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

Creating a Positive, Quality Learning Environment

Wilcannia Central School

The name “Wilcannia” is said to be derived from either one of two Aboriginal terms - either ‘gap in the bank where floodwaters escape’ or ‘wild dog’. The town is nestled on the banks of the Darling River and is in the country of the Paakantji people. Wilcannia is 965kms north-west of Sydney, and 200kms east of Broken Hill. The land is semi-arid and is sparsely settled by pastoralists who run sheep (and increasingly wild goats). Many of the properties are held with 99-year leases, but some of the lands are now being returned to traditional owners. Wilcannia was listed as having a population of 604 people in the 2011 census, of whom, 77% are Indigenous. It is listed as one of the most socially-disadvantaged areas in NSW in the 2015 “Dropping off the Edge” report.

Initially established as a town in 1866, it serviced a population with many buildings including 3 hotels.

By 1868, Wilcannia had grown to include 3 or 4 stores, a bank, a doctor’s surgery, 2 blacksmiths, 2 butchers, a brewery, a court and lockup, and a few houses, and a population of 287 people. Wilcannia reached its peak in the 1880s, with a population of 3000 and had 13 hotels and its own newspaper, the Western Grazier. During this period, it was the third largest port in New South Wales (next to Sydney and Morpeth near Newcastle). Along with Wentworth, Echuca, Mannum and Goolwa, Wilcannia was one of the major Murray-Darling river ports. The role of the river and its paddle steamers was to provide a means of transport of goods, most notably wool and wheat. In 1890, there were reportedly 90 paddle steamers using the river. The town has many reminders of the by-gone era with many magnificent stone buildings lining its streets.

Wilcannia Central School is a K-12 school that also operates a pre-school centre. It is part of the Connected Community Strategy and so has policies in place to ensure that the programs offered at the school meet the needs of the students, and are relevant to the students' needs. The school was offered an Instructional Leader under the *Early Action for Success* strategy, whose role is to build quality learning in the school, including numeracy. The school has a strong emphasis on literacy, numeracy and community. The students are able to learn the local language – Paakantji – through language classes lead by community people and supported by appointed personnel within the school. More recently, the school has emphasized the early years of schooling and has invested resources in the development of quality learning for the students (and teachers) in this sector.

Defining Success

The school measures its success in two ways. First the NAPLAN data provides insights into how the school is working in the early years of schooling and the potential flow on effects to the Year 5 level. There has been a growth in the Year 5 data suggesting that the changes being rolled out at the school are impacting on learning.

