

# 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

# 2014

## Culturally Responsive Pedagogy

### *Bayulu Remote Community School*

Bayulu School is located on Gogo Station, approximately 16km from Fitzroy Crossing and 410km from Broome. Gogo Station, also known as Margaret Downs, is a pastoral lease, originally established in 1885. By 1902, the station occupied an area of 1,750,000 acres (708,200 ha). The original homestead was built in 1912. By 1928, the herd size was estimated at 90,000, making Gogo the biggest station in Western Australia. Gas was discovered on the property in 1930 after a water bore was drilled. A severe drought hit the Kimberley region between 1951 and 1953, the first in 70 years, and Gogo lost half of its stock. In 1985 an area of 1 square mile (3 km<sup>2</sup>) was excised from the property to form the Aboriginal community of Bayulu which is home to about 150 Indigenous Australians. Thousands of hectares of station land were burnt out in 2011 when a fire was deliberately lit by a local man at the Muludja Community (close to Fitzroy Crossing).

In 2011, some of the largest flooding hit the Fitzroy Valley and cut Bayulu off from the Fitzroy Crossing township. Teachers were helicoptered into the site and remained at the school, sleeping on the floors or in the Principal's house until the waters receded.

Unlike many community schools, Bayulu is not located in any community but is located close to the old homestead. Students are bussed in each day from several communities – Bayulu Community, Joy Springs Community, Gillarong Karnparmi (Three Mile) Community, Ngalingkadi Community, and Mimbi Community. The communities are very supportive of the school and the school seeks to build strong partnerships with the communities, often holding events to bring families into the school.

Bayulu is the oldest school in the Kimberley. When established in 1957, classes for approximately 20 students were held in a cave, which acted as a cool retreat, located near the old homestead. The school has been located at its current site since 1962. Initially built by the Department of Education as one classroom and a teacher's house, the school had another six classrooms added and, in 2000, a new administration building was added. The school also has a well-equipped library, three small resource rooms, and a covered basketball court that is used for a range of activities, including assemblies and gatherings with community members.

