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 Professor Robyn Jorgensen

2015

High Expectations for Mathematics Learning

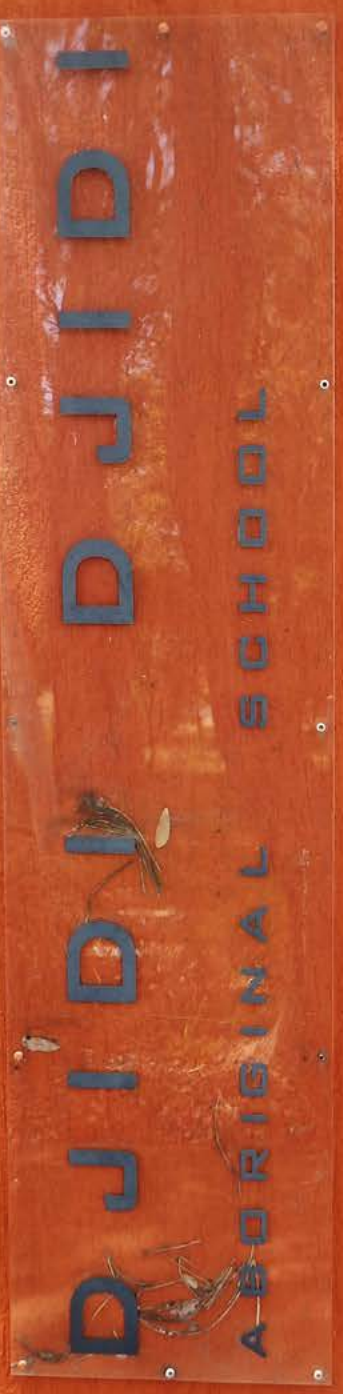
Djidi Djidi Aboriginal School

Bunbury is situated approximately 200kms south of Perth. It is a port town and services the mining, farming and timber industries of south-west Western Australia. The town is known as the dolphin capital of Western Australian due the frequent presence of the mammals in the Bay. It is the third largest city in Western Australia with a population of approximately 33,000 people, but the population of the Greater Bunbury area is an estimated 67,090 people.

Bunbury was originally named Port Lechenault in 1803 by the French explorer Captain Louis de Freycinet in recognition of the botanist (Lechenault de la Tour). The bay – Geographe - was named after one of the ships in the fleet. Dr Alexander Collie and Lieutenant Preston explored the Bunbury area in1829.

Sometime later, Lieutenant Governor Sir James Stirling, upon visiting the region, established a military post. The town was later renamed after Henry Bunbury in recognition of his significant contribution of establishing the inland route from Pinjarra to Bunbury.

Djidi Djidi Aboriginal School was established in 1998 after consultation with the Noongar people in Bunbury. It is a magnet school for the Aboriginal families in the Bunbury area. Students are bussed to the school from the town and surrounding areas, some as far afield as 20kms. The Noongar Community of Bunbury felt there was a need for a school to cater for the needs of their children and that an Early Childhood Centre (Kindergarten to Year 2) was needed to give Aboriginal students a sound start to their education



with strong involvement by Aboriginal people. In 1999, this was extended to Year 3. Following a community survey, the Department of Education & Training endorsed a recommendation to add an extra year level every year until 2003 when Year 7 was reached. The school now caters for students from K-7. Aboriginal culture is central to the programs offered at the school including art, music, performance dance, language and food. The school was designed by the Noongar elders and represents the values of learning held by the community. The Noongar elders see the school as providing key learning for their children so that they can be successful in the worlds beyond schools. The community takes responsibility for cultural learnings. The Elders want the school to teach and use Standard Australian English as the language of instruction.

The children, Elders and the Bunbury community are central to the sense of place that is a priority at the schools. Noongar language is taught at the school as a part of the cultural and language programs. In 2015, the school suffered a serious fire that destroyed the resource centre which has inhibited the capacity for the school to operate many of its programs. The term Djidi Djidi refers to the wagtail found in the local area and is part of the school logo.