	2011	2012	2013	2014
Year 3				
Year 5				

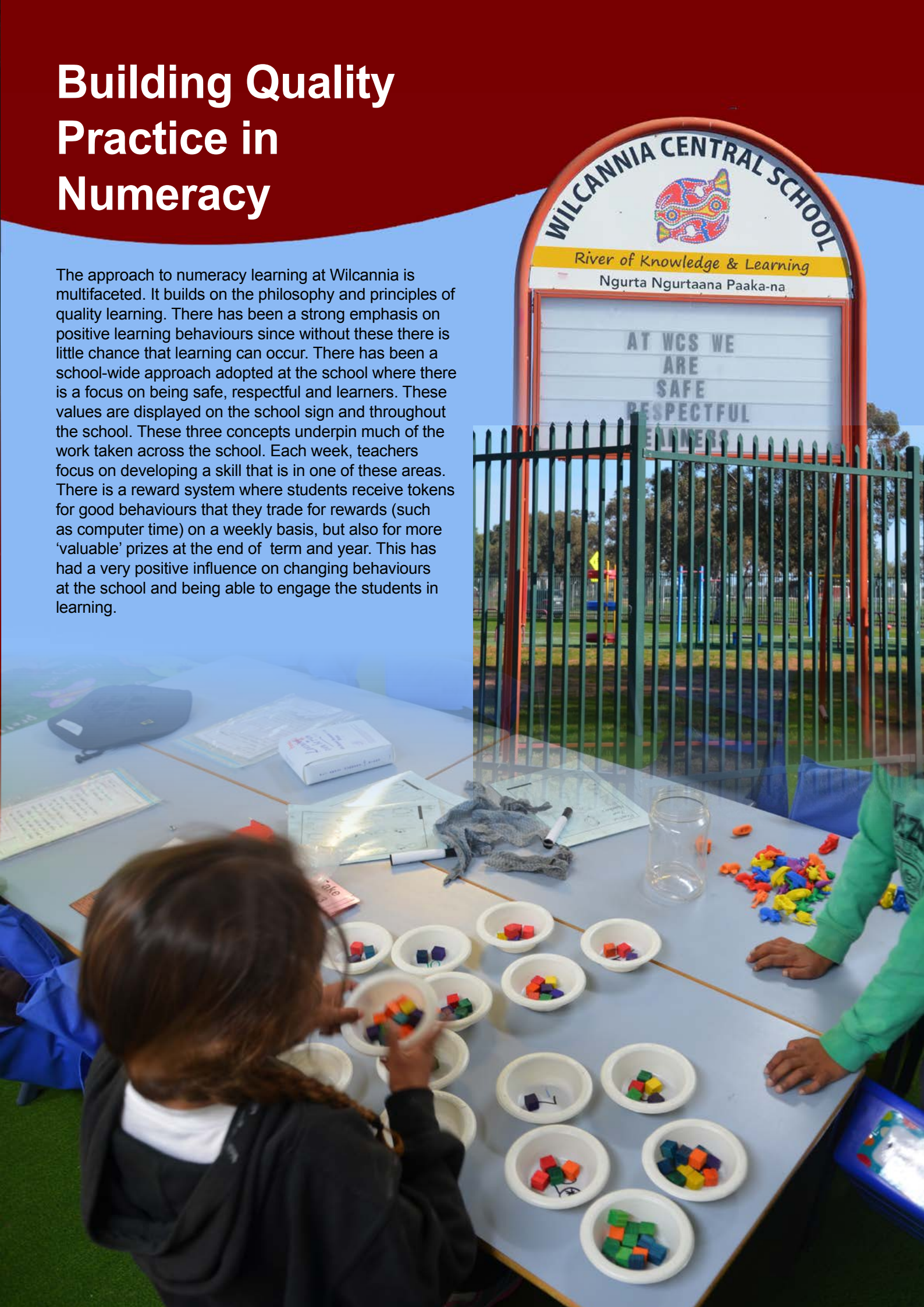
Wilcannia has put a strong focus on the early years of schooling, so that students will come to school with strong foundations in numeracy. The pre-school experiences have resulted in all children being at level when they enter school. At this point some students move to another K-2 school in the community. The K-2 students who remained at the school are all (except one) working at age-appropriate levels.

