



UNIVERSITY OF
CANBERRA

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
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Structure and Support for Teachers

Kulkarriya Community School

Kulkurriya Community School is located in the famous Noonkanbah Station. Noonkanbah was initially established in the 1880s and covered approximately 400,000 hectares (or 1 million acres). It commenced grazing cattle and sheep. The station now runs about 7000 head of cattle and 350 horses. Cattle are trucked to Broome for sale. The station is located between Camballin and Fitzroy Crossing, and is approximately 75km down a dirt track off the Great Northern Highway.

Until 1971, the traditional owners, the Yungngora people, were employed by the station owners but in that year, they walked off the land over poor pay and bad conditions, and took up residence on the fringes of Fitzroy Crossing. In 1976, the Aboriginal Land Fund purchased 1800 square kilometres of the pastoral lands for the Traditional

Owners (TOs), and approximately 200 people returned to their country. The community is independently managed by the Yungngora people through a Board of Directors, who also have control of the school. The council provides governance of the community. The community has experienced considerable growth and has a store, a community office, and clinics, and has recently undergone a large expansion and housing renewal project.

Noonkanbah became well known for protests in 1980 when the Premier of Western Australia gave permission for an American mining company – AMAX – to undertake exploratory oil drilling in what was sacred land for the Yungngora people. On August 7, 1980, Noonkanbah was the scene of violent confrontations between police and protesters as the

drilling rigs broke through the picket lines and entered onto the sacred land. The Yungngora people had their native title recognised over the Noonkanbah land in April 2007.

Kulkurriya Community School is based in Noonkanbah and is part of the Aboriginal Independent Community Schools (AICS) network which is part of the Association of Independent Schools of Western Australia (AISWA). It commenced operation in 1978, when lessons were taught in an old shearing shed.

There are now 90 students from pre-primary through to secondary. The school has recently introduced the “Irlee bird” class for caregivers and infants. This class supports young parents and helps them transition their children into school.

Kulkurriya Community School places strong emphasis on fostering Standard Australian English (SAE). Most students speak Kriol at home and in community, and some students speak Nyikina and Walmajarri languages.

Defining Success

Kulkurriya has had good NAPLAN results in recent years. In 2010, Year 3 students performed better in the numeracy test than did Year 3 students at similar schools. In 2012, Year 7 students performed better, and Year 3 and Year 5 students performed significantly better, than did students at similar schools.

The Numeracy Portal, developed by AISWA (see AISWA report in this series of case studies), has been operating at the school for three years. Early-years teachers report that most of their regularly attending students are working at the level expected of students in their year; prior to the use of the portal, this was not the case. Similarly, the principal reports that since the school began using the portal, the number of students reaching national benchmarks has increased.

Initiative

Most staff at Kulkurriya are new graduates or early-career teachers, and many stay at the school for only two years. The high staff turnover and the neophyte status of most of the teachers mean that building strength in numeracy teaching requires strategies that are sustainable and that support early-career teachers. This report focuses on two such strategies. The first strategy to be discussed is the active uptake of the Numeracy Portal. The portal provides a whole-school framework and scaffolding for teachers. The second strategy to be discussed is the ongoing, focused support from numeracy experts. The school receives expert advice from the AICS numeracy consultant and a curriculum coordinator who supports teachers to use the Numeracy Portal. The teachers also receive excellent professional learning - one full week at the commencement of each of Terms 1 and 2.