NGALINGKADJI

BAYULU

8-MILE

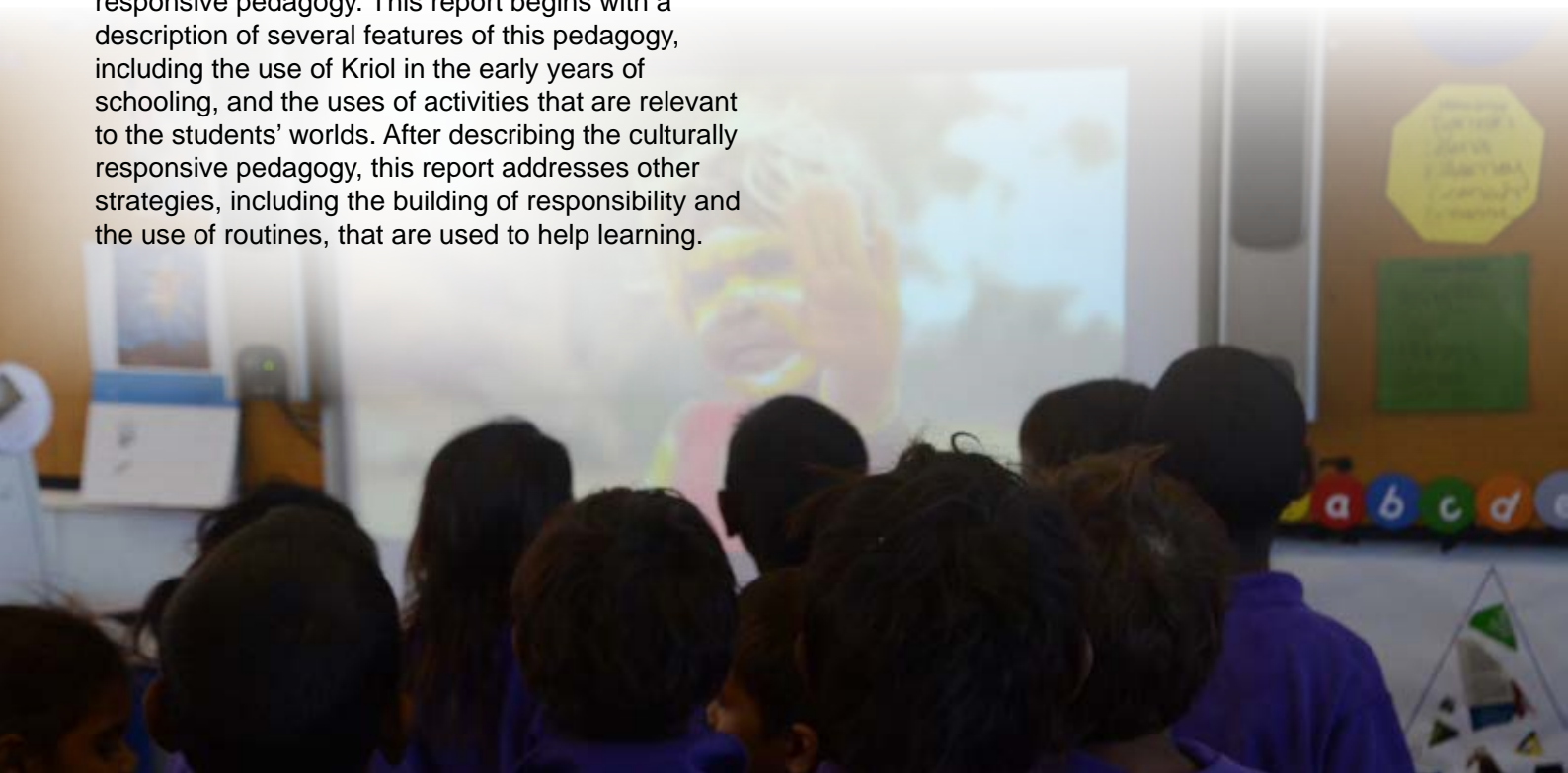
3-MILE

GILLARONG

WELCOME TO BAYULU REMOTE COMMUNITY SCHOOL

## Initiatives

Bayulu Remote Community School uses a culturally responsive pedagogy. This report begins with a description of several features of this pedagogy, including the use of Kriol in the early years of schooling, and the uses of activities that are relevant to the students' worlds. After describing the culturally responsive pedagogy, this report addresses other strategies, including the building of responsibility and the use of routines, that are used to help learning.



# Features of a Culturally Responsive Pedagogy

## Two-ways Approach

### Relevant Activities

Within the two-way approach adopted by the teachers is the valuing of activities undertaken by the students as part of their everyday lives. Worksheets are used rarely in the early and middle years of schooling. This is because most worksheets are developed for mainstream, urban students, so they distract the students with stimuli that may have little relevance to the students' lives. At Bayulu, many activities centre on examples from community, and teachers use resources other than worksheets for recording student learning.

### Early-years Kriol

The school's recognition of Kriol as a language is made explicit for students. The school employs a number of AIEOs and one of their key roles is to support the use of Kriol in the early years. For example, the AIEOs and the teachers in the early years help develop language-based resources that support Kriol and help to build bridges between Kriol and SAE. Nursery rhymes are translated into Kriol so students can hear, for example, "Humpty Dumpty" in Kriol and English. In one class, a song "Five fat pies in the Bayulu shop" is sung in Kriol to the tune of "Five little ducks went out one day," and children act out the song. This activity is led by the AIEO. This process gives credibility to the AIEO as being a valued member of the teaching staff.

The use of prepositions in mathematics is an under-researched area, but it is known that many Aboriginal languages have limited prepositions in comparison with SAE. It is not uncommon for Kriol speakers to over-rely on the use of "in" as a preposition, which is limiting in relation to mathematics. Consequently, opportunities for students to build the rich language of prepositions is important in their language development. Teachers have recognised this and are building resources to scaffold language development. In one class, the AIEO and teacher have created a book that uses Kriol and English to address prepositions, and contains photos taken by the AIEO of the students using playground equipment. For example there are photos of the children on the slippery slide, under the climbing frame, and inside the cubby house. For each photo, the prepositional statement is presented in SAE and Kriol. This resource is helpful not only because it displays mathematical concepts, but also because it allows students to experience both SAE and Kriol language. Students see that their language is valued and is not a lesser language, but is different from the language spoken at school. Also, using photographs of the students helps to build students' and families' interest.

