

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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2015

Catering for the Whole Child

East Kalgoorlie Primary School

Kalgoorlie is a large inland city famous for gold mining, and the Golden Mile. It has a population of around 31000 people. While generally referred to as "Kalgoorlie" the town is the amalgamation of 2 cities - Kalgoorlie and Boulder in 1989. The beginnings of the town, Kalgoorlie-Boulder were in 1893 when three Irishmen - Patrick Hannan, Tom Flanagan and Daniel O'Shea stopped to re-shoe their horse and found 100 ounces of alluvial gold. Hannan rode to Coolgardie to register his claim, thus providing the catalyst for the gold rush which gave birth to Kalgoorlie. The area is known internationally as one of the richest gold deposits in the world.

Both Kalgoorlie and Boulder have strong reminders of the architecture of the rich boom period of the late 1800s and early 1900s.

The growth of the towns, located in some of the driest land in Australia, was possible through the engineering skills of C Y O'Connor who lead the construction of the inland pipeline from Perth to Kalgoorlie to provide water to the area. The pipeline, some 530 kms, was commissioned in 1896 and completed in 1903 for the cost of 2.5 million pounds.

The unique landscape around the Kalgoorlie-Boulder area is referred to as 'The Great Western Woodlands' or the 'Goldfields Woodlands'. The area spans 16 million hectares and is home to nearly 20% of Australia's known plant species. The woodlands around Kalgoorlie and Boulder were severely divested during the early years of the Gold Rush to provide fuel for the steam driven engines of the mines and trains. A vast network of train lines was established to enable woodcutters access to the timber.

Today, the towns are thriving on the gold and nickel mines that surround the region. The large open "Super Pit" mine rests at the eastern edge of the towns. It is the largest producer of gold in Australia and fourth in the world, having produced 50 million ounces of gold.

Kalgoorlie East Primary school is located at the eastern end of the city, near the Super Pit. The school was part of the Western Australian Aboriginal Innovation Schools Initiative. As a magnet school, students are bussed to the school, some from as far away as Coolgardie. There are

high levels of poverty among the students, and high levels of transience so the school has developed a number of strategies to address the issues confronted by students. An emphasis at the school has been the well-being of the students, with student health being prioritised through the school managing the health process with community partners to ensure that all aspects of students' wellbeing are considered. Targeted programs have been developed that focus on early intervention and the well-being of students, such as sports engagement, full-time Kindergarten and three year old Kindy.



Background to the Initiative

East Kalgoorlie Primary School is an independent public school and has a population comprised of 98% Indigenous students. The majority of the students are from the surrounding area, but there is a high transient population of students who may come from as far as the remote communities in the Ngaanyatjarra Lands and may be in town for business. The high levels of poverty and often associated conditions of poor health have resulted in the school giving priority to the well-being of the students. The school has a very targeted program where it acts as a broker for the children's health. They assess and monitor students' health and then act on the students' needs. This includes doctor appointments, obtaining specialist care (within the health care system) as well as educational services (such as hearing, speech). By taking care of the students in this way, it offers teachers insights into the overall well being of the students and helps to develop comprehensive understandings of students' behaviour, and engagement with learning.

Defining Success

The focus on early years of schooling has meant that there has been a steady increase in the performance of the students as they move through the school. Most of the students now enter the pre-primary years at a level commensurate with their same age peers. It is anticipated that over time, this progression will be sustained as students move through the school.





