



Celebrating success:

Numeracy in remote Indigenous contexts



What makes for successful numeracy education in remote Indigenous contexts: An ethnographic case study approach

Stories on remote indigenous mathematics successes compiled by Professor Robyn Jorgensen

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Adopting a Multi-faceted Approach

Maitland Area School

Maitland Area School is in the rural setting of South Australia's Yorke Peninsula grain belt. It caters for children from Reception (in other states known as pre-school) to Year 12, with approximately 200 students. It is quite a small R-12 school, but it is quite complex. The Maitland Area School is a member of the partnership with Point Pearce Aboriginal School and the Narungga Community in the education of their children.

Point Pearce Aboriginal School is located on Aboriginal land some 20km from Maitland, and has 15 students aged from newborn to 8 years. The school builds on the existing pride in Aboriginal heritage and actively promotes the Narungga culture. Services offered include playgroup, occasional care, kindergarten and a class for children from Reception to Year two. At the end of Year 2, families can decide to send their children to the Maitland Area School, the local Lutheran school or elsewhere. The choice of schools is often informed by family ties and

histories with other community members. The school essentially runs two classes – one for the pre-school students, and one for the school-aged students. As the numbers are small, and the programs are largely mainstream, this report will focus predominantly on the work at Maitland Area School.

About one third of Maitland's students are Indigenous. Like many rural schools, the secondary section of the school is smaller than the primary section with about 80 students in Years 8 to 12. However, a feature of the school is its focus on providing a seamless transition through the various stages of schooling via an increased capacity to know every student and to individualise teaching and learning

Maitland Area School has an R-12 focus and students are spoken of in that way – not secondary or primary. The stated aim is that all students achieve national standards, and targets are not differentiated for Indigenous students. Aboriginal parents have expressly stated

that they want their children to achieve the same standards as the rest of the Maitland community. A feature of the school is its cultural inclusivity and acceptance.

There is a history of discontent between the Maitland and Point Pearce schools and both have been very proactive in efforts to become one entity, aligning structures in curriculum and governance. There is an agreed focus on literacy in the early years, and now numeracy has been put on the agenda. As an early-years setting, Point Pearce embeds numeracy and literacy learning in activities.

Literacy and numeracy are important school priorities, with sound early and continuing intervention for students needing assistance. Vocational literacy and numeracy is a focus in the secondary years, as the school offers industry certificate courses. Maitland is the focus school for Central and Lower Yorke Peninsula for Primary Industry Pathways. The school offers a range of other programs, including music, having received a large grant from the BER to build a dedicated performing arts. The school is well known for its music program, winning many awards in competitions against much larger schools.

Early years learning at Point Pearce

Point Pearce is a unique site in the early-years preparation of its students. Being located in designated Aboriginal Lands, Point Pearce has a strong connection with the local community. It has a cultural centre and is now the depository for many archival documents. This is valued by the community. The school had been a primary school, but older students are now expected to attend local schools. Thus, Point Pearce is now an early-years setting only. As is the case in many community schools, attendance can be sporadic and students often arrive late at school, particularly in the colder months. The school welcomes

children whenever they arrive and programs are flexible so as to cater for the arrival (and departure) of children.

The learning experiences are very focused on building literacy and numeracy understandings. With small classes and diversity in ages, the teachers target activities to the students' levels of understanding. The school has provided resources, such as a support teacher and an AEW, to enable this individualised teaching.



Defining success

The socioeconomic status (SES) of the area is indicated by the 2012 ICSEA score for the Maitland Area School, listed on the MySchool website (www.myschool.edu.au) as 921 (the median Australia-wide score is 1000). Unfortunately, this does not accurately reflect the wide diversity of communities within the Maitland area. The school draws from farming families working successful agricultural businesses on farms that have been in families for generations (and who traditionally send their children to boarding schools in Adelaide after Year 9). The school provides for diverse families, including Aboriginal families living in the Point Pearce community (which has an ICSEA score of 634). Within this context, a mean SES indicator does not adequately reflect the diversity of the school. As the experiences of the students are diverse, Maitland Area School does not use the averaged or aggregated scores of the school's population to measure success from one year to the next. Rather, the school measures the progress of individual students. Learning and success are very individual so the school seeks to recognise the backgrounds of the learners and identify their learning needs.