Background to the Initiative

In 2010, the school was keen to adopt a school-wide cultural change where high expectations of students were seen as central to the culture the school. In this process, the school has worked to build a collaborative culture among the staff – teachers, support staff, and administration. Time has been allocated for staff to build their learning teams – within the class and across classes. To develop high quality learning, teachers have embarked on a journey of assessment for learning. Strategies have been developed to monitor student learning and in that process, develop targeted interventions.

Defining success

Djidi Djidi currently assesses students twice each term (at 5 weekly intervals). All data are stored on the school-based system. Scores are entered into the system and growth is monitored carefully with targeted intervention undertaken for those students who need support.

By systematically following a whole school numeracy scope and sequence together with the careful monitoring of targeted interventions it has been found that the stable cohort of students at the school are now at or above the National Minimum Standard in NAPLAN.

The focus in the early years where the school has been putting a lot of emphasis on literacy and numeracy skills in the kindy and pre-primary years, has shown that the students who are now moving into the primary school are school ready in school behaviours and academic skills. The students exiting the pre-primary years, who have been at the school for the two years, are at benchmark levels (or above) and more than ready for their school years. The rigorous focus placed on pre- literacy and numeracy skills has provided a solid foundation from which to leverage from in later years.

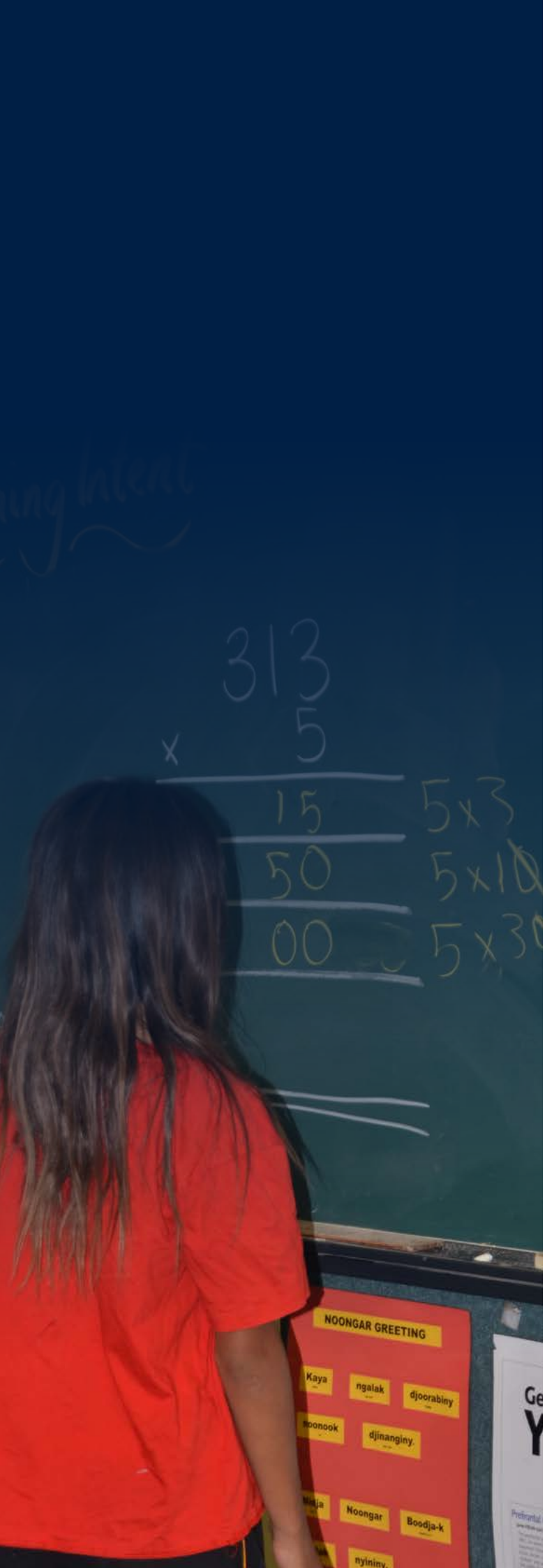
The whole school environment, with its emphasis on high expectations and scaffolding students to enable them to achieve success, has created a very positive atmosphere at the school. The whole school attendance rate hovers around 85%, however out of 98 students 63 attend school 90% or higher.