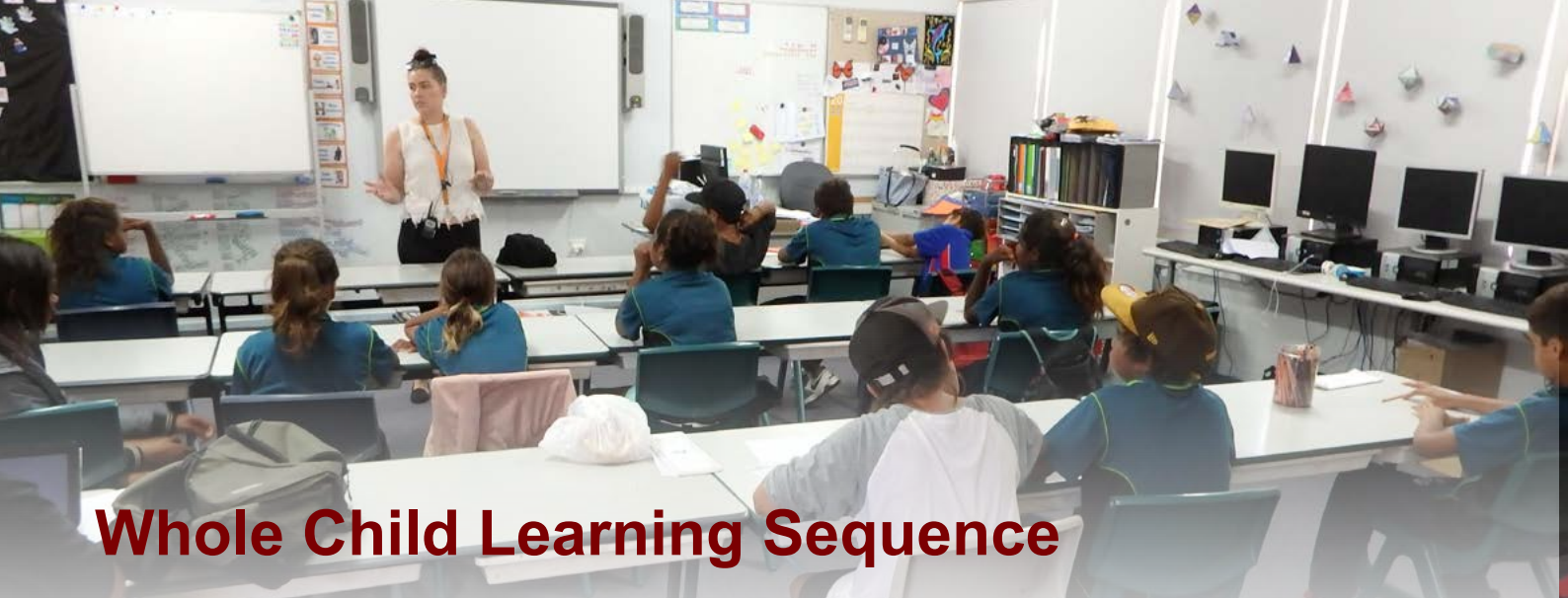
The Well Being of Students

Kalgoorlie East PS understands that the community sees success as related to the overall well-being of their children. In this context, the school has taken the lead in ensuring the health and well-being of the students alongside their academic development. The school has an allocated person whose role is to work with the students and the families to ensure that the health needs of the students are met so that any health problems are dealt with in a timely manner. All teachers undertake health assessments of students, and over time, the students and families have gained a trust with the school personnel to feel confident and safe to talk with staff about the health needs of their children. The school keeps detailed records of the health assessments (and interventions) so that there is a comprehensive account of the health and

well-being of the students. It is the case that many families may be in remote communities for family or cultural business but will return to the school for health appointments, suggesting the value that the families place on the health of their children.

The school essentially provides a shop front for the many health services that are required for the students – including ENT specialists; speech pathologists, paediatricians, occupational therapists along with the usual services associated with doctors, dentists, and hospital. In some cases, students may be in hospital for treatments, but with the strong partnership with the school, students will be 'released' for the day to attend school, and then returned to hospital for the remainder of the day. This is particularly the case for students whose families may live out of town.





Whole Child Learning Sequence

East Kalgoorlie PS has developed its own learning sequence based on both social and curriculum outcomes. The curriculum is built so as to provide seamless transitions between the phases of learning. The Learning Sequence is supported by an assessment rubric that has been agreed to by the whole staff. The Sequence allows both teachers and administration to see where students are at in terms of their learning rather than prescribed year levels. It also allows flexibility in the progression of students. For example, if students are in Pre-Primary but working above their phase level, they can be moved into Grade One so that the teaching would be aligned with their needs. This strategy not only extends the child (or meets the child's needs), it also helps teachers in the differentiating of the curriculum, as part of the intent is to reduce the diversity of the learners within a class cohort, thus making planning for learning somewhat more efficient for teachers.

The levels of the sequence are shown using colours, rather than numbers. As students achieve learning outcomes identified in a particular level, they are able to move to the next level. Within a level (or colour), there are particular 'hot spots' that are seen to be important within a particular level. Students may struggle within a level but a priority is given to the 'hot spots' which are critical to moving into the next level so teachers will spend time focussing on achieving the particular concepts.