In addition to supporting the use of Kriol in the early years, the AIEOs help students to transition to SAE as they progress through school. By the time students are completing their primary years, they are expected to be confident users of SAE. As a result of the two-way approach, students recognise the need to speak English, as this is the language of power and access.



## Using Kriol in the Classroom

Because translation between English and Kriol can take considerable cognitive load, teachers allow students to talk mathematically in Kriol. This makes for noisy classrooms, but the teachers are comfortable with the noise level, as it is obvious that the students are on task. If AIEOs are in the class, they work with the small groups using Kriol to help clarify meaning and expectations. Being confident to let students talk in home language requires the teacher to provide mathematical activities that the students find engaging and enabling so that they are motivated to work on

them, and remain on task. This is often through the use of two-way resources (see below).

Teachers at Bayulu recognise that students may mentally process information in Kriol. For example, when a teacher asks a question, a student may mentally translate the question into Kriol, determine the answer in Kriol, mentally translate the answer into SAE, and then reply in SAE. Teachers recognise that this process is time consuming and, consequently, they do not pressure students to answer quickly. This may help students to feel comfortable when responding to questions in class.



# Modelling SAE and Mathematical Language

The teachers at Bayulu model the use of SAE in class and expect that students will answer questions in full sentences using SAE. Students tend to provide single-word answers, so teachers model the response and ask the students to repeat the response. Most teachers have adopted the wrist bands that are commonly used in Kimberley schools – the black band refers to SAE, and the orange band refers to Kriol. Teachers point to the bands to draw students' attention to the language they are using, or to remind them to speak in SAE.

There is a strong recognition among the staff that students should be exposed to a rich curriculum and vocabulary in mathematics rather than a restricted and limited curriculum. Consequently, teachers promote the use of mathematical terms so that students become familiar with the formal register of mathematics. For example, the terms "numerator" and "denominator" are used; pneumatic devices (such as "Ned sits on the donkey") are used to help students remember and make connections between these abstract terms. Teachers scaffold students so that they can engage with the content and language of mathematics.

## Orlu Pre-Primary kid

Pre-Primary Positional Language Book.



By Room 8.



Tali and Jayezena are **under** the water trough.



siedwai.  
the slide.



Orlu pre primary standingup bud ununeet.  
The Pre primaries are standing **under** the bridge.



Hayley beehienwai la dat curlwan slied.  
Hayley is **behind** the spiral.



primary kids dai standing.



Olu pre primary insiedwai la kubbi house.  
The Pre-Primaries are **inside** the cubby house.



Olu pre primary sidindoun la chair.  
The Pre-Primaries are sitting **on** the chair.

# Creating Two-way Resources

Teachers at Bayulu have created activities that are relevant to the worlds of the learners. One teacher wanted the students to use arrays to represent various operations. Each of the operations was built around the interests of individual students. For example one student liked mangoes, so the example described that student eating a certain number of mangoes on various days. Personalising the examples was believed to create motivation for the students. Also, providing examples from the everyday worlds of the students was believed to help make links to the activities. A teacher noted that using examples that most of the students have never encountered

and possibly will not encounter, such as elephants, distracted students from the task; in contrast, embedding the examples in the worlds of the students appears to help students engage with the task.

Students need to see the relevance of the concepts being taught. For this reason, teachers create opportunities for learning in context. When teaching fractions, one teacher used a mandarin to illustrate the parts of a whole. The flood gauges on the roadside were used in a discussion about decimals. There is no need to weaken the curriculum for the students; rather, it is important to find ways to make the curriculum appropriate for the students.





## Other Strategies Used to Support Learning

### Feeling Good

The school actively supports the Stronger Smarter approach and teachers are able to do the professional development offered by the program. Drawing on the Stronger Smarter philosophy, teachers check how students are feeling at the start of each day. Students show thumbs up if they are feeling good, thumbs horizontal if they are feeling neither good nor bad, and thumbs down if they are feeling bad. Students may be asked why they are feeling a certain way, to give credence to their feelings. Knowing how students are feeling helps teachers to think about how they will interact with individual students. If students feel safe and happy, they are better able to learn.

### Building Independence and Responsibility

One focus of the strategies used at Bayulu is to build learners' independence, which is valued in their home culture. The First Steps program helps scaffold independence through integrating whole-class teaching, small-group work, paired work, and individual work.