Each student is assessed using the PAT-M assessment scheme and then their results are displayed on a data wall. Throughout the year, as assessments are made, teachers are able to move the students' results along the data wall. In addition, because the assessments show students who are performing above or below age-appropriate expectations, teachers are able to build appropriate learning experiences so that they are able to move individuals forward. As such, success is very individual but a shared success between the students, teachers and families. The public recording of students' results means that students' progress is visible to others.

Teachers also keep records of the students in the early years of schooling and these work better for this sector of schooling than a higher reliance on other formal testing. These records are also displayed on the data wall.

Students are making considerable improvements on the PAT-M and other tests. Both teachers and students have been able to celebrate the gains made beyond anticipated growth areas. These gains have been seen to be a result of the targeted teaching that is now guided by the data gathered.

Transparency

There is a strong ethos of transparency across the school. The leadership team and staff recognise the value of being aware of the planning for the school, the directions being taken, the support that is provided to enable visions to be enacted, and the explicit openness of governance within the school.

As the school has had some challenges in the past, being transparent and open with community members was a priority for the principal and staff. Ensuring that the community is aware of actions being taken at the school, and has a voice into its direction through an on-going dialogue, is important to the school.

The intent of the data wall is to share students' levels of learning, and to show growth. The details shown about students on the wall were negotiated and include gender (as shown by the colour), and the child as an individual (as shown by their photo). There was discussion as to whether or not the background of the student (Indigenous or not) would be shown. However, Indigenous families want their children to be treated like the others, so it was decided that this was not to be done.



¹ Progressive Achievement Tests in Mathematics (or PAT-M) is a test designed by ACER to "provide objective, norm-referenced information to teachers about the level of achievement attained by their students in the skills and understanding of mathematics." This test is being used by many schools funded through the National Partnerships program funded by the previous Federal government.

Leadership

The Maitland staff involved in this study expressed overwhelming support for their Principal. There is a strong sense the school benefits from his leadership. The Principal has been instrumental in bringing about a collegial and harmonious environment that links strongly to community. In consultation with various stakeholder groups, the wishes of the communities are heard and either enacted or discussed further. This had led to the school being one where Aboriginal students are not differentiated from the mainstream so that they are exposed to high expectations equal to those of their peers. However, it is recognised that they may have special needs to be considered (as for other students who need extra support).

The Principal has been instrumental in fostering an approach to education that is genuinely R-12, conducive to an integrated school. The expectation that teachers will teach across the R-12 range when necessary has brought about a harmonious, one-school approach within the staff, enabling a more coherent and seamless approach to the education.

The Principal has created strong links into the community by being part of a number of service groups, living in the area and making a strong

connection with many people in the community. This way he has been able to gauge reactions to and from the community. Being part of, and listening to, community is a strength that he has brought to his leadership. Linking in with the feeder school, Point Pearce, has been a focus of his attention with the intent to build stronger links with the local people to address some of the experiences of the past. It is envisaged that this may help to make stronger, more informed transitions into the school. The Principals at the two sites have collectively worked to build a strong public sense of partnership between the two schools.

The Principal has a very supportive approach to leadership. He values staff input and supports teachers' and/or administrative teams' proposals for leading change. As a result, staff feel valued and, more importantly, successful in their teaching.

A feature of the Principal's strong leadership is open and honest communication with staff, and encouragement of similar communication between staff. This has built a strong sense of collegiality and is highly valued by the teaching staff, who reported feeling informed about the direction of the school.





Partnerships with community

As the school is very old, it has a long history with the local Aboriginal people, some of it quite negative. Grannies and aunties cited a mantra “black at the back” that reflected practices of an era that remain strong in their memories. As this impacts on relations with the community, the Principal and staff work closely with community members to build confidence in the school. The Principal acknowledges past wrongs and seeks to work with community members to build a new future for the students. Regular meetings in community are held to discuss initiatives, to seek feedback and to gain input. The two Principals liaise strongly to ensure a presence of Maitland staff in the Point Pearce community and vice versa. This includes many staff members working in community and the sharing of staff across the two campuses so that there is continuity between the two sites. For example, rather than a person from each school following up on school issues with the same families, the two schools employ shared people who liaise with community members, presenting a united educational face.