For each level, the school has identified a content description (that is taken from the National Curriculum) and elaborations. For a given colour level, a more detailed description is provided on the elaboration that is explicitly tied to the context at East Kalgoorlie, including links with the cultural context of the students. The school also outlines the resources (concrete and digital) that are available to the teachers to support the development and teaching of an elaboration. The sequence also provides assessment advice to teachers on how to assess an identified outcome.

In the context of East Kalgoorlie School, there is an emphasis on oral language development. As students progress through the learning sequence, profiles of students can be constructed.

The learning sequences are targeted for individual students so it is not expected to describe students holistically but rather to describe the learning outcomes for various levels. It is anticipated that students may be at different levels for different areas of the curriculum. Such a process allows teachers to celebrate/document/describe student achievement as well as assigning students to learning experiences that match their needs, including grouping students (homogenous as well as heterogeneous) for learning experiences. Assessments are made at 5 week intervals and recorded into a school system that can be accessed by other teachers and the school administration team.

Health & Wellbeing / Attendance	Tier 1	Oral Language			Physical Development			Sensory Profile
	Tier 2	Critical & Creative Thinking			Social & Emotional Learning			
	Tier 3	English			Mathematics			
	Tier 4	History /	Science	LOTE	Health & PE	The Arts	Technologies	



					Sensory Profile
Tier 1	Oral Language		Physical Development		Balance & Motion
Tier 2	Critical & Creative Thinking		Social & Emotional Learning		
Tier 3	English		Mathematics		Hearing
Tier 4	History/	Science	LOTE	Health & PE The Arts Technologies	

Learning Sequence – East Kalgoorlie Primary School

Term 1	Term 2	Term 3	Term 4
Beginning & Week 5	Beginning, Week 5 and end of term	Week 5 and end of term	Week 5 and end of term

Students are mapped against the sequence so that teachers are able to identify current understandings and where to set future targets, and what is needed to be achieved for a student to meet the levels that are expected for age groups.



Strength-Based Curriculum

Kalgoorlie East PS uses a strength-based curriculum where the strengths of students are recognised. Many of the students enter school with knowledges that are not usually part of the standard curriculum. For example, their knowledge of animals or the land, will be used as a key learning focus and these knowledges are incorporated into learning activities. This process ensures that students feel that they have important skills and knowledges to contribute to the learning environment and are valued.

Organising Classrooms

Classrooms are organised around the curriculum levels. By identifying the levels of understandings of the students, clustering of students are made whose levels are similar. This helps to reduce some of the diversity that is found in classrooms. Students are all on individual learning plans so teachers differentiate learning activities in classrooms so as to meet the needs of students. Teachers have scope and flexibility to conduct lessons in ways that suit their preferred teaching styles providing they are achieving learning outcomes that are commensurate with the learning sequence.

With a core group of regular attenders as well as significant number of transient students, teachers need to organise their classrooms to cater for the potential considerable diversity within a classroom. This is achieved through organising small group work activities that are differentiated for learners. Throughout lessons teachers organise activities that appear to be the same for the students – such as number recognition – but will be quite different. For example, in the orientation component of a lesson, a teacher was working with students to read numbers. For the whole group activity, the numbers varied from 7 through to 11517. In the small groups, the teacher targets the work undertaken so that it matches the needs of each student. The activities that the students undertake will be in the focus of the lesson (e.g. the strand/s of the curriculum along with the level of the learning intent). In some activities, the groups will be organised by the levels of the students, where other activities will be grouped so that students co-teach their peers.

There is fluidity within classroom organisation. Students are able to be assigned to different classes as they move forward in the learning sequence. Students are also assigned classes depending on their achievements in particular curriculum areas – a student may be in one class for numeracy and another for literacy, depending on the colour of their level.



Differentiating Learning

With the whole child learning sequence, the diversity within any classroom is sought to be reduced so that classes are structured around the levels within the sequence. However, there is still quite a lot of diversity within any class – some in terms of learning and others in terms of behaviours due to the transience of students or their particular health needs. Teachers seek to address differentiation as a priority. Within the introduction of a lesson, the overall concept may be similar for the whole group, but then in the work phase of a lesson, teachers will differentiate the learning by clustering students in groups according to their needs.

iPads have been an important part of the differentiating in classrooms. In some classes, teachers use them for one group to work with, whereas in other classes teachers use them for whole class activities but the activities are locked to the needs of the students. Prior to the lesson, the teacher identifies the needs of the learners and then plans the targeted activities for the particular students. Locking the activity is important so that students do not go off task and search for other activities.