Creating Success in Numeracy Learning

Djidi Djidi has embarked on a journey of continuous learning and improvement. The staff has identified on a continuum where they think they are located. They then embark on goal setting to move the school forward. The Continuous Learning Continuum is a school improvement model that has been taken up by the school. There are a number of dimensions upon which the school tracks its growth, as a school staff.

- Information and analysis
- Student achievement
- Quality planning
- Professional learning
- Leadership

The continuum is assessed against three areas – approach, implementation and outcome and where there are five levels in which the gains are monitored. Staff collectively identifies their current standing and work together to effect change towards the final levels. This model has provided staff with a means through which they are able to identify their current status, and then to set goals and strategies as to how to progress towards increased improvements across the five dimensions of growth.



Whole School Approach

In adopting a whole school approach, the staff has focused on a number of areas in which to enhance their improvement. Initially, the philosophy of high expectations provided the key motivation for the school. High expectations were of staff, teachers, teams and students. Goals are set to provide a clear direction in which the staff and students are expected to show growth and improvement. The school has developed its vision and has three main aims:

- To improve the educational outcomes for Aboriginal students;
- To strengthen and affirm Aboriginal culture; and
- To involve Aboriginal community members in school decision making and in the school's educational programs.

The underpinnings of the whole school approach is to provide opportunities for "…Noongar children to perform as well in school as any other child in any other school and as educational practitioners we hold high expectations towards providing a quality education that will give them access to every opportunity that every other child can access."

Djidi Djidi has taken a coaching process to support staff in their growth. The staff work one-on-one with the coach who will focus on the successes of the teacher, along with areas of concern. The focus of the sessions is as much on the personal development of the teachers, as their emotional well-being, and their performance as a teacher. Building a culture of trust across the staff, the coaching process has enabled teachers to talk through their work and life at Djidi Djidi with a sense that they can be confident of support and success.

Learning Teams

The culture at Djidi Djidi has moved to one of learning teams. The teams consist, at the classroom level, where teachers and the Aboriginal Indigenous Education Officers (AIEOs) and Teaching Assistants (TAs) meet weekly. In this meeting program, the second weekly meeting is for the meeting of clusters of teaching teams across the as well as clusters of teaching teams across sectors of schooling. Working together on problems, and based on data, has seen teachers move their approaches to teaching to solving problems. The administration team allocated funds for the establishment of the learning teams. Allowing time off teaching for the classroom teams meant that teaching staff were able to meet to work through issues in the classroom and to help support staff to work alongside their teachers. Knowing how to teach, plan and assess students has created a productive dialogue among the learning teams.

Data Data Data… Informing Teaching

Djidi Djidi has focused on the implementation of school wide testing in number study. The focus on number came from an identified analysis of students' needs, so there is a strong focus on number study and the four operations. The testing scheme focuses on the operations. This testing scheme is implemented twice each term – at 5 weekly intervals. All students' results are entered into a school-wide database. The testing scheme is matched to levels commensurate with expectations of the National Curriculum so that teachers are readily able to see the expected achievement of students for a given age range. The teachers then use a traffic light coding system for ready recognition of achievement when they access the data base. In this system, the red coding indicates students' achievements are below benchmark, yellow to signify being at benchmark, while green shows achievement above benchmark. This colour coding enables both teachers and administration to quickly monitor students learning while also alerting staff to the areas in which problems/successes are being observed. The data are entered into a spreadsheet which is an easily accessible tool for teachers (and administrators). Data are mapped on the dates nominated for the testing period.