Responsibility is also fostered at Bayulu school. The classroom has an "economy" through which students earn money to spend in the shop of Fun Fridays. Throughout the week, students earn imitation money for completion of tasks, for behaviour, or for attributes the teacher seeks to acknowledge. Students never lose money, because the system is designed to reward positive behaviours rather than be punitive. In addition to using the reward money in the school shop, students who lose pencils use the money to buy new pencils. This system has created a climate of caring for property.





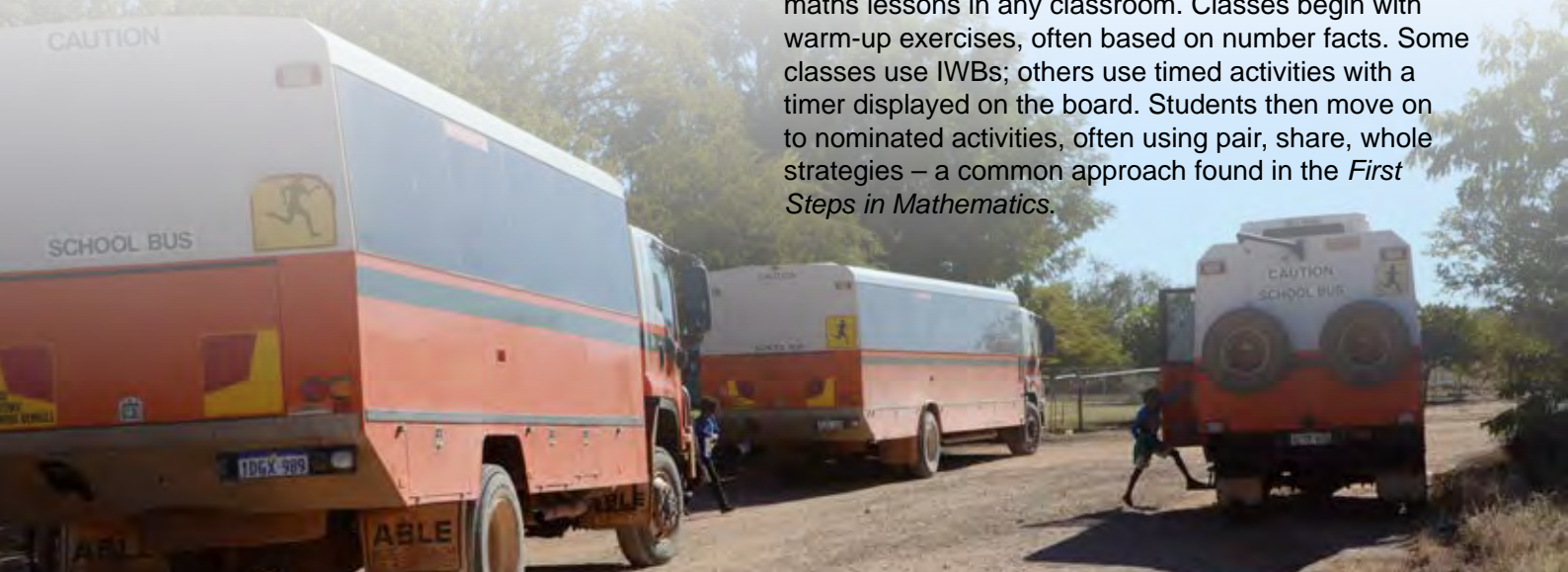
## AIEOs

Each week, the deputy principal and the AIEOs meet to work through the AIEOs' job descriptions so that they are aware of their responsibilities and tasks. It is important for the AIEOs to recognise their important role in the education of the students. These meetings aim to build a robust culture among the AIEOs so that they feel a sense of responsibility to attend, work with the students, and take some control in the classroom. Teachers are encouraged to plan with their AIEOs so that the AIEO is aware of his/her role in the classroom.

## Being Explicit and Having Routines

For a range of reasons, most notably language and culture, students are often left second-guessing what teachers want. When expectations are not clear, students behave poorly. Consequently, teachers at Bayulu seek to make the learning intent and behavioural expectations explicit. This increases students' access to the learning of the lessons and helps to keep behaviours under control.