There has been a very strong message from community that they want the best for their children, not a curriculum different from that provided to non-Indigenous students. Indigenous children should get the same education as non-Indigenous students. In a recent success, one of the Aboriginal girls won a place on a cultural exchange visit to Japan. The family did not want to make a story out of her success in relation to her being Aboriginal, but wanted her to be simply part of the team. The common and high expectations for all the students are consistently evident in all sectors of practice across the school and are strongly endorsed by Principals at both sites.

When the school embarks on the rollout of a new initiative, they will undertake considerable

consultation with the community prior to the development of a new strategy or process, and then work with the community as that initiative is being enacted. Many of the initiatives are in response to parent and community concerns. For example, families and teachers were concerned that students seemed to forget basic skills and facts. Consequently, the Numeracy Coach adopted a program that would help build skills, links with the families and numeracy knowledge in the home. This school-wide program, “the 2-minute challenge,” was introduced to Point Pearce families with the Numeracy Coach visiting and hosting a BBQ to talk with and share ideas (including the new program) with the local parents, seeking their input and working with them on how best to establish the rollout of the program.

Responding to community wants is seen to be a critical aspect of engagement. The school seeks to proactively anticipate and respond to community problems, concerns, and ambitions for education, explaining changes or why things may not be able to change. The school actively seeks to be as responsive as it can, ensuring that the voices of the local communities are heard, acknowledged and acted upon in a timely manne.

Staff at both Point Pearce and Maitland schools also see it as important to liaise with community members about the success of the students. This success could be shared in formal meetings and informal talks with family about a student’s success. In some cases, families also had internet access so it was possible to capture real-time events using iPad software and email to the family members evidence of a student’s achievement. These positive affirmations of success were important in building good relationships with the families since, historically, many of the interactions between schools and families were of a negative nature.



Attendance

Maitland Area School has a strong focus on attendance. Recognising the national priority of 80% attendance as being a minimal requirement but believing that 85% is needed to effectively bring about learning, the school has set a minimum of 95% attendance for all students. The data wall (described below) indicates students whose attendance is below this benchmark. Point Pearce reported an attendance rate of 93% for a period of time; however, this dropped to 84% in recent times.

To support attendance, a number of strategies are being implemented, including the use of Aboriginal Liaison Officers to work with families whose children are not attending. All administrative staff members are off-line during class meetings held at the start of the day. If any children are absent, an administration team member takes the class while the teacher follows up with the families to see why each child is not attending. By the end of the year, attendance has increased significantly.

It was acknowledged that students can undertake many extra-curricular activities such as sport, dance, music, etc. that encroach on their learning time. As literacy and numeracy are the priority areas of learning, having students at school is crucial. To ensure that students attend, the school has set limits of 15 days per annum to be spent on extra-curricular activities so that students' primary focus is literacy and numeracy. For external reporting purposes, the school uses the usual mandated recording of attendance.

Being closely connected to the community, staff members are acutely aware of familial circumstances. One young woman – a regular attendee – was consistently late to school, because she was caring for siblings and younger children. Her late attendance impacted her learning, because she often missed literacy lessons, which were taught first in the first session of the day. Consequently, the coordinator liaised with family to build strategies to help the young woman attend school on time.





Assessment practices: Data Wall

The data wall has been established in a common meeting room. Discussions were held with stakeholders (P&C, Governance Committee, SRC, etc.) to assess their views on the suitability of the data wall being in a space used by various stakeholders. After consultation, it was decided that the data were a private matter for school staff and that the common room should be accessed only by staff and not outside groups.

Staff decided that students' Aboriginality would not be identified on the records since it was the express wish of the community that their children be treated the same as non-Indigenous students.

The data wall maps the achievement of students on various tests for literacy and numeracy. For numeracy these included PAT-M for Years 2-10, and NAPLAN scores. The data are for individual students so that teachers are able to see where each child places in relation to the national standards.