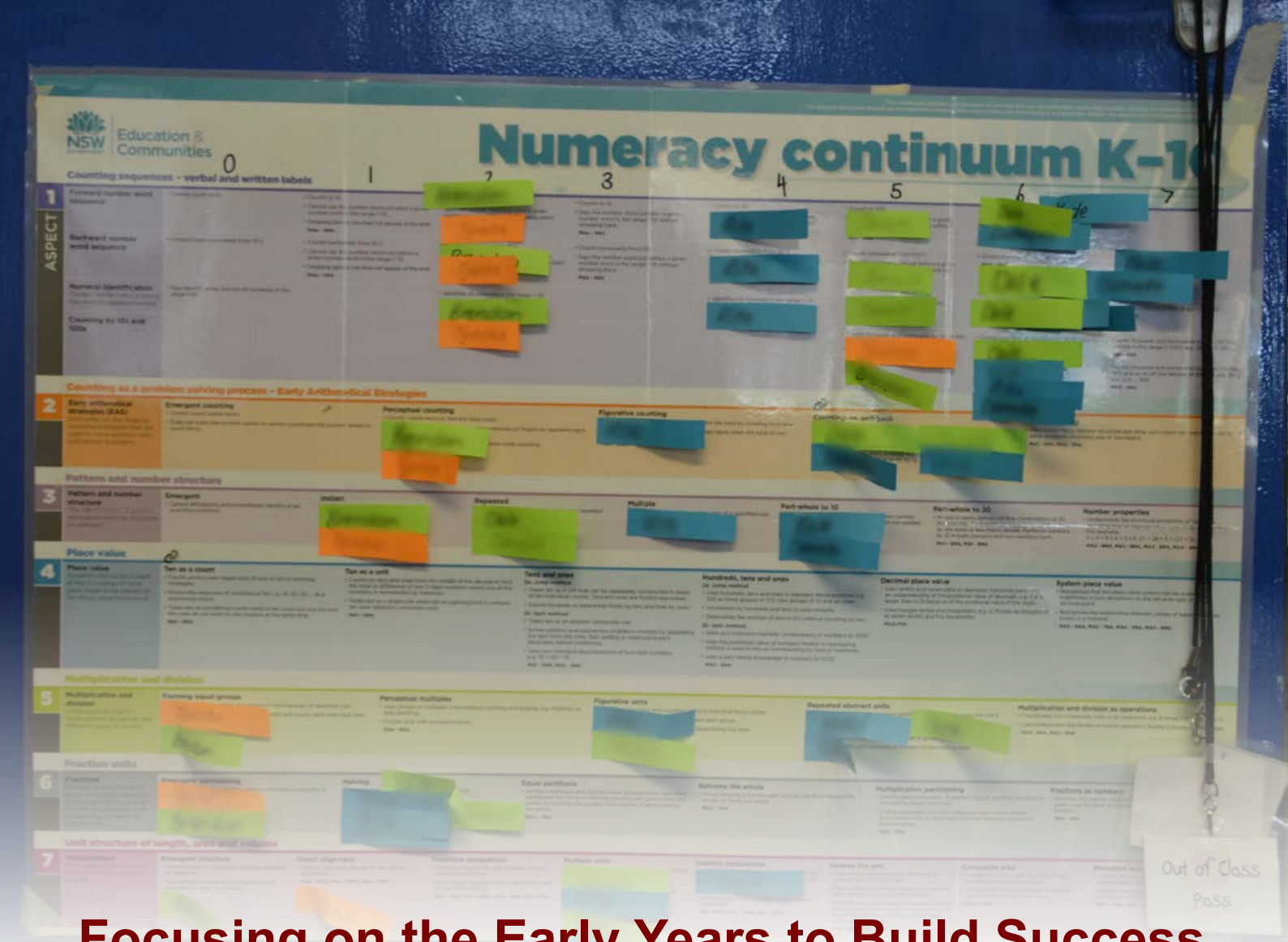
Those children who went to the K-2 school come back to Wilcannia CS in Year 3 and often are significantly behind their peers who remained at the school. This can affect the NAPLAN test results. It is clear that those students who remain in school have gained results commensurate with their same age peers in other contexts across the state and nation. The practices in the early years are now filtering into the upper grades and achieving successes as teachers and students become familiar with the new numeracy practices and now are able to build strong mathematical understandings particularly in the big ideas of number.

For the past three years, the school has also been collecting extensive data on the students, mapping their progress against a number of programs/models including PACMaths and the Numeracy Continua. These mapping exercises are showing teachers (and families) the growth in student learning. These data are also shared with families so that they are able to see (and celebrate) their children's successes.

Building Quality Practice in Numeracy

The approach to numeracy learning at Wilcannia is multifaceted. It builds on the philosophy and principles of quality learning. There has been a strong emphasis on positive learning behaviours since without these there is little chance that learning can occur. There has been a school-wide approach adopted at the school where there is a focus on being safe, respectful and learners. These values are displayed on the school sign and throughout the school. These three concepts underpin much of the work taken across the school. Each week, teachers focus on developing a skill that is in one of these areas. There is a reward system where students receive tokens for good behaviours that they trade for rewards (such as computer time) on a weekly basis, but also for more 'valuable' prizes at the end of term and year. This has had a very positive influence on changing behaviours at the school and being able to engage the students in learning.





Focusing on the Early Years to Build Success

The pre-school setting is building strong mathematical understandings so that when the students transition to formal schooling in Year K, they have the basic number skills for the early years experiences. The school has two teachers who can work in the pre-school years, one of whom will transition with the students as they move into the school setting, whilst the other will take over the pre-school and then move the following year on a rotational basis. This is seen to build and maintain relationships that were established in the pre-school setting – a key function in working with Aboriginal learners.

Once in the early years setting in the school, Wilcannia CS has been proactive in keeping classes small so that students can have focused teaching directed at the needs of each student. With all students on individual learning plans, the smaller classes (of about 8 students on a regular basis), the teacher is able to create learning experiences that consolidate and extend each student based on informed teaching. The ongoing assessment of each student against numeracy continua ensures that the teacher knows each students' current level of working mathematically and then where to take the students in terms of their future mathematical growth.