Teachers also use the data as a sharing conversation with their students. A student is shown his/her results and collectively negotiates goals for their learning with the teacher. The students also negotiate ways to achieve their goals.

The school has a model for teaching (see Figure 2) which has been developed so that teachers focus their teaching on developing quality practices within the classroom. At the second level, there will be identified students who will need targeted intervention for particular concepts, skills or processes. These needs will have been identified through testing and it is seen that with targeted intervention, students will be able to reach benchmark. There is likely to be a cohort of students whose learning needs are significantly below benchmark and an Individual Learning Plan (ILP) is developed for those students.

Figure 2: Model for Teaching

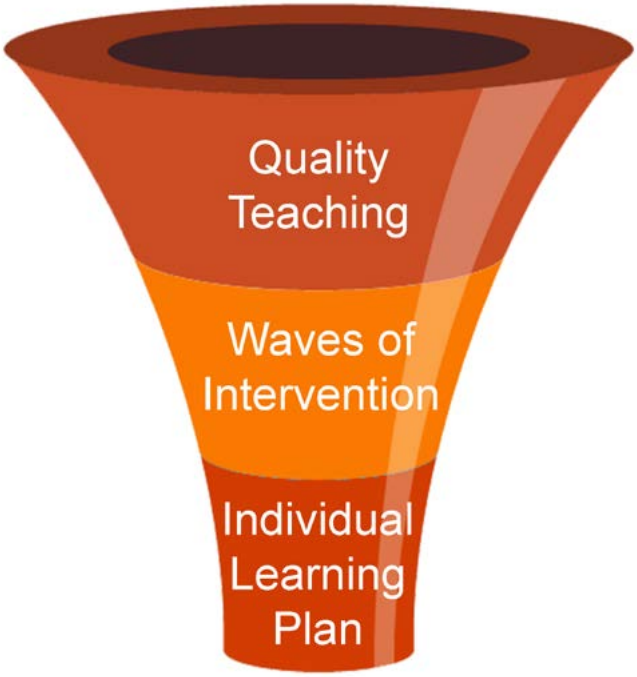


Figure 1: An example of student data recording using the traffic light system

7	12I	5	10	a	12	14								
5	10C	12	16	16	18	19	17	20	20	22	24	27	28	30
6	11C	15	a	19	a	22	20	25	25	27	28	33	30	31
4	9E	3	10	a	a	a								
7	12H	30	30	32	33	33	32	32	33	22	33			
7	12G	21		21	24	22	28	26	27	24	31			
9	14B	28	33			33	a	33	33	33	32			
9	14B	29	33	33	28	33	32	33	33	33	33			
6	11A							14	11	a	18			
5	10G	7	a	12	13	9	7	14	14	14	18	14		
6	11I	0	1	0	1	3	0	5						
7	12J	11	15	14	20	24	21	20	22	22	23			
5	10F				11	9	13	13						
4	9F				5	4	10	a	14	9	11	14	17	
6	11J				15	9	19	22	19	23	27	26	26	29
4	9H	5	7	7	5									