Access to students' results helps teachers to understand students' challenges in various areas. For example, a mathematics teacher was able to understand why a particular student performed well on number word problems (esoteric tasks) but struggled with problem-based tasks – this seemed incongruent. After seeing the results on the data wall, the maths teacher saw that the difficulties with problem-

based tasks may have resulted from difficulties in literacy, indicated by poor performance on literacy measures. This awareness subsequently informed her interactions with the student, who was then more able to successfully engage in tasks as literacy needs were addressed.

The data wall has provided a forum for teachers across the school to better understand the learning needs of their students; to dispel some of the assumptions that can be created around a particular student's strengths and weaknesses; and to be accountable and responsible for implementing strategies to address areas of need. In a small rural context, it can be the case that students may be seen too narrowly and false impressions are created. The data wall has created opportunities for teachers to see where students are in relation to national norms. Thus, teachers have been able to understand their students' learning needs and so plan more effective teaching based on evidence rather than on their assumptions about student achievement.

The data wall has created a significant opportunity for teachers and staff to celebrate the success of learning and learners. The public shifting of students along the data continuum shows where gains have been made, and gives cause to celebrate the work of the students (and staff) in facilitating learning growth.



Teaching practices

Much of the practice in mathematics at Maitland is achieved through the use of good questioning and open-ended tasks/questions. Teachers are encouraged to adopt practices that foster deep learning as well as a rich mathematical language. There is a professional support board located in a high-traffic area, where the leadership team places materials and resources that can be implemented in classrooms. The support materials arise as a result of discussion of teachers' concerns, or may be associated new initiatives that the school is taking on board. The professional support board complements other professional development activities.

Having high expectations of deep learning

The school has adopted an approach that aligns with the community's wish that all students acquire a quality education. After orienting students to the purpose of the lesson, perhaps through a game, some teachers write the lesson intent (taken from the Australian Curriculum) on the board and then unpack what this means to the students. This makes the learning quite explicit to the students.

There is little observable emphasis on direct teaching of basic skills. Many of the staff articulated that a focus on basic skills often meant the students encountered the same content year after year and were never introduced to the deep ideas of mathematics. There is a more profound attempt at Maitland to bring about deep learning of mathematical concepts and processes. However, programs such as Quicksmart, Mathletics, or Study Ladder are used to help students who may be struggling with basic skills. Similarly, the "2-minute challenge" that was sent home to families was also designed to build/consolidate basic skills. The shift from a focus on basic skills (deficit models) to a focus on big ideas reflected staff opinion that the students were capable of learning mathematical concepts with appropriate scaffolding.

Strong focus on metalanguage of maths

Aboriginal students often struggle with the language of mathematics, so teachers at Maitland emphasise the teaching of the metalanguage of mathematics. Classrooms have language boards that display key mathematical words (as well as other boards for other discipline areas) so that they become an integral part of the classroom environment.

Students are expected to talk and reason mathematically, to justify responses and use a mathematical register in

responses. Teachers tend to ask questions (rather than use direct instruction) to elicit responses and to encourage the use of mathematical language and thinking/reasoning.

One teacher spoke the local language, Narungga. He used mathematical Narungga words (e.g., numbers) in his teaching and questioning so that it validated the home language of the students, and exposed non-Aboriginal speakers to a new language. At both Maitland and Point Pearce, strong recognition of the local language was evident in the classroom displays that allowed the students to draw on their local language and the language of mathematics.

Communicating mathematically

Not only are students exposed to the subject-specific language of mathematics, they are expected to communicate using it. Communicating mathematically requires the use of good questioning by the teacher to prompt students so that they not only provide answers but can justify, explain, expand, etc their responses. This process allowed the students to articulate their thinking. Through good scaffolding by the use of questioning, the teacher created an environment where students would offer responses and others would feel comfortable supporting, challenging or extending their peers' responses. The dialogic ethos of the classroom supported the thinking, working and communicating aspects of mathematics that is now seen to be a vital but missing element of good mathematics education.

Group work

Across the school, group work is a strong feature of mathematics lessons. Having a good sense of the learners' needs was foundational to the grouping practices. Students were most often grouped heterogeneously so that they did not come to see themselves as failures, as is often the case with ability grouping. Students were frequently grouped on a needs basis, but it was recognised that needs changed depending on the context and the tasks, so grouping was very flexible.