Routine is another important feature of lessons at Bayulu. The students often experience disruption and a lack of routine in their community, so knowing what to expect at school helps to settle them. Each morning commences with a physical activity chosen by the teachers – running around the perimeter of the school, boot camp, yoga, etc. All classes do this, and then move to their classrooms. There is a standard procedure for maths lessons in any classroom. Classes begin with warm-up exercises, often based on number facts. Some classes use IWBs; others use timed activities with a timer displayed on the board. Students then move on to nominated activities, often using pair, share, whole strategies – a common approach found in the *First Steps in Mathematics*.





## Targeted Learning for Identified Students

As is the case in many remote schools, some students at Bayulu are significantly behind their same-age peers, for a range of reasons. The wide diversity in a class can often create planning challenges for teachers. In addition, students whose needs are not met may behave poorly. At Bayulu, a special class has been created for those students in the early years of schooling who need extra support to build their fluency in a wide range of areas, but most often in number, place value and operations. These students are taken into a withdrawal room and work in an almost one-on-one context that focuses on the skills that need to be developed. This approach enables the classroom teacher to work with the students who have these skills (and are most often the regular attenders) and move them forward in their mathematics.

## Fun Fridays

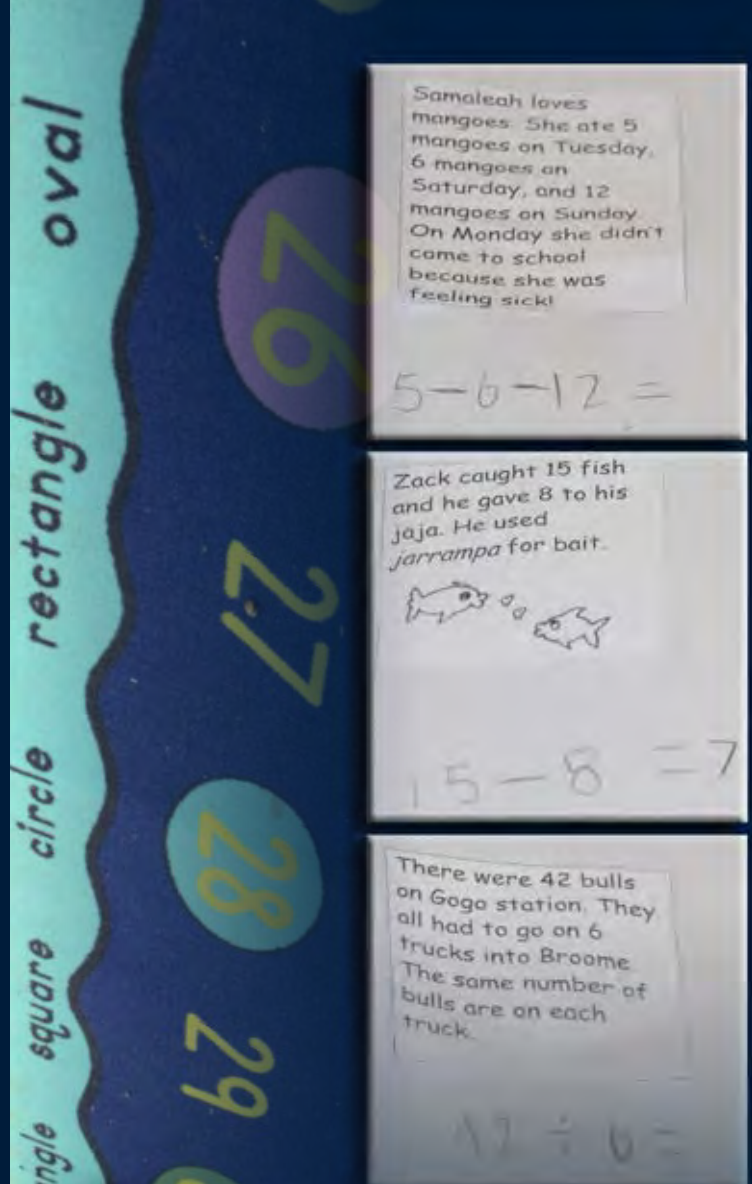
Attendance at Bayulu school is similar to that in other remote schools. Attendance from one community is very strong, but students from other communities attend regularly only on Tuesdays, Wednesdays, and Thursdays. In order to encourage students to attend on Fridays, maths lessons on Fridays involve fun activities.