The Instructional Leader (referred to in more detail later in this report) has a key role in supporting teachers in the K-2 area (as well as across the school) to develop quality learning practices in her classroom. The Instructional Leader supports the teacher in developing quality classroom practices, as well as interpretation of data and where to take future learning based on those data.

Using Data to Inform Practice

In 2012, the incoming leadership team implemented a data-driven approach to teaching. Teachers are required to assess students in an on-going manner and then use these data to inform their subsequent practice. The tests and assessments used are derived from externally and recognised testing schemes – one commercial resource and one developed by NSW DET.

Data are recorded against each student, and the teacher then develops targeted teacher for that student. The students' achievements are recorded on the continua and are in a place that can be seen.

Individual Learning Plans

All students are placed on individual learning plans (ILP) so as to meet the diverse needs of learners and to cater for the diversity of learners and year levels in each class. Most classes consist of 2-3 formal school year levels as well as diversity in achievement within each year level.

The ILPs are negotiated documents – based on assessment of students' learning, goals that are negotiated with the students and families, goals for formal learning of mathematics (and other areas of the curriculum), and the needs of the learners.

Sharing Student Learning with Families

Building on the Connected Community Strategy that has underpinned the reforms at Wilcannia, there is a concerted effort among the staff to share the student data with families. There is an expectation from community that the school is obliged to communicate with them and so there is a concerted effort to implement practices to enable communication between the school and families.

Rather than rely on the usual practices of informing parents – such as parent meetings at the school – the teachers go to the families in their home environments. In some cases, the teachers are accompanied by Aboriginal staff from the school, while in other cases where the teacher may already have good relationship with the families, he/she may go to the home alone. The purpose of these meetings is to share with families how students are progressing (or not) in their mathematical learning (as well as other areas of the curriculum). It is expected that the teachers share good news as well as anything that may be challenging for the students, families or school. Community expects that there is good communication between the school and the families and value the sharing of information about their children's success and needs.

The meetings with families are structured in ways that enable the families to understand, in a highly grounded way, what children are achieving (or not). The reporting to parents is against the national or state standard so that families know where their children are in relation to population norms. The families want to know honestly where their children are in terms of their learning of mathematics (and other areas, most notably literacy) but in ways that make sense to them. For example, if a child were performing at a level that was at, above or below standard, examples of the child's work would be shared with the families, and also compared with where the expectation of what should be achieved against state/national standards or a standardised resource. Celebrating growth is a feature of the meetings so that families are aware of what the child is achieving. Equally where there has been slippage, this is shared with the families. Teachers also work with the families in ways that they might be able to support their children's learning.

Any areas that may require input from the school and/or families that may be of benefit are also discussed with the families. Collectively, this helps in the negotiation of the Individual Learning Plans for each student.

