for further education need to be addressed
 - Those who are players in this network of relationships respect first (second, third, fourth etc) languages and incorporate these into the curriculum
 - Cultural safety requires skillful leadership. Leaders need to work with Communities to achieve this. They must be able to bring together different groups for the sake of education (See Theme 2).
 - Reducing the disparity between school and community.
2. The key driver needs to be Community recognising what it is they want for their children (assuming that Community members want their children to leave and enter professions outside the community): stories of Aboriginal and Torres Strait Islander people telling stories of how mathematics fits in their culture - how it helps improve Community economies for example.
3. Schools need to change and become more flexible and responsive and recognise mathematics in culture, celebrate and validate culture, and recognise culture as mathematical:

theme 2

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- A student's pride and wellbeing takes priority and needs to be strong to engage in rigorous curriculum
- Schools need to validate different ways of learning eg problem solving
- Educate teachers about Aboriginal and Torres Strait Islander mathematics (ethno mathematics) and culture and bring it into the classroom
- Ensure that teaching and learning support and develop cultural identity
- Whole of student and whole of school approach – identity, recognition



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Leadership

Where are we now?

In looking at the status in leadership that is making a difference to the mathematics learning outcomes of Aboriginal and Torres Strait Islander students, it is important that all levels are considered ie Community, education and business and how well they are leading individually and/or collaboratively.

Within Community there are some state based Aboriginal and Torres Strait Islander education consultative groups that have been sustainable and have a history of strong leadership. There are also numerous examples of education leadership in Indigenous Communities across Australia.

In schools, good practice happens where classroom practice aligns with leadership practice and there is school commitment from leaders.

In business, there is a growing focus on leading change which is often generated by reconciliation action plans or social responsibility strategies.

Effective leadership is undoubtedly a forerunner for change and is a recurring theme in making a difference. Skilful leadership means that Aboriginal and Torres Strait Islander students and employees experience cultural safety.

Skilful leadership means that Aboriginal and Torres Strait Islander students and employees

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What are the issues?

One of the big hiccups that is preventing Community, education and business from talking and hence collaborating, is that they do not speak the same language. "They don't understand each other". Another issue is that schools generally do not teach about business in a way that hits the mark for Aboriginal and Torres Strait Islander students.

What are some ways forward?

We need to break down the siloes between Community, education and business and create an interface or space for the three to translate the different languages each one speaks.

We need a triumvirate of leadership within the eco-system of relationships that inspires Aboriginal and Torres Strait Islander people and those working with them - whether it's Community, education or business - to greater heights of achievement.

Each sector could be responsible in different ways. For example:

- a.) Community is responsible for leading the aspirations eg scholarships and developing the cultural language. b.) Organisations that work with Communities and employ people need ensure Aboriginal and Torres Strait Islander employees stay strong in culture. C.) The vision for leadership is set by Aboriginal and Torres Strait Islander people.
- In schools quality teaching and learning embeds cultural perspectives, leads change, is relevant to context and gets kids ready for careers
- Business is responsible for providing safe spaces (culturally safe) for Aboriginal and Torres Strait Islander people, "where we can be ourselves", and access to careers are supported as well as pathways. Business must lead investment in education internally and externally

Integral to successful leadership are the relationships between Community, education and business. Discussing and defining responsibilities both collectively and individually as leaders, and communicating effectively and productively, is an essential element of the eco-system of relationships.



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Transition

An Aboriginal and Torres Strait Islander person may experience different types and levels of transition at many points or steps in their life as illustrated in the diagram below. What is apparent is the 'ecosystem of support' that helps people move through these transitions so they are 'math-ready' at any(transition) step along the way.

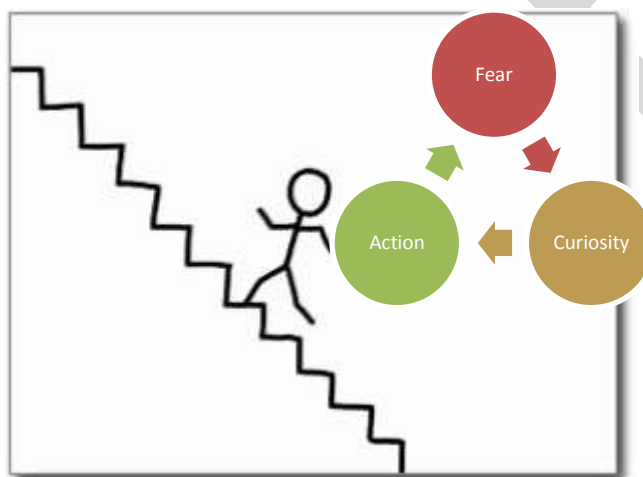


Diagram 1: Maths ready in a stepped learning environment during transition steps

Where are we now?