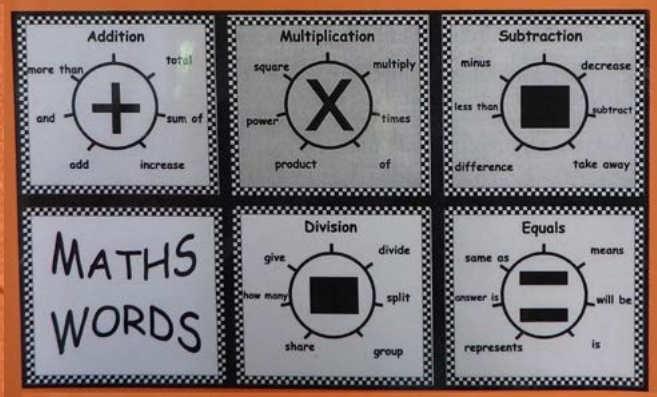
Making Use of NAPLAN data

The school has employed the services of a consultant to help with the interpretation of NAPLAN data. The online program takes the school's NAPLAN data and provides an interpretation of that data. The administration team, and teachers, refer to these analyses to inform their teaching. The detail in the analysis of the data highlights to teachers and staff where there are strengths in the students' learning, as well as where there are gaps. The data can be broken down to individual student data, so provides comprehensive data for teachers to use in their teaching. Where there may be a gap in learning, for example in patterns and algebra, teachers may see that a student or students may not have performed well in this strand when compared with their achievements in another strand. The students may be working at a level significantly below their performance, and the analysis highlights this so teachers are then able to implement targeted teaching.

A School-Wide Learning Approach

The school has adopted a school-wide planning model for lessons. The lesson plan has been developed by the school and based on a professional development activity undertaken by the leadership team. The model has drawn on what was practiced by many of the teachers, but has refined the planning so that all teachers are expected to undertake this model in their teaching of mathematics.

Phase of lesson	Focus/ time	Strategies
Previewing the lesson – setting the stage	Fluency 10 mins	Prior knowledge, expectation of lesson, focused and targeted activities in the focus of the lesson.
Mathematical literacy – revise and tune in	Fluency 10 mins	Developing the mathematical register, resources in the room to support language; text, graphics, symbolic language.
Modelled session – input	Understanding 10 mins	Explicit teaching of skills knowledge and understandings through modelling and demonstration. Use concrete models.
Group activities/ constant elements	Problem solving 10-15 mins per group	3-4 activities one of which is explicit teaching, mixed ability groups chosen by the teacher. Constant elements include patterns (algebra); construction; devices and tools for measurement; and manipulatives and puzzles.
Reflection session	Reasoning 10-15 mins	The most important part of the lesson needs to be done well and tie the lesson together, and make explicit links for the students.