Using Digital Media to Support Numeracy Learning

Across the school, there is a very strong emphasis on the use of digital media. All classrooms have interactive white boards, as well as iPads. In some classes there are full class sets of iPads, while in others they are used for small group work. Teachers reported that the students engaged with the iPads and that they were useful for providing motivation for learning and engagement while also being set to the levels appropriate for individual learners.



Early Years Learning a Priority


Closing the Gap is taken seriously at East Kalgoorlie PS. This has been addressed in a very serious way through developing a comprehensive early years program. The school has a three-part program for the early years. The school offers a pre-kindy program for three year old children who are able to attend for 5 days a week for the full school day. The students are then able to progress to the kindy (4 year old) sector of the early years phase, before moving into the pre-primary year (5 year old). Collectively this provides students with potentially three years of (full-time) schooling in preparing students for Year One. The teachers work in a highly collaborative and supportive way to ensure that the programs provide a strong basis for the social, emotional and cognitive development of students to prepare them for schooling.

The program has been highly successful with most students now completing pre-primary at benchmark level. The table below shows how students in 2012 and 2013 entered and exited the pre-primary years. The data show how there is an upward progression within a year but also the improvement from 2012 to 2013 where the baseline data were already higher for the second cohort. These data correspond with the rollout of the early years programs. The students in 2013 had completed the 3 years of early years schooling, while the 2012 cohort had two years in the early years sector. These data, and subsequent data indicate that there is an upward trending of student achievement that suggests the impact of the extended experiences in the early years is impacting positively on student performance in numeracy.

	Numeracy			
	2012		2013	
	Sem 1	Sem 2	Sem 1	Sem 2
Students at 1.5		12%		21%
Students at 1.4		18%		5%
Students at 1.3		18%		
Students at 1.2		6%	10%	5%
Students at 1.1		24%		11%
Students at 1.0		6%	10%	5%
Students at 0.9		6%	5%	16%
Students at 0.8	15%		5%	11%
Students at 0.7			10%	5%
Students at 0.6		12%	5%	5%
Students at 0.5	25%		15%	
Students at 0.4	15%		25%	16%
Students at 0.3	15%		5%	
Students at 0.2	20%			
Students at 0.1	10%		10%	
Students at 0.0				

Numeracy achievements for Pre-Primary students

The data suggest that in 2012, 40% of the pre-primary students were at or above benchmark in Semester 1 while in Semester 2, 84% of the students were at or above benchmark. In comparison, the students commencing in Semester 1 of 2013 were already achieving higher levels than their peers from the year prior, and achieved at a higher rate than their peers in 2012 at the end of year 2013. This upward trending appears to be a result of the implementation of the early years programs.



The school has received special authority to conduct a full time 3 year pre-kindy, and is now conducting a Kindy readiness program for families to come to the school. This scaffolding into school practices, including numeracy practices, will enable younger children to learn many of the literacy and numeracy skills in a friendly and supportive environment and be better prepared for school. Many of the basic social, emotional and academic skills that students need for school are taught in a repetitive process so that over time, the skills will be incorporated into the student's repertoire of skills and knowledges.

Leadership and School Culture

There is a strong, supportive culture at the school where teachers feel valued and supported. The teachers all reported that they feel valued by the leadership team and that suggestions staff have for improving or changing practice is supported by the leadership team. Teachers are empowered to adopt quality practices that will enhance the learning of their students.

The teachers are able to attend professional learning activities that will enhance their teaching, and there are regular opportunities provided by the leadership team for learning about current trends in education. The professional development can

be offered through Kalgoorlie-based activities, or through travel to Perth, or with consultants coming into the school. Being in a regional centre enables greater access to professional development than for many remote sites. The principal and leadership team proactively circulate current research and practices among the teachers so that they are kept informed and abreast of new initiatives in educational practice and thought. Teachers reported that they would attend professional development activities often being very familiar with the content of the PDs because of the strong input from the leadership team and principal into the development of ideas and trends in education.



A close-up photograph of children's hands and arms as they play with wooden blocks and red cards on a table. The cards have numbers like 7 and 13 on them. The background is slightly blurred, showing more of the play area.

Benefits for Learning and Learners

The two key strategies being used at the school have two major outcomes/benefits for the students.