The Numeracy Portal

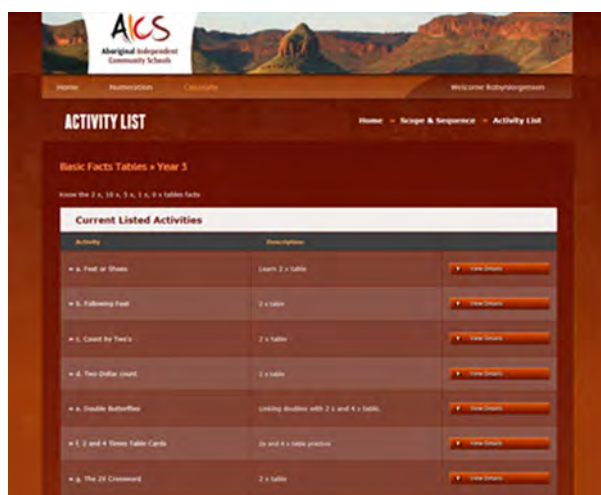
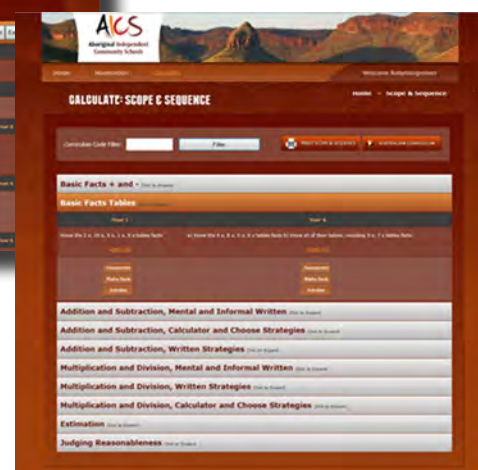
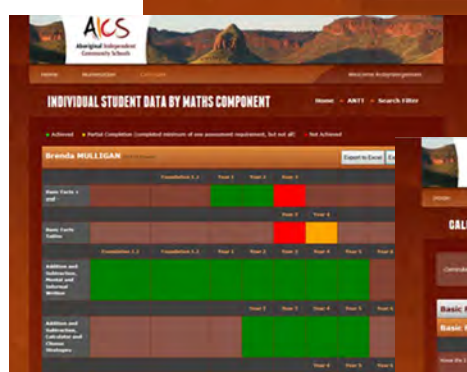
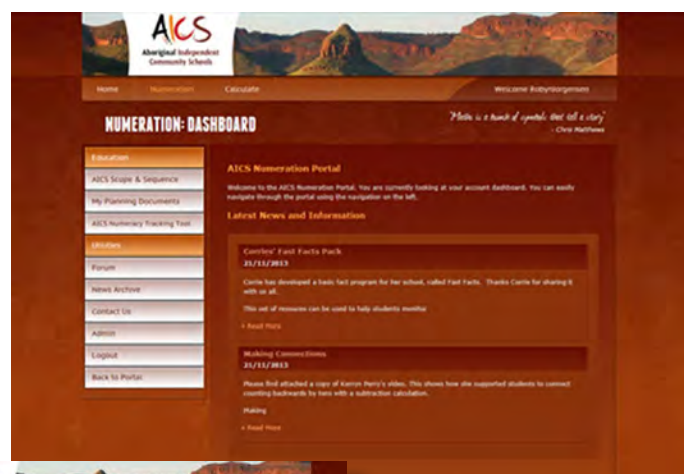
The Numeracy Portal provides a whole-school framework for mathematics. For neophyte teachers, the portal is a valuable tool because it has been built upon a considerable database of quality resources, and modified for use by teachers in remote areas. Consequently, early-career teachers can be confident that the tool is an exemplar of best practice for their context. This takes considerable pressure of the beginning teachers.

The Scope and Sequence

The school has adopted the approach of having high expectations of learners and teachers. The scope and sequence built into the Numeracy Portal allows teachers to gain a sense of students' mathematical understanding and, consequently, where energies need to be directed in order to move students forward. The scope and sequence also helps teachers to backward map: For a student who is struggling, the teacher can identify concepts that the student needs to understand, and can target teaching at the appropriate level of mathematics.

Teachers are able to enter data about their students' completion of assessment items, so the portal enables staff to identify curriculum areas that have received little attention. For example, staff at Kulkarriya identified that calculator use had received little attention, so the use of calculators became a focus for teaching.

The pedagogy and assessment contained in the portal have been adapted from the First Steps, and are age appropriate. Consequently, the pedagogy of the Year 2 content is suitable for young children; if a Year 6 student needed to be taught Year 2 content, the content would need to be delivered in a way that was appropriate for a Year 6 student.



Assessments and Activities

The Numeracy Portal has compartmentalised learning into key learnings that students should achieve as the building blocks of knowledge. Some of the less important concepts have not been included. Assessments have been created for each of the key learnings, and teachers use these to gauge students' understandings. Teachers are then able to access the databanks of high-quality activities (and links to other activities) that they can incorporate into a computer-generated planning document.

The portal allows teachers to record students' achievement of assessment tasks. If a student has successfully completed an assessment task, that task is shaded green; red shading indicates that the student has not successfully completed that task. This creates a visual map that allows teachers to readily see student progress (see Numeracy Portal case study, in this series of reports, for more details).