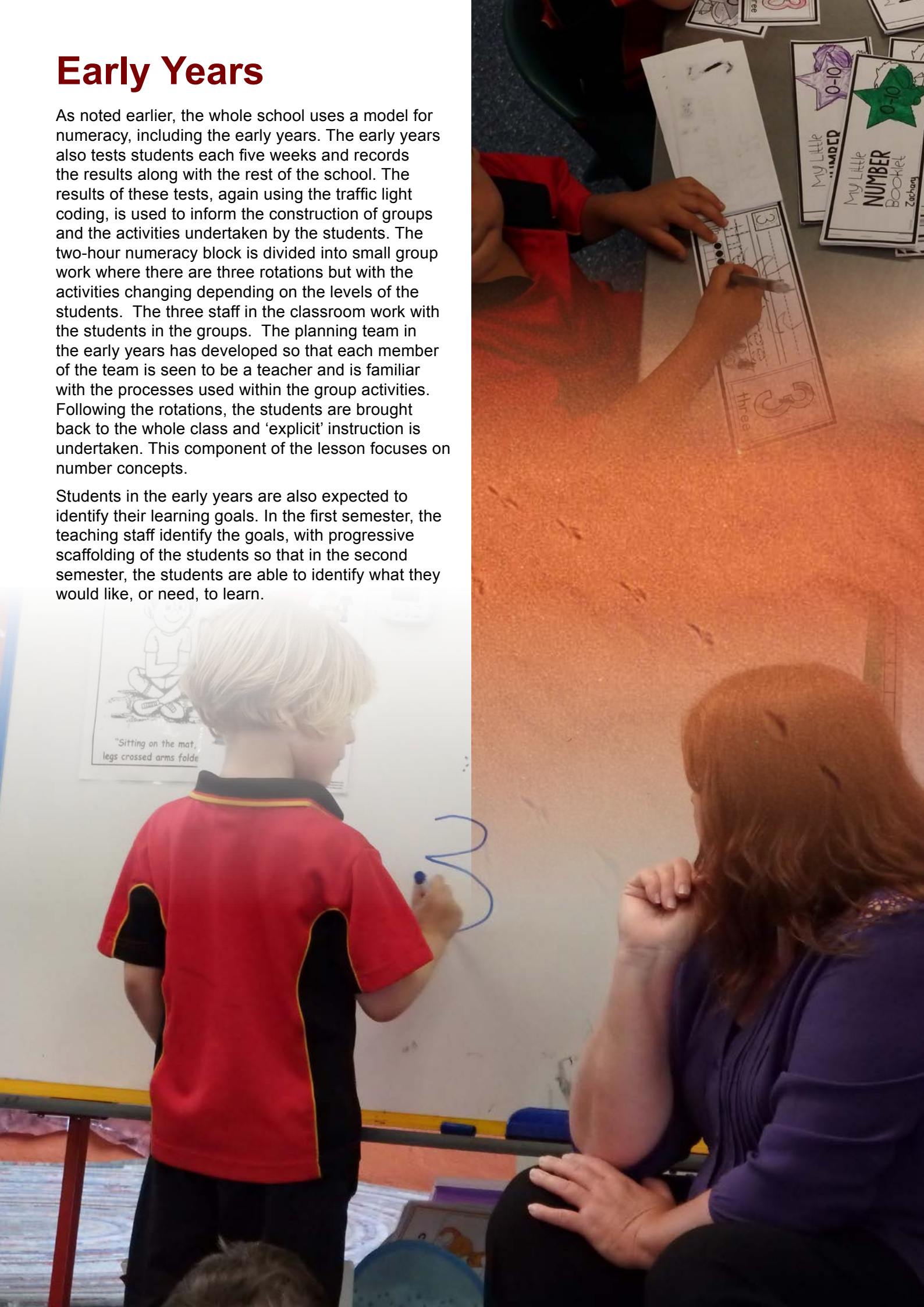
Within the model, there is a specific focus on mathematical language since the students' immersion into Standard Australian English requires that they also become proficient in the register of mathematics. Many of the terms used in school mathematics may not be used by the students in their out-of-school contexts so there needs to be an emphasis on developing their proficiency in the register of mathematics. Many words, for example, comparatives (greater, less than, more than) or terms such as 'the same as' or 'different from' are not used by the students, so explicit teaching of many of the taken-for-granted terms in mathematics need to be specifically taught.

The school has intentionally not bought into any commercial packages but rather has taken an approach of cherry picking ideas that best suit the needs of their students.

Early Years

As noted earlier, the whole school uses a model for numeracy, including the early years. The early years also tests students each five weeks and records the results along with the rest of the school. The results of these tests, again using the traffic light coding, is used to inform the construction of groups and the activities undertaken by the students. The two-hour numeracy block is divided into small group work where there are three rotations but with the activities changing depending on the levels of the students. The three staff in the classroom work with the students in the groups. The planning team in the early years has developed so that each member of the team is seen to be a teacher and is familiar with the processes used within the group activities. Following the rotations, the students are brought back to the whole class and 'explicit' instruction is undertaken. This component of the lesson focuses on number concepts.

Students in the early years are also expected to identify their learning goals. In the first semester, the teaching staff identify the goals, with progressive scaffolding of the students so that in the second semester, the students are able to identify what they would like, or need, to learn.



Benefits for Learning and Learners

The early years have created a unique and extended period of pre-schooling that helps to prepare the students for many of the experiences of schooling. The two full-time years prior to school have closed the gap in many mathematical concepts and processes. The students are also taught many school behaviours so that they can commence Year One well prepared for the demands of the classroom. In most cases the students are working at benchmark when they enter Year One.

Using targeted learning experiences that are based on the understandings of the students has meant that students are exposed to the mathematics that they need in order to progress along the learning continuum.