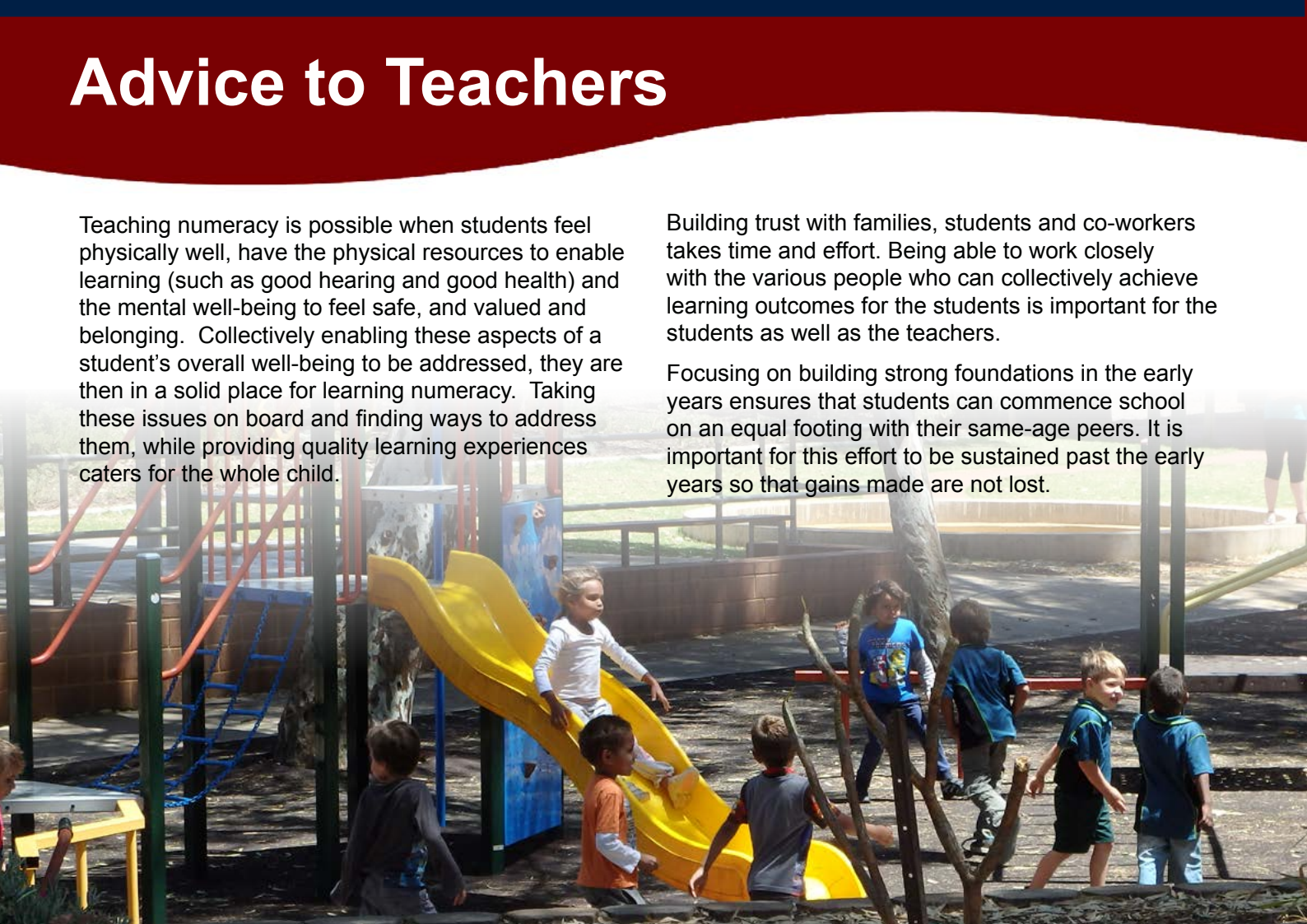
Focusing on the overall well-being of the students has meant that students' overall health needs are being addressed, thus enabling them to engage in learning. For example, the regular ear checks monitor students' ear health and hearing, which can vary over time. Students who are able to hear well are more likely to engage with the activities in a classroom and, as a consequence, learning can occur. Students and their families have gained considerable trust in the staff to care for their children, and there are now good relationships between the school and families.