Mapping Success Against Recognised Models of Learning

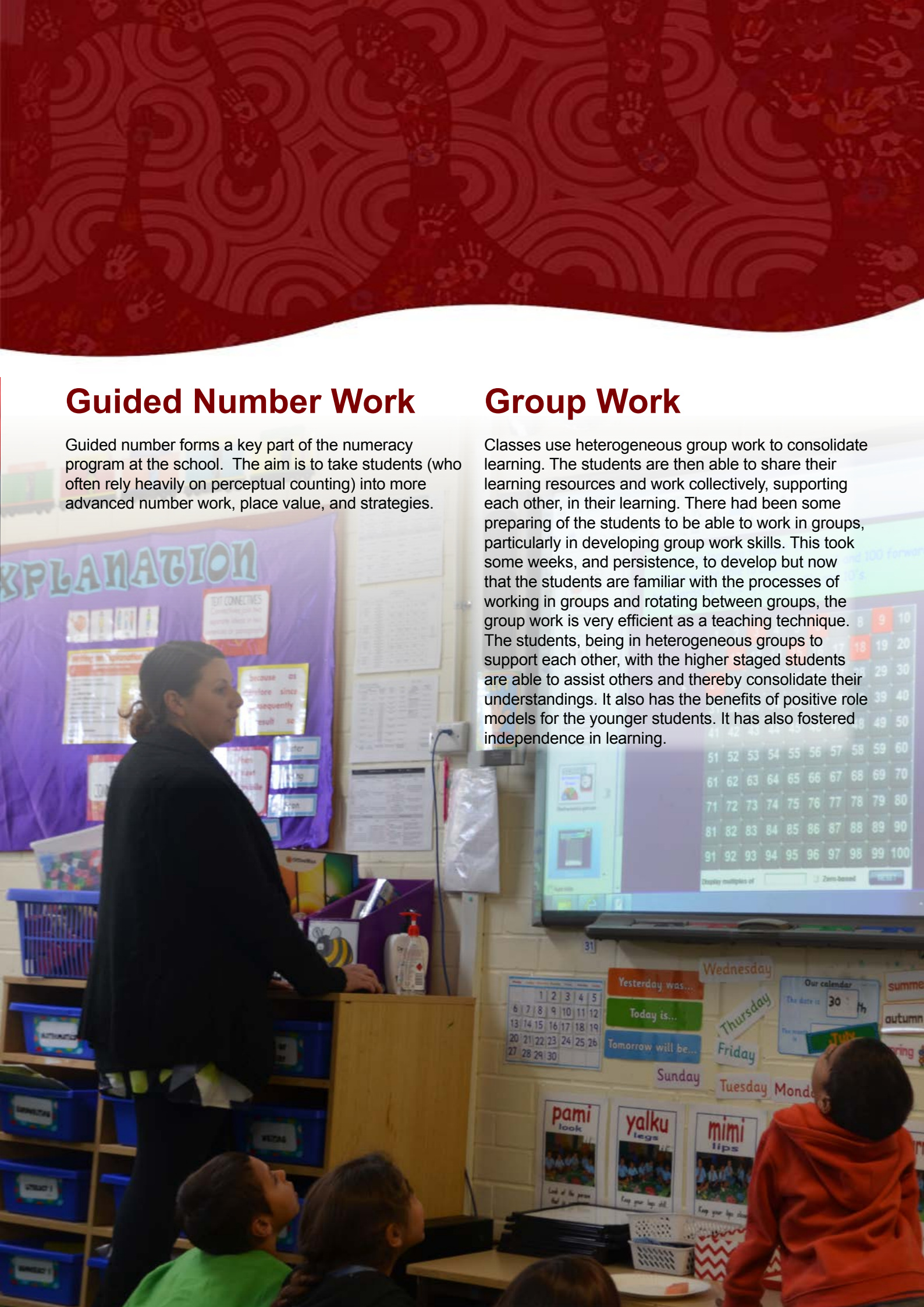
Wilcannia Central School has adopted a continua of learning in numeracy against which students are mapped. The continua is based on the big ideas in number (whole number, addition and subtraction; multiplication and division; fractions and decimals; and patterns and algebra) and working mathematically (communicating, problem solving and reasoning). The teacher will work with students, usually in a one-on-one situation to identify (and monitor) student learning. Depending on what the student can achieve, then the teacher will devise strategies to support learning into the next concepts within that sequence of learning.

Guided Number Work

Guided number forms a key part of the numeracy program at the school. The aim is to take students (who often rely heavily on perceptual counting) into more advanced number work, place value, and strategies.

Group Work

Classes use heterogeneous group work to consolidate learning. The students are then able to share their learning resources and work collectively, supporting each other, in their learning. There had been some preparing of the students to be able to work in groups, particularly in developing group work skills. This took some weeks, and persistence, to develop but now that the students are familiar with the processes of working in groups and rotating between groups, the group work is very efficient as a teaching technique. The students, being in heterogeneous groups to support each other, with the higher staged students are able to assist others and thereby consolidate their understandings. It also has the benefits of positive role models for the younger students. It has also fostered independence in learning.