Numeracy Support

Numeracy Consultant

The role of the numeracy consultant has evolved over time. Initially, the consultant frequently undertook team teaching with the teachers; team teaching still occurs, but now the main focus of the consultant role is helping teachers understand how the school can be more successful in mathematics. The Numeracy Consultant has worked in the Kimberley for several years, and consequently has a strong understanding of the students, and their strengths and needs. She also has a very strong working knowledge of mathematics education, so is able to support teachers to effectively plan, teach, and assess the students in their school. The strong knowledge of the Numeracy Consultant is highly valued by the teachers because, when they experience difficulties with teaching particular concepts, they are able to ask her where they should direct their teaching.

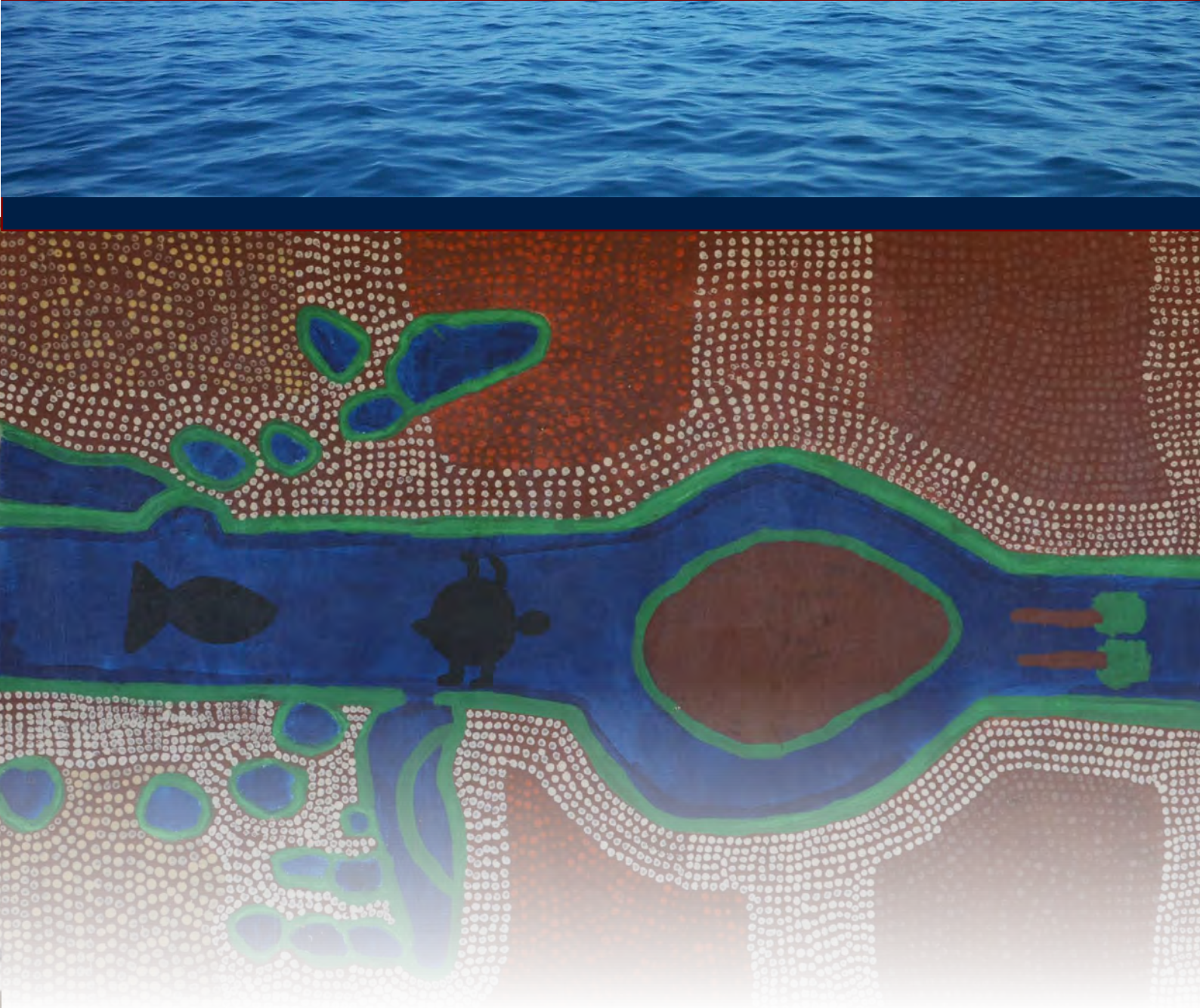
Neophyte teachers often experience a sense of urgency regarding the teaching of mathematics and feel that they lack deep knowledge. The Numeracy Consultant encourages the teachers to break down mathematics concepts so that they can work incrementally and progressively build students' understandings. This has been invaluable for the teachers since there is considerable diversity in the classes.