The early years program has provided significant input into the school readiness of students. The three-year intervention has resulted in the students being comparable to their same-age peer group

in other Australian schools. The provision of many learning experiences has helped to close the gap in many areas of development – social, emotional and academic. Students have many of the early-year numeracy (and literacy) skills expected of students in the Pre-Primary years, as well as the many school behaviours – taking turns, sitting in class, asking for permission to undertake particular activities, etc. This has meant that teachers are now able to teach much of the pre-primary curriculum due to the readiness of the students.

Teachers have targeted their teaching strategies to cater for the needs of the learners. These have included the use of digital technologies as a tool for engaging learners. Teachers have also recognised that students often have challenges with retention of knowledge, so there is a constant revision of concepts through varied strategies.

Advice to Teachers

A photograph of a group of young children playing on a playground. One child is sliding down a yellow slide, while others are standing or walking nearby. The playground has various equipment like slides, ladders, and climbing structures.

Teaching numeracy is possible when students feel physically well, have the physical resources to enable learning (such as good hearing and good health) and the mental well-being to feel safe, and valued and belonging. Collectively enabling these aspects of a student's overall well-being to be addressed, they are then in a solid place for learning numeracy. Taking these issues on board and finding ways to address them, while providing quality learning experiences, caters for the whole child.

Building trust with families, students and co-workers takes time and effort. Being able to work closely with the various people who can collectively achieve learning outcomes for the students is important for the students as well as the teachers.

Focusing on building strong foundations in the early years ensures that students can commence school on an equal footing with their same-age peers. It is important for this effort to be sustained past the early years so that gains made are not lost.

Model for Quality Learning

General Principle	Implications for Mathematics	Focused Strategies
Cater for the health and academic well-being of students	Students need to be healthy, well, safe and happy in order to learn mathematics/numeracy.	<ul style="list-style-type: none"> Schools and teachers to monitor the health and well-being of students and to ensure they get the required health needs met in a timely manner. Employ a staff member whose role it is to liaise with families and support personnel to ensure a one-stop health and well-being model for each student.
Whole school planning	The school has developed a learning sequence that matches the learning needs of the students, and is linked to their social and emotional wellbeing.	<ul style="list-style-type: none"> Develop a whole school learning sequence that reflects the learning needs of the students and aligns with the national curriculum. Create phases of learning that document progression through the phases so that students (and teachers) are able to see progress. Students are flexibly grouped in class, and across classes, according to their achievements in the different phases (levels). All teachers are inducted in the model and are able to understand the use the model. Class data are entered in to a school data base so that students' progress is mapped, and monitored.
Early Years focus on Numeracy	Develop strategies that cater for the prior-to-school experiences so that students can be schooled in numeracy practices so they are equivalent to their same age peers in pre-primary.	<ul style="list-style-type: none"> Pre kindy, kindy and pre-primary classes have many of the pre-numeracy concepts as featured parts of the curriculum – sorting, colours, number (writing, recognition), counting etc.
	Support parents with strategies to help their children in the home environment with numeracy activities.	<ul style="list-style-type: none"> Building trust with families and then encouraging them to support their children's numeracy learning, helps reinforce concepts being learned at school.
Leadership	Clear guidelines are provided to staff, and carefully inducted into the processes valued at the school.	<ul style="list-style-type: none"> A school model for numeracy is shared with the staff, and staff are supported in the carriage of numeracy programs.
	Teacher input is valued and acted upon.	<ul style="list-style-type: none"> Teachers can suggest changes to practices and are supported in taking on change and roles within the numeracy area.

Key Messages – Summary

Investing in the early years in a concentrated way can help reduce the gap prior to schooling so that students can commence their first formal year of schooling at a level commensurate with same age peers.

Focusing on the overall health and well-being of the students can enable students to engage fully in learning.

Providing quality learning environments, including the use of digital tools, helps to engage learners.

A curriculum designed to meet the needs of the students – holistically – and then phased so as to map progression through various concepts, provides strong scaffolding for both teachers and students to know their current levels of understandings, and where they will need to move in order to map progress.



School Demographics

Year range	K-7	FTE teaching staff	9.9
Total enrolments	126	Non-teaching staff	18
Location	Provincial	FTE non-teaching staff	10.8
ICSEA (school)	595	Indigenous students %	97%
ICSEA (distribution of students) (bottom quarter to top quarter)	96% 3% 1% 0%	Enrolments: Girls/Boys	60/66
Teaching staff	14	Language background other than English	17%
		Student attendance rate %	74%