Defining 'transition' refers to a number of aspects of an Aboriginal & Torres Strait Islander students' educational pathway. The most obvious transition steps are those from home to school and from home to tertiary institutes. There are also transition steps between education cultures ie from primary to secondary schooling to tertiary education.

On another level there is the transition from fear to curiosity to action. For students to be maths-ready at any of these points along their pathway, their chances of successful outcomes are improved within a stepped learning environment. This is illustrated in Diagram 1 where the steps represent each of

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the levels students engage with as they go through possible cycles of fear to curiosity to action along the way.

What are the issues?

The diagram provides a valuable framework for considering the transition issues for Aboriginal and Torres Strait Islander students in mathematics education. If the steps represent the levels of education, the most prevalent issue is that students are continually being placed in environments where teachers are at rather than where students are. In many schools across the country there are teachers who are teaching out of their field or specialisation and are not competent and this can be particularly so in mathematics. Chances are that this is even more prevalent in schools that have Aboriginal and Torres Strait Islander students. The level of frustration can be rife for both teacher and student!

There are many other issues:

1. The evident division in teaching in secondary where there is cohesion in primary (in teaching styles) and in teachers working together.
2. Students are ready at different times – for whatever reasons. They need time to consolidate as they move through transition steps. These steps - between home, school and tertiary, career sectors - need to be smoothed for, and with, the students. More needs to be done to improve the transition between students leaving their home environment to go to school. For example, parents need to feel comfortable engaging with schools and schools need to provide a space – we are calling it a ‘3rd space’ - where parents and schools come together. This approach will build relationships between home and school – making it comfortable for parents to engage and become involved, and for schools to learn more about families etc
3. Some students do not have the resilience to cope with the transition steps and do not feel that it is okay to fail, to pause and develop confidence before moving on. At these transition steps we need to create comfort zones or safety blankets for students
4. There can sometimes be a “nasty” side to opportunity - where the employer is looking for a statistic to make them appear good - people are offered positions but don’t actually have the skills
5. Students need to have time to practise their newly learned skills. A fault with Australian Curriculum is that it is so full there is not time to do this
6. Students need to be able to see and feel that they are learning
7. Shift away from grades
8. There is a dearth of research about the 3rd space where parents and schools come together (eg how schools report to Aboriginal and Torres Strait Islander parents)
9. There is often stereotyping about Aboriginal and Torres Strait Islander students which can lead to misnomers and generalisations. There can be vastly different experiences for urban and rural students eg in connections to Community and Country

Some students do not have the resiliency to cope with the transition steps and do not feel that it is okay to fail, to pause and develop confidence before moving on.

10. Issues with transition for students between a school and business partnership. Schools must help students get ready for the opportunity in cadetship, scholarship, apprenticeship etc.
11. Often the leadership in schools is not invested in transition.

What are some ways forward?

Organisations need to change ie at school and business levels. We can see the potential for some very positive ways forward and this will begin with improved relationships between schools and business and an intersection between leadership from both for students' transitioning.

1. Leadership in schools must be fully engaged with a committed effort. "We want the best for our students and ensure they succeed." This will include following up with students when they leave school.
2. Research that identifies what works and doesn't at transition points/steps
3. Identifying successful models around the country and emphasise these, for example, the Koorie academy model – program (see Mark Rose presentation)
4. Destination tracking – students that are transitive/mobile and supporting them in their moving. Further to this, follow up of students 2-3 years on – similar to what happens at Immanuel College. Consider new ways of education tracking and tracking competency
5. Smooth the transition steps for the student and continue it 'around' so students see themselves as lifelong learners,. An example of this could be linking business to education to business and then linking back to Community with students engaged in a lifelong learning process
6. Identifying and accessing resources from government and business that can help smooth the transitions
7. There are some peer relationships and mentoring programs working well. We need more mentors – a critical mass - to create a ripple effect; Connect mentor program at University (eg AIME?)
8. Programs that give school students experience in university
9. Role models: more role models made more prominent and at various transition steps. Role models from secondary who go in to primary schools – work all the way through from home to school to work etc.
10. Create an alumni culture within schools where Year 7s go back to primary school and university students got back to secondary school. This will enhance the transition process for students from the other direction but also helps to form the eco-system of support that students might need
11. Consider an ambassador program?????
12. Working with students at different stages in resiliency training and accepting that 'failure is ok', that we learn from mistakes as well as our successes
13. There always needs to be a Plan B just in case Plan A does not work
14. Qualifying people (and resourcing) who are skilled to specifically work with Aboriginal and Torres Strait Islander students to provide career advice

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15. Rather than students be placed in a level where teachers might be at, teachers are put in the level that students are at
16. Transition is usually linked to change and change can be positive therefore rather than viewing transition as a hiccup or an adversity, the flipside is looking at transition as a positive. There can be many important transition steps for people – getting them at the right times so they can make the transition will make a difference.