The teachers at Kulkurriya utilise the Numeracy Consultant in a strategic way, by planning how they

will obtain best value from her visit. For example, in Term 1, the curriculum meeting (discussed below) identified that the school will focus on measurement in Term 2. Prior to the consultant's visit, the teachers advised her of this plan, and asked her to conduct workshops with teachers on this topic and to assist them with planning. In addition, the Numeracy Consultant has access to the Numeracy Portal, so prior to her visiting the school, teachers often pose questions/problems to her so that she can use the portal to check students' performance and then plan what steps the teachers need to take after her visit. This has been a valuable resource for the teachers as the time she is able to spend with individual teachers is targeted to their needs.

Teachers report that the Numeracy Consultant makes an invaluable contribution to their work as teachers and has prepared them well. Many models of PD rely on a train-the-trainer model that ultimately creates a trickle-down effect; in contrast, Kulkurriya's use of the consultant means that training is not watered down. Consequently, despite being in a very remote location, the teachers feel that they are at the forefront of knowledge and practice in mathematics teaching. Furthermore, the role of the Numeracy Consultant is for support, and not evaluation, of the teacher. The depth of knowledge of the communities of the Numeracy Consultant helps the teachers have trust in her judgements of what is needed for the students.





Curriculum Coordinators

The Curriculum Coordinator, based at the school, works directly with the teachers. She deals with numeracy and literacy, but teachers request her assistance in mathematics more than in literacy, suggesting that there is a greater need for numeracy support. The consultant's role is similar to that of a director of teaching and learning; she looks at pedagogy and what teachers are doing and how they are doing it, and tries to raise the standard. She meets with teachers to discuss their progress with teaching; she also takes part in team teaching, and models teaching (including just parts of a lesson) to teachers.

One of the consultant's most significant roles is to help teachers to use the Numeracy Portal. In addition, the consultant assist teachers with the transition into teaching in a remote context, and, in particular, the teaching of mathematics in that context. There are many issues that are specific to working in remote locations – language, culture, community, and general remote living – all of which impact on teaching mathematics.

Curriculum Meetings

Curriculum meetings are convened by the Curriculum Coordinator every fortnight. During the meetings, teachers share planning, discuss the work they are undertaking in the classroom, and discuss concerns. For this reason, the meetings are invaluable for the growth and understandings of new teachers. The meetings also enable the Curriculum Coordinator to work with the whole school to ensure that they are working on the same topics. In this way, the meetings help teachers build a stronger knowledge of mathematics curriculum, and assist with monitoring the rollout of the numeracy program.

Professional Learning for Teachers

In addition to benefitting from the Numeracy Portal and the Curriculum Consultant, teachers are also exposed to much professional learning. At the start of Terms 1 and 2, they receive a week of PD each term. Approximately 2 days in each PD session is allocated to numeracy. The first PD is held at Fitzroy Crossing and is quite structured, and is aimed at inducting staff into AICS schools. The second PD, held in Broome, is more flexible and addresses strategies for teaching and learning. It also includes special streams for principals and Aboriginal Education Workers (AEWs).

Teachers are often exposed to further PD sessions held over three days, from Friday to Sunday, usually at Fitzroy Crossing. Relief teachers are usually not available because the school is very remote, so the school will close on the Friday. This causes minimal disruption, because Friday is always a short day and usually has lower attendance. Teachers are very professional and committed, and they willingly attend these weekend sessions.

Kriol and Mathematics

Professional development emphasises the importance of language in the Kimberley context. Specific reference is made to the potential barriers to learning created by the differences between Kriol and Standard Australian English used in schools. To address these barriers, the school has focused on increasing AEWs' ability to support learners' code switching. Often, AEWs work with small groups to support students to code switch.





Benefits for Learning and Learners

The Numeracy Portal has benefits for students and teachers. Students are provided with mathematical learning that is targeted to their levels of understandings. They are also provided with high-quality learning experiences in mathematics that help to build their understandings.