# Benefits for Learners

The two-ways approach to language and activities recognises and celebrates the home cultures and languages of the students. This builds the students' pride in their language and identity, and helps to create an environment that does not isolate or marginalise the children. This approach also builds bridges between students' home culture and the dominant culture of schooling, so that students build their knowledge of and fluency in SAE.

Encouraging students to use Kriol in mathematics lessons helps students to build mathematical understanding. This is because the use of home language to negotiate meanings enables students to focus on the mathematical ideas rather than on translating between Kriol and SAE.



## Advice to Teachers

Students coming to school experience mathematics through a dominant language that is very dissimilar to their home language. Valuing Kriol (or other home languages) and creating learning experiences in both languages helps students to code switch between their own languages and that of school.

Students should be exposed to the language of mathematics so they experience and understand this language. Support must be provided to help students understand the language of mathematics.

Rather than use worksheets containing foreign concepts (such as elephants) that can distract students, it is more appropriate to draw on the lifeworlds of the students. This process helps students to make connections between their worlds and school mathematics and, in so doing, creates a sense of why students need mathematics.

AEIOs can offer good support for teachers to scaffold language learning and be the conduit between the home language/s of the students and the language of the school. Appropriate scaffolding of AEIOs can help to build strong educators in the communities (although this may not apply to all AEIOs).

## Model for Quality Learning

General Principle	Implications for Mathematics	Focused Strategies
Scaffold use of Kriol in schools	Create opportunities for students to draw on their home languages and to apply these to mathematics as they develop greater proficiency in SAE.	<ul style="list-style-type: none"> <li>Use home language and SAE in resources that illustrate mathematical concepts and processes (and language) and that build upon children's experiences.</li> <li>Expose students to the rich language of mathematics, with high expectations that they will learn this language. Provide appropriate scaffolding for the students so that they can access mathematical language.</li> <li>Create motivating problems for the classrooms. Allow students to negotiate their understandings in Kriol, and encourage them to explain their working in SAE.</li> <li>Allow longer wait time for students as they try to make sense of questions and interpret the demands of the task. They may be translating between Kriol and SAE.</li> </ul>
	Support mathematical communication.	<ul style="list-style-type: none"> <li>Students have a tendency to respond with single words rather than full sentences. Model appropriate forms of response to enable them to communicate mathematically.</li> </ul>
Two Ways approach	Use students' out-of-school mathematical experiences as a basis of learning activities.	<ul style="list-style-type: none"> <li>Provide activities that draw on the experiences of the students in the worlds beyond school. This will motivate students to engage with the content.</li> <li>The use of contextually located problems can help to create awareness of the relevance and importance of mathematics in students' worlds.</li> </ul>
	Engage AIEOs' significant knowledge and language to support a two-ways approach.	<ul style="list-style-type: none"> <li>AIEOs can create resources that draw on local knowledge and language for mathematics.</li> <li>AIEOs can lead activities in the two-ways learning of mathematics.</li> </ul>



# Key Messages for Numeracy Learning

Students in the early years need appropriate scaffolds and models to help them develop language skills in SAE. In the early years, there needs to be a two-way approach that values Kriol as a language that is different from, but not subordinate to, SAE. Mathematical resources can be made to support a two-way approach to language and the transition to SAE.

By the time the students are in the upper years of primary school, there is an expectation that they will be proficient in SAE. This proficiency may not develop, but having high expectations is important, so scaffolding at this level is about modelling appropriate SAE and seeking clarification of meaning.

AIEOs are a valuable resource for building bridges between Kriol and SAE. The AIEOs provide cognitive resources (spoken language) and assist with the development of physical (books, books, cue cards, etc.). The AIEOs also model SAE to the students so that they can see that it is possible to code switch.

It is important to allow wait time when posing questions in maths. The students often need to translate the question into Kriol, work out the problem, and then translate back into SAE. This takes considerable cognitive load so wait time should be extended. A long wait time does not always signify confusion or lack of knowledge; rather, it may reflect the translation process.

## School demographics

Year range	K-7	FTE teaching staff	11.6
Total enrolments	123	Non-teaching staff	9
Location	Very Remote	FTE non-teaching staff	6.1
ICSEA (school)	665	Indigenous students %	99%
ICSEA (distribution of students) (bottom quarter to top quarter)	89%   9%   2%   0%	Enrolments: Girls/Boys	62/61
Teaching staff	12	Language background other than English	90%
		Student attendance rate %	70%