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Investment

There has been much good work by many people across Australia to 'close the gap' in education and in other areas such as employment and health. However, there remain striking disparities between Aboriginal and Torres Strait Islander people and non-Indigenous people especially in economic inclusion and community economies. Increasingly, business and industry are investing in people, projects and plans to at least halt this growing disparity.

When we refer to 'investment', what do we mean? It's not always the mighty dollar. It also means investment in the local community, in relationships, and in generosity of spirit. It's about building social capital in communities and creating business investment in education.

Where are we now?

Currently, the effort, energy and passion of individuals is "near tipping point" in many situations. For example, generosity of spirit is not sustainable. Passion is not sustainable; in schools, all too often, we see passionate teachers eventually 'burn-out'.

There are many initiatives that are funded, and certain amounts and types of funding available, but any funding is considerably diminished due to red tape and bureaucracy 'clipping the ticket' at every level.

What are the issues?

Many of the issues outlined below relate to resourcing:

1. We are all asked to do more with less
2. Maintaining a digital connectivity/forwardness. Rural and regional Australia is getting further away from metropolitan Australia. The digital divide between the two is another 'gap'.
3. Less resourcing (including humans): Rural, Remote and Regional resourcing needs to be a compelling offering and consideration needs to be given to these locations to ensure continuity and succession

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planning. We note that some bespoke programs are having some success; they are however not a scalable way forward.

4. Remote schools that don't have eldership, leadership – what happens to them?

What are some ways forward?

Investment by Community, education systems and business in and through each other will contribute to ensuring the prosperity of Aboriginal and Torres Strait Islander people

Key to success include:

1. Digital adoption and connection – more help to more people (scalable)
2. Consolidation of project funding for scale – how do we consolidate the dollar to spread further? Investment that is scalable
3. Best practice adaption with resources
4. Longitudinal studies with long term reporting to determine the investment success. This would include an investment protocol to consider long term, meaningful outcomes to do more for more than one group
5. Empowering communities - Indigenous students to be empowered by maths and gates opened to them so they are better positioned to make a difference to their communities, organisations and systems in which they work, and their worlds.

The timing is ripe to explore the nexus of school, home, community, and business in the context of Indigenous achievement, community development, and business development and what the possibilities might be for the relationships between them to build bridges. A partnership of these Community, education and business will push for social and cultural justice so mathematics can be used for 'the purposes of empowerment at both the individual and community levels' (p. 220, Nasir et al 2008).

'Business' is now realising the need to increase focus on maths, particularly to the poor levels of uptake of STEM based scholarships and cadetships offered through RAP's. The private sector in particular is always focused on problem solving in pursuit of competitive advantage. This outlook is new to focusing on Indigenous disadvantage and holds much promise.

Investing in the nexus of school, home, community, and business in the context of Indigenous achievement, community development, and business development offers some exciting possibilities.

The timing is ripe to explore the nexus of school, home, community, and business in the context of Indigenous achievement



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Quality teaching and learning

We know that quality mathematics teaching equates to quality mathematics learning but what does this specifically and especially mean for Aboriginal and Torres Strait Islander students, their teachers, schools, families, communities, business and beyond?

Where are we now?

The current status is wide and varied and this in itself is part of the challenge but also part of the solution. But first, what do we know:

1. That Aboriginal and Torres Strait Islander students generally are two years behind their non-Indigenous counterparts in Australian Curriculum Mathematics (ACM) outcomes by year 3 and this trend continues throughout the remainder of schooling (NAPLAN)
2. Career pathways for any students are limited if they do not have the mathematics
3. There are mentors and tutors encouraging students to do higher mathematics
4. There are mathematics faculties in schools driving change in pedagogy, in what mathematics looks like in the classroom, and in the importance of maths.

What are the issues?

When considering the issues in quality teaching and learning of the ACM, these are wide and varied. Generally, they are about attitudes to mathematics; teacher capacity to teach mathematics in responsive ways (culturally, socially and academically); appropriate professional learning for teachers; a culture of underperformance in teachers and students (and schools).