Lesson structure

The general approach involved a challenge, question or game to orient the lesson in an engaging manner. The students would then undertake a series of activities that were directed at the key learning objective for the lesson. Another activity (often a quick game) would indicate the conclusion of the lesson in a fun manner.

An example of a Maitland lesson

The initial component of the lesson was a quiz/game in which the students needed to reason mathematically to solve the problem. They were allowed to help their peers in through prompts, without telling the answer. As a whole group, students were then called to offer their responses and justify their thinking.

The students accessed the interactive whiteboard (IWB), controlling the technology while the teacher prompted students to ask questions. Students recorded their responses on the IWB while talking through how they came to that response. The teacher encouraged them to use mathematical terms and reasoning as they justified their thinking.

In the main part of the lesson, students were required to communicate mathematically. There was very little, if any, direct instruction. Instead of prompting recall, the teacher probed deeper aspects of mathematics through using questions to elicit responses from students. Students were required to talk through their thinking as they provided responses.

Students were encouraged to use a range of strategies to solve problems so there is a strong shift from rote, drill and skills. The teacher encouraged students to actively use methods that they preferred, and explained that there was more than one way to solve a task or problem.

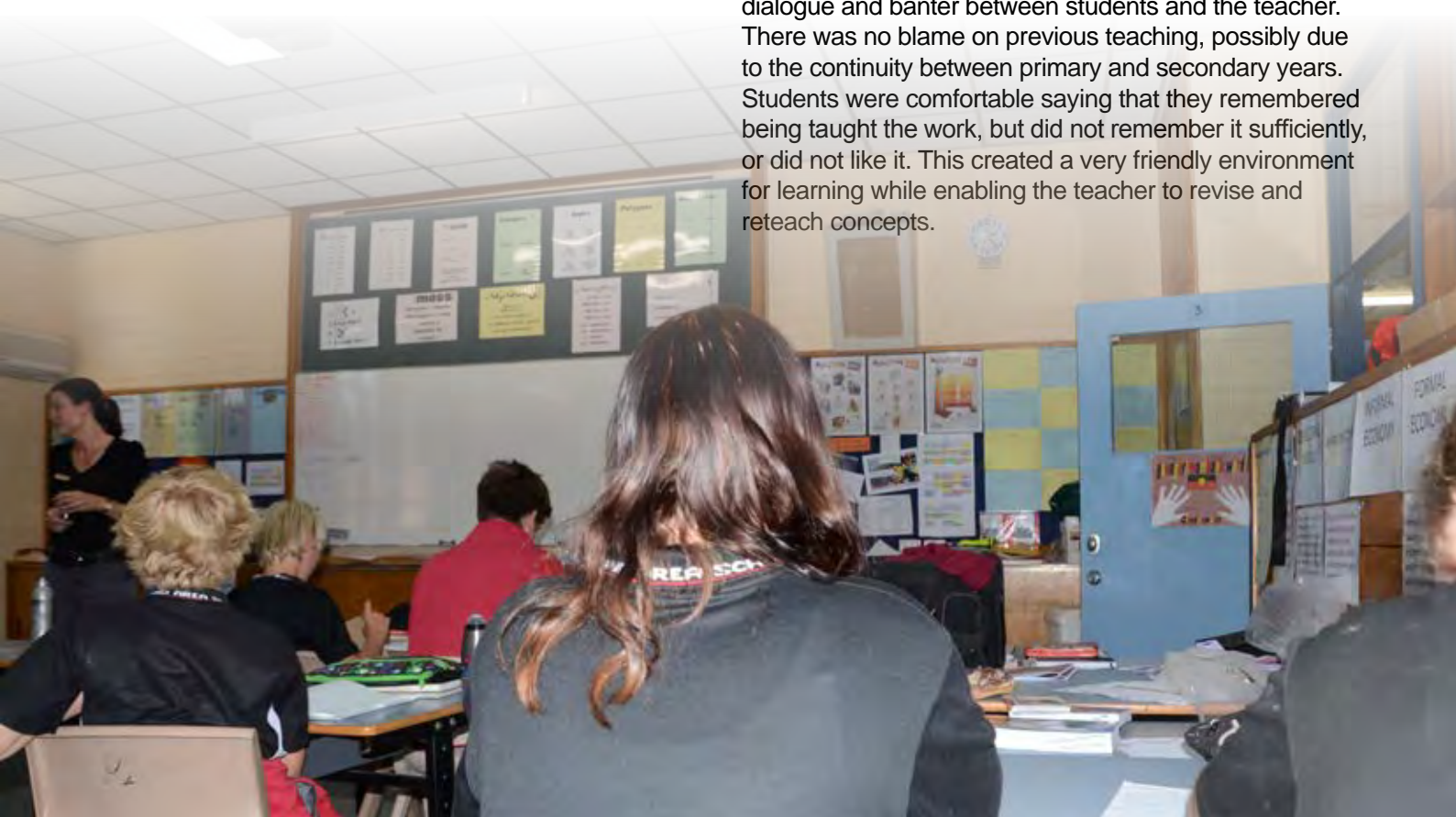
Setting mathematical tasks into a real context