Most of the teachers are early-career teachers – in their first or second year of teaching. The learning curve is exponential for all new teachers and the need to support these teachers is well known. The Numeracy Portal provides significant scaffolding for teachers. The diagnostic tests help teachers determine students' levels of mathematical understandings, and the Scope and Sequence is invaluable in helping teachers plan where to take students if they are working well, and how to backward map if students are having problems. The wide range of activities on the portal supports teachers to make good choices about how to teach nominated learning. Furthermore, the support provided to the teachers through the Numeracy Consultant and the school-based Curriculum Coordinator enhances their capacity to provide quality targeted learning for the students.

The Numeracy Portal has created a shared language across the school and ensures consistency across teachers in terms of their planning. The cyclical nature of the underlying process of assessing, planning, teaching, assessing, planning etc. helps teachers to be aware of their students' current levels of understanding and how to scaffold their learning. The assessments align with the curriculum so this gives teachers, particularly neophyte teachers, confidence that their teaching is targeted to learning and meets the demands of the national curriculum.

Because the portal is used across AICS schools, teachers are able to access assessment records of students who have transferred into the school from another AICS school. This allows the teacher to plan appropriate learning for the student, reduces the amount of time that needs to be spent on assessment, and increases the amount of time that can be spent on targeted teaching. This benefit of the portal is particularly important for students who attend irregularly.



Advice to Administrators, Leaders and Teachers

Early-career teachers, and those new to teaching in remote contexts, need support in their learning in mathematics and remote teaching. Many teachers have a restricted understanding of the learning continua in mathematics. When there is great diversity in classrooms, as is often the case in remote contexts, a good understanding of this continua can support teachers' planning-for-learning. Support tools, such as the Numeracy Portal, offer considerable scaffolding for teachers.

The support offered by human resources – the Numeracy Consultant and the Curriculum Coordinator – is highly valued by the staff. Teachers value the easily accessible expertise in planning, teaching, and assessment. Knowing how well the role of Curriculum

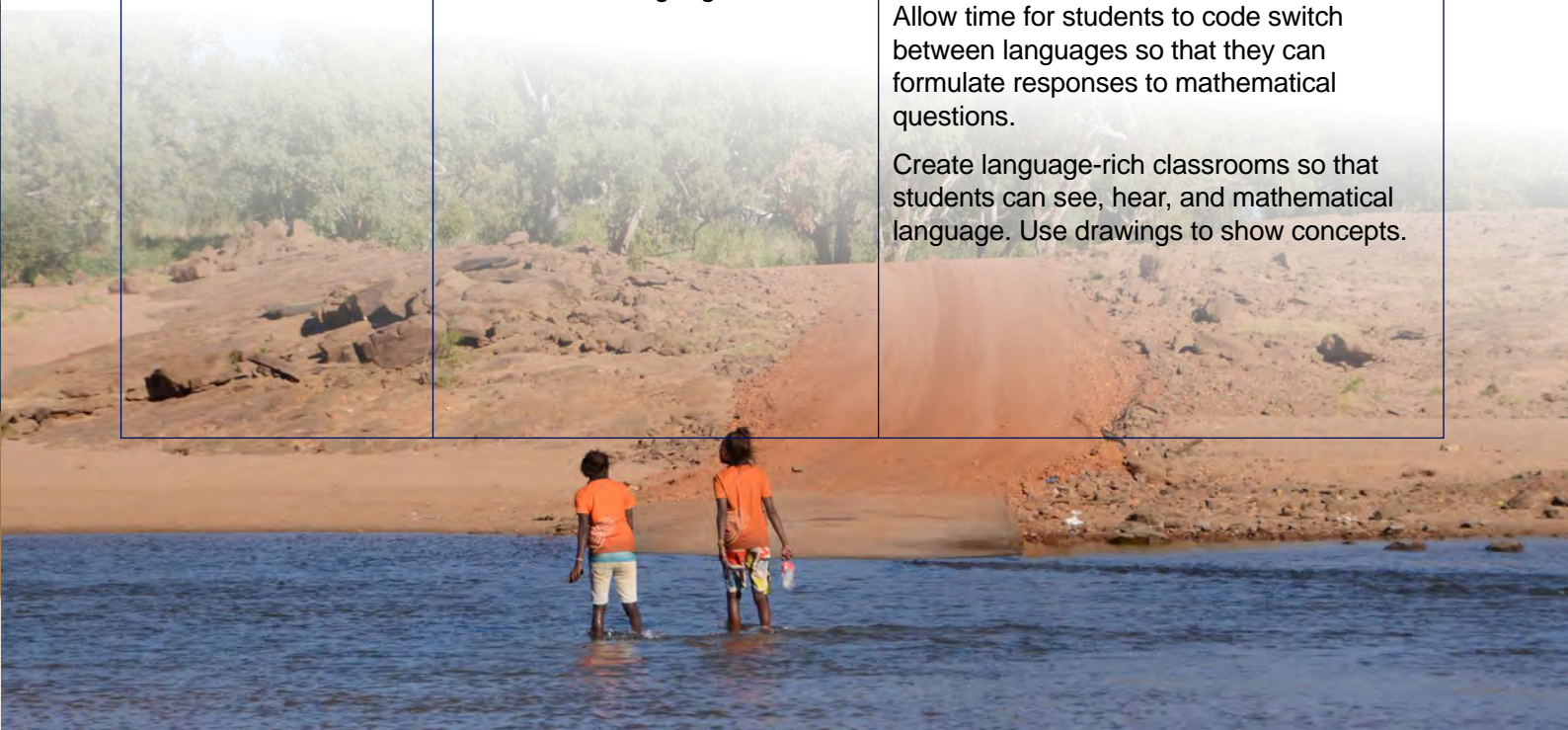
Coordinator was valued by teachers, the principal, in consultation with the staff, opted for a funding model under which classes were made slightly larger to enable employment of one teacher for the role of Curriculum Coordinator. This may be difficult under the current funding regimes and in small schools where there is less scope for realigning budgets.