Identifying students who are just below benchmark or close to benchmark and undertaking targeted and intense intervention creates a space for growth that can promote understandings that are commensurate with the expected levels of learning.

The focus on the early years of schooling with targeted learning has enabled students to commence school with levels that are expected for students of that age group.

The learning teams of teachers have created a positive learning context for the staff. They are able to co-plan for learning experiences of the students and ensure that all staff within a class are working collectively for the benefit of the students.

Advice to Teachers

Data are important to inform decision making for students. The data provide the evidence upon which to base content and pedagogical decision making. This targets the learning experiences for the students so that maximum gains can be made within the time frames available for teaching.

The early years are an important preparation time for young learners. Quality learning environments that are informed by the needs of the students enable teachers to target learning for their students.

Working in teams helps teachers to facilitate a quality learning experience for the students. The teacher, the AIEOs, and teaching assistants can co-plan for teaching, particularly when using small group activities.

Model for Quality Learning

General Principle	Implications for Mathematics	Focused Strategies
Develop a whole school plan	The numeracy plan is developed in consultation with all staff.	• Involve staff in the on-going development of the school numeracy plan so that there is ownership of the program.
	All staff are professionally developed.	• Induct staff upon appointment, and then have regular (fortnightly) meetings with staff so that all staff are working on the same numeracy programs and planning across the school.
	Seek expertise advice on developing a quality program that aligns with contemporary approaches and policy.	• Expertise from outside the school may be useful in developing a numeracy program – whether or not there is the expertise within the school. Consultation with the staff as the numeracy program is evolved is critical for the effective adoption and ownership of the document.
	A consistent approach across the school benefits teachers.	• Teachers are able to share learning, resources and support for each other.
	A consistent approach across the school benefits learners.	• Students come to know expectations of mathematics lessons – goals, pedagogy, assessment etc – so that they are enabled to engage with the lessons upon commencement of a lesson.
Induct and support staff in an on-going manner	Inform incoming staff of the numeracy approach being used at the school so that they are aware of to what they will be committing.	• Provide prospective teachers with adequate information so that they are fully informed of the school numeracy plan. • Prior to commencing at the school, provide teachers with significant information so that they come to the school aware and prepared for the approaches used at the school. • Induct new teachers and provide on-going support for teachers as they commence their time at the school.
Use student data to inform teaching	Conduct regular numeracy testing (on-line) so that students' mathematical understandings are identified and are used for planning.	• Numeracy tests should be focused but not onerous so that a fair assessment can be gained of students' understanding. • Encourage teachers and staff to celebrate students' success. • Measuring small successes and growths enables teachers to see the impact of their teaching on student learning.
	Use student data to map ongoing success of students.	• Use student data to map ongoing success over time.

Key messages – summary

Having high expectations of Indigenous learners is essential, then building environments to realise the potential of learners. Data is an essential part of created targeted learning that matches the needs of the students. Targeted learning and interventions ensures that the students' needs are meet.

Providing support to teachers and support staff to develop a coherent approach across the school requires time to build a common approach. Enabling teachers and staff time off class initially enables the culture of learning teams to be developed. Over time, the culture becomes embedded as the way of working across the school.

Being able to communicate in a positive and supportive is critical to building a community of trust among the staff.

Building positive learning environments in the early years where students can learn many of the concepts and processes needed on entry into formal years of school, enables them to progress into primary school well prepared for the mathematics curriculum. Tracking the students' learning and then developing targeted learning activities for the students ensures that students are working at benchmark, or above.

School Demographics

Year range	K-7	FTE teaching staff	10.7
Total enrolments	132	Non-teaching staff	21
Location	Provincial	FTE non-teaching staff	12.9
ICSEA (school)	654	Indigenous students %	97%
ICSEA (distribution of students) *(bottom quarter to top quarter)*	89% | 10% | 3% | 0%	Enrolments: Girls/Boys	62/70
		Language background other than English	1%
Teaching staff	15	Student attendance rate %	82%

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