As the Year 5/6 teacher had taught Grades 3-7 at Point Pearce before being relocated to Maitland, he still routinely used strategies learnt at Point Pearce, in particular, the linking of mathematical tasks to real-life events. For example, students were involved in organizing a pizza lunch. They were to invite at least two guests (family or friends). They had to work out how many people to cater for, the quantities of pizza mix needed, the costings and so forth. Such a contextual task was set for most terms as they provided a real-life justification for why many mathematical concepts and processes were needed.

Responding to students' needs

The teachers responded to students' learning needs very effectively. As was evident across the school, students were seen as individuals. Teachers identified students' needs, and responded to them through targeted individual or group teaching

Planning was also responsive to students' needs. In one class, the teacher had been working on a lesson and found that fraction knowledge was poor, so devised an impromptu lesson to reteach many of the aspects of fractions that were required. There developed a friendly dialogue and banter between students and the teacher. There was no blame on previous teaching, possibly due to the continuity between primary and secondary years. Students were comfortable saying that they remembered being taught the work, but did not remember it sufficiently, or did not like it. This created a very friendly environment for learning while enabling the teacher to revise and reteach concepts.





Consistency in staffing

Most of the teachers had been at the school for considerable amounts of time and were members of the wider community. Most lived in the community or in the surrounding areas and were firmly committed to the region (and school). Many of the teachers were now teaching the children of their past students, bringing familiarity with families, the children and their circumstances. This helped the school meet the wider pastoral and academic needs of the learners; in gaining an appreciation of the students and their backgrounds; and in understanding effective teaching practices in other areas of the school, particularly since the school was R-12.

The R-12 approach has potential for sharing of data across the school. As the teachers were expected to work across the range of year levels, it was possible for teachers to liaise with other teachers regarding their experiences with curriculum. In addition, teachers gained valuable knowledge from teaching various grades. For example, at one stage, the junior secondary teacher had taught maths in the upper primary years and had learnt how to teach many of the foundational concepts that students are expected to have when they enter junior secondary. Knowing which mathematical concepts were taught, and how they were taught, meant that she could recognise any gaps and misconceptions when these students entered the junior secondary years. The same teacher was also able to observe early-years mathematics lessons and gained an appreciation of how difficult many of the concepts (such as drawing and recognising the numeral 6) could be for early learners.

Numeracy coach

The school has appointed a numeracy coach whose role is to work with teachers on issues around pedagogy and delivery of content in order to bring about better learning outcomes. The numeracy coach had been undertaking extensive data collection aimed at the 37 children who were achieving below the NAPLAN benchmark. These students were the target for the numeracy interventions aimed at bringing low-performing students to at least benchmark standards. Considerable data were collected on the students through testing, observations in the classroom and discussions with key support people.