In remote contexts, the language of instruction is often different from the language/s of the students. AEWs can offer considerable support to teachers in code switching between the languages being used. AEWs need to be supported in their growth as educators so that they can be confident members of the teaching team.



Model for Quality Learning

General Principle	Implications for mathematics	Focused strategies
Teachers new to teaching and remote contexts need strong support.	Teachers need support for their professional learning in teaching mathematics in a remote Indigenous context.	Development of resources – both physical and human – to support teachers.
Ongoing support for teachers.	Development of an online resource for teachers.	Data drives pedagogy: Teachers assess students on specifically designed tasks, and this data is entered into a system that directs teachers to effective strategies targeted to the assessed learning needs.
		The development of high-quality learning activities to support teachers to implement effective, targeted learning for students.
Personalised support for teachers.	Providing expert knowledge to support teachers to develop high-quality, targeted learning.	An external consultant visits school each term to help with the professional learning of teachers in mathematics. The visits are shaped by the needs of the teachers. Ongoing support is provided in the interim periods via email or phone.
		An on-campus support person helps teachers on a day-to-day basis with issues related to the Numeracy Portal and aspects of mathematics education.
Tracking and monitoring learning.	Transience and mobility can create gaps in learning and/or repetition of teaching.	Tools such as the Numeracy Portal enable teachers to access student data from a common source and thus reduce time spent on testing.
Language proficiency in SAE	Building strength and competency in mathematics and mathematical language.	<p>Specifically identify what is Kriol and SAE.</p> <p>Model the use of SAE in the classroom.</p> <p>Allow time for students to code switch between languages so that they can formulate responses to mathematical questions.</p> <p>Create language-rich classrooms so that students can see, hear, and mathematical language. Use drawings to show concepts.</p>



Key Messages – Summary

The Numeracy Portal has undergone ongoing development and refinement to reach its current status. It has gained more traction in the school since improved internet access has enabled teachers to use the portal more effectively. Although the Portal has been an important scaffold for teachers, its effectiveness is limited by the fact that it deals only with the area of number and does not extend beyond Year 6 level. It would be a much stronger resource if extended, because many students have progressed beyond the scope and sequence, and there is a need for the other strands of the curriculum

The advice provided by the Numeracy Consultant (external to the school) has been invaluable to teachers and the Numeracy Coordinator. Access to a person with strong mathematics and pedagogy knowledge is important, and it is equally important that this person is familiar with the context within which teachers are working.

Language is key to numeracy. Many students may know the mathematics but are lost, confused, or redirected when solving maths problems. As maths is becoming increasingly language based (particularly in NAPLAN tests), the potential to be successful relies strongly on being proficient and confident in SAE. Building strength in SAE and code switching is important in mathematics.



School Demographics

Year range	U, PP-12	FTE teaching staff	7
Total enrolments	83	Non-teaching staff	18
Location	Very Remote	FTE non-teaching staff	18
ICSEA (school)	609	Indigenous students %	100%
ICSEA (distribution of students) (bottom quarter to top quarter)	88% 12% 0% 0%	Enrolments: Girls/Boys	44/39
Teaching staff	7	Language background other than English	78%
		Student attendance rate %	84%