1. Attitudes towards mathematics:
 - Dispositions, attitudes, recognising mathematics, perceptions of, and fear of mathematics are major issues for students, teachers (and parents/families).

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- When teachers are anxious about the teaching of mathematics, Aboriginal and Torres Strait Islander students are possibly more perceptive of and receptive to teacher anxiety and pedagogy. When students become anxious about mathematics they can be easily turned off or become disengaged from mathematics
- 2. Mathematics can be perceived as being 'not important' and is therefore not pursued.
 - Parents can have that attitude that 'I was bad at maths, that's why you are'.
 - cultural acceptance of 'bad' at maths
- 3. Teacher capacity:
 - Generally, teacher capacity is not at a level it should be – there is a lack of professional learning around Indigenous students and mathematics; teachers 'scared' or lack of knowledge of teaching maths (especially primary but also in secondary)
 - lack of knowledge of Indigenous students
 - There is not the workforce
 - wide range of ability in classroom
 - lack of good teaching pedagogy
- 4. A culture of underperformance:
 - We continue to see an underperformance of students, of teachers, and of schools, a culture of underperformance; interventionist, deficit and underperformance, low expectations; not looking to extend
 - focus on vocational rather than more academic
 - blaming underperformance on student (in the main)
- 5. The mathematics curriculum:
 - There is an impenetrable curriculum further hindered by the expectation for differentiation of curriculum that caters for a diversity of learners
- 6. Data:
 - In some schools and tertiary institutes, Aboriginal and Torres Strait Islanders students are being encouraged not to do mathematics for various reasons eg the school wanting to ensure they have good test results (eg Year 9 NAPLAN)
 - underachievement in maths – NAPLAN /PISA.

What are some ways forward?

By looking at the current status in quality teaching and learning and the range of issues, finding ways forward fall into several categories: mathematics education; leadership; teacher responsiveness; professional learning; student pathways. To 'close the gap', plans in schools must include recognised, ongoing professional learning for all educators that places mathematics education and quality teaching of mathematics as a priority.

1. Teacher responsiveness to Aboriginal and Torres Strait Islander students and families/community:
 - greater collaboration between teachers,
 - we need more teachers to be culturally proficient, aware of richness of Indigenous knowledge
 - community agreement in schools
 - pathways for students in to (????) teaching (maybe link with business).
2. Professional learning of teachers
 - Mathematics content knowledge of teachers – deep knowledge of maths and maths teaching – needs to start early ie in primary school

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- maths teachers accredited to teach maths
- teachers to re-experience maths teaching
- look at teacher training
- use AAMT to be the conduit to support all teachers – resource / guidance / PD
- Snapshots of excellence need to be made available to everyone. But also more than just viewing – foregrounding and reflection
- Aligning mathematics learners, culture and professional standards to identify teacher-learning needs.

3. Mathematics education

- lift status of teaching especially maths
- numeracy coaches linked with business
- Teachers have resources that unpack the Australian Curriculum (AC) to help/support all teachers (especially non-maths teachers) to teach the AC. “what does it look like in their classroom?”
- Teaching and learning that scaffolded and explicit; use of “relate-able” tasks – concrete, practical application that connects to experience
- recognizing mathematics as important.

4. Leadership in schools

- high quality curriculum people in administrative positions
- recognition of quality maths teachers and pathway into leadership positions
- principals need to be on board

5. Assessment

- an assessment tool (non-NAPLAN style) that shows the student /teacher has value-added
- Assessment practices in schools provide opportunities for oral answers.

6. Other:

- development of teacher workforce –eg a network of ‘high performing teachers’ in maths education for Indigenous students is created and remunerated at higher level than other teachers
- A network of powerful and successful school leaders whose schools have achieved parity in maths outcomes is formed and mentors other school communities. The network would also produce resources and support programs for leaders to target improved maths outcomes
- partnership between ‘us’ /university/business to put pressure on government
- That a national strategy is put in place to catalyse and coordinate any work done in this area and connect projects to continually develop maths practices and approaches, and learning programs. These are made available to all schools with ongoing professional learning to implement these effectively through evidence based practice. Any such projects must have ‘ a clearly measurable performance path agreed to at the beginning of the project’
- That the juxtaposition of Community, education and business is investigated and supported as a way forward to building teacher capacity.

Because of the spread of schools and communities – from very remote to inner city – the creative and innovative use of technology to connect with and between schools and their communities and business will be essential.

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