There is a strong pedagogical focus in the role of the numeracy coach. The approach is driven by the needs of the teachers, students and school. A key feature of the role is to support teachers to better understand the context of the students and then develop strategies to support learning. The numeracy coach also acts as a broker – bringing in key personnel to support teachers in the numeracy work – including professional development opportunities, sharing opportunities, and the introduction of packages to enhance learning. The numeracy coach had been able to introduce Mathematics across the school. He has also led the “2-minute maths challenge” initiative in which activities are sent home and students work with their families to solve the problems. This strategy of building links with the homes was important for numeracy as it was previously felt that parents were happy to do literacy activities (such as reading) but less inclined to do numeracy activities. The fun activities encourage family participation. The numeracy coach also writes a piece in the school newsletter to help inform families about numeracy activities and approaches being used at the school.

Model for Quality Learning

Principle	Strategy	Mathematics
The school is an R-12	<ul style="list-style-type: none"> Teachers are expected to teach across areas. 	<ul style="list-style-type: none"> Teachers liaise with other teachers about students' learning.
Data informs teaching	<ul style="list-style-type: none"> The development of the data wall and the public sharing of student data and success. 	<ul style="list-style-type: none"> NAPLAN and PAT-M data are used to identify learning needs in mathematics for individual students.
Attendance is critical for learning	<ul style="list-style-type: none"> Internally, students are recorded on data wall with 95% attendance expected. Students can have 15 days of extra-curricular activities. 	<ul style="list-style-type: none"> Teachers liaise with families when attendance is low. Aboriginal coordinator liaises with families when attendance is low.
Strong partnerships with community	<ul style="list-style-type: none"> Formal and informal meetings with local parents. Governing body with community representation. Acting on, or providing quick responses to concerns of all families. 	<ul style="list-style-type: none"> Learning in mathematics is based on needs, not on background. Aboriginal students are treated the same as their peers, and mathematics learning is based on their current needs and understandings in mathematics.
Quality Learning	<ul style="list-style-type: none"> Deep learning of mathematical concepts. 	<ul style="list-style-type: none"> Basic skills are learned through support tools; lessons focus on deep learning. Access to mathematical language, communicating mathematically. Use of open-ended questions and tasks to promote mathematical thinking and reasoning. Worksheets are kept to a minimum and used only as a small component of lessons.

Advice to teachers

Maitland has a very comprehensive set of practices that work towards building success in numeracy. Many strategies have been developed to support numeracy learning. As one of the participants noted, there is “no silver bullet for numeracy; it depends on the gun which fires the bullet” – teachers are critical for learning and need to have a range of strategies to support learning.

Identifying the needs of the learners is important for targeting appropriate learning interventions. It is reasonable to anticipate strengths in areas of need in other areas of mathematics. Learners vary and the teacher’s role is to know what to teach and how to teach it.

The highly individualised learning plans for students provide a strong platform based on needs and strengths, rather than on race, language or gender. When teachers plan for what the student needs, then the learning is at the level of the student/s.

Language is a key factor in learning mathematics so scaffolding the learning of mathematical language and being able to communicate mathematically is a key to success.

Points of differentiation

Maitland Area School is an R-12 school where there is seamlessness between the sectors of schooling. This makes for a unique context in terms of mathematics learning. Many of the teachers have been in the region/town for more than 2 and 3 decades and have a strong knowledge of the students and their backgrounds. Combined with the small numbers of students at the school, there is a strong sense of knowing the students and their needs.

Data-informed pedagogy – the school tracks students in a public way so that all the staff are able to see the learnings of their students, and provide educative experiences that meet students’ needs. Data has enabled teachers to “know” where students are rather than to assume. Having nationally normed tests enabled teachers to see their students’ achievements relative to the normal population rather than in the context of their small cohort.

Aboriginal children, at the request of the local community, are treated the same as mainstream students. Individual attention is paid at the point of learning.

Leadership has provided a coherent approach to education in a unique context. Valuing staff, living locally, and making decision making transparent (to both staff and community) has built a strong trusting and collaborative learning environment.

School demographics (Maitland Area School)

Year range	R-12	FTE teaching staff	19.6
Total enrolments	209	Non-teaching staff	17
Location	Provincial	FTE non-teaching staff	12.1
ICSEA (school)	921	Indigenous students %	23%
ICSEA (distribution of students) (bottom quarter to top quarter)	22% 22% 45% 10%	Enrolments: Girls/Boys	109/100
Teaching staff	22	Language background other than English	14%
		Student attendance rate %	88%