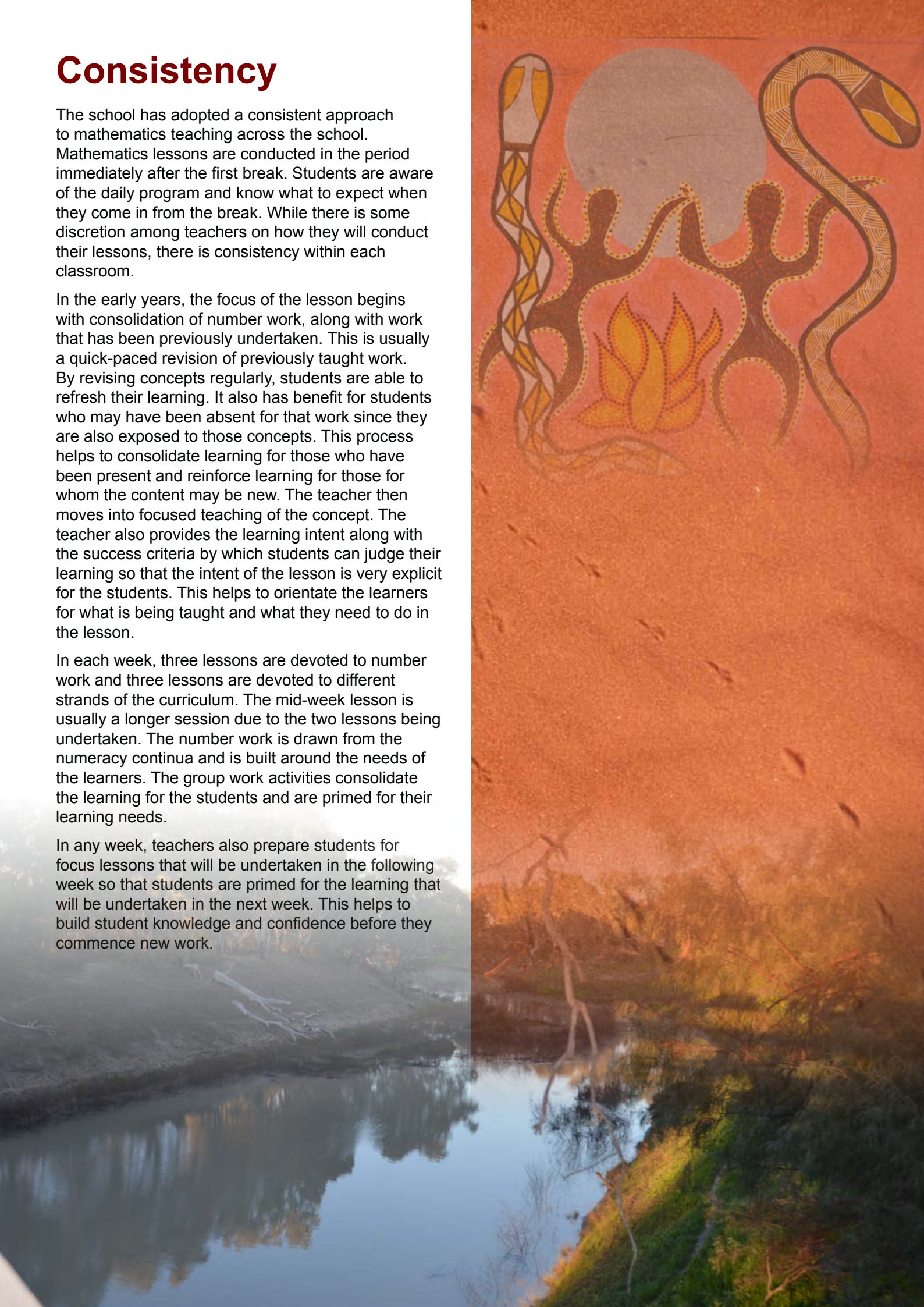
Consistency

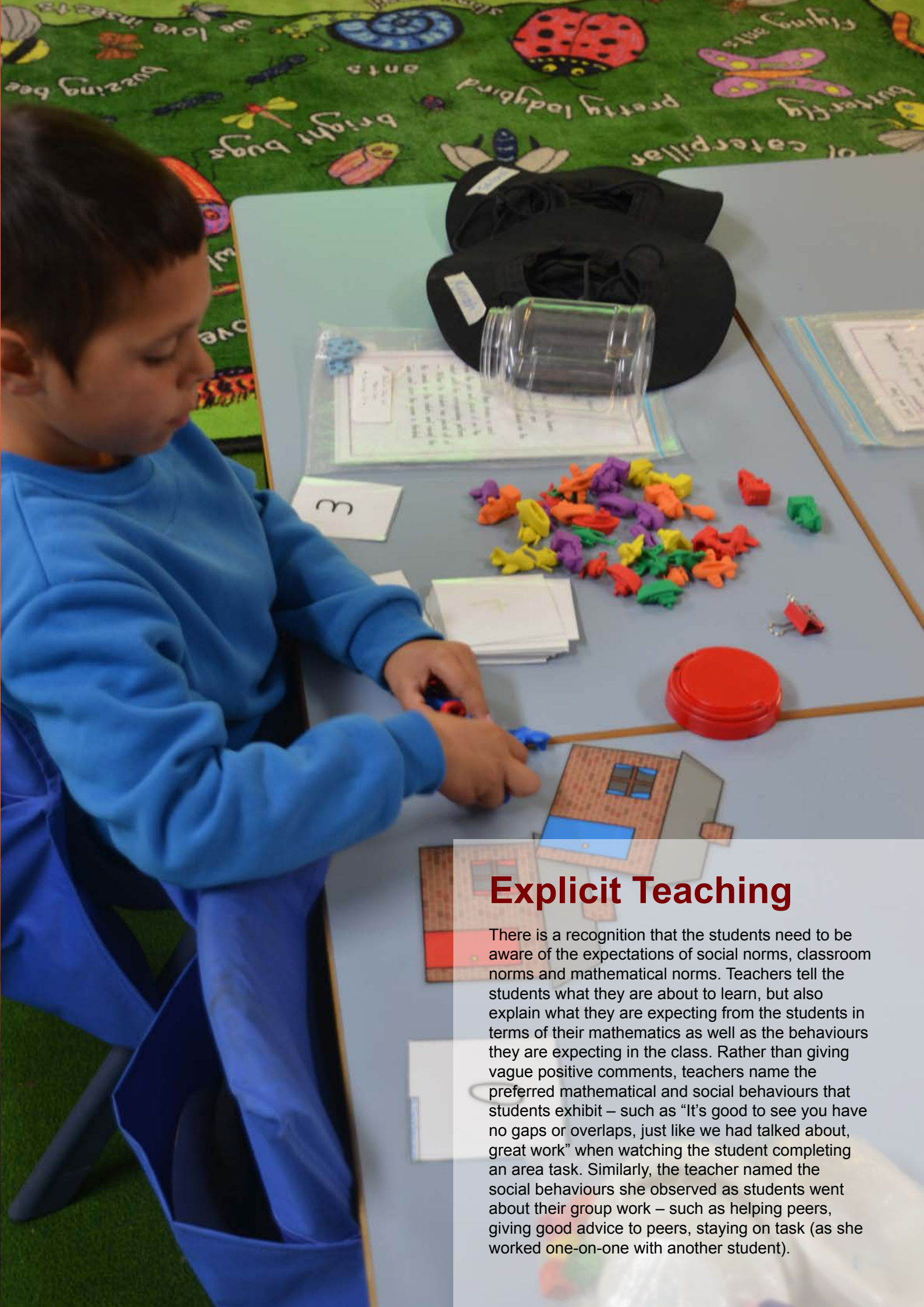
The school has adopted a consistent approach to mathematics teaching across the school. Mathematics lessons are conducted in the period immediately after the first break. Students are aware of the daily program and know what to expect when they come in from the break. While there is some discretion among teachers on how they will conduct their lessons, there is consistency within each classroom.

In the early years, the focus of the lesson begins with consolidation of number work, along with work that has been previously undertaken. This is usually a quick-paced revision of previously taught work. By revising concepts regularly, students are able to refresh their learning. It also has benefit for students who may have been absent for that work since they are also exposed to those concepts. This process helps to consolidate learning for those who have been present and reinforce learning for those for whom the content may be new. The teacher then moves into focused teaching of the concept. The teacher also provides the learning intent along with the success criteria by which students can judge their learning so that the intent of the lesson is very explicit for the students. This helps to orientate the learners for what is being taught and what they need to do in the lesson.

In each week, three lessons are devoted to number work and three lessons are devoted to different strands of the curriculum. The mid-week lesson is usually a longer session due to the two lessons being undertaken. The number work is drawn from the numeracy continua and is built around the needs of the learners. The group work activities consolidate the learning for the students and are primed for their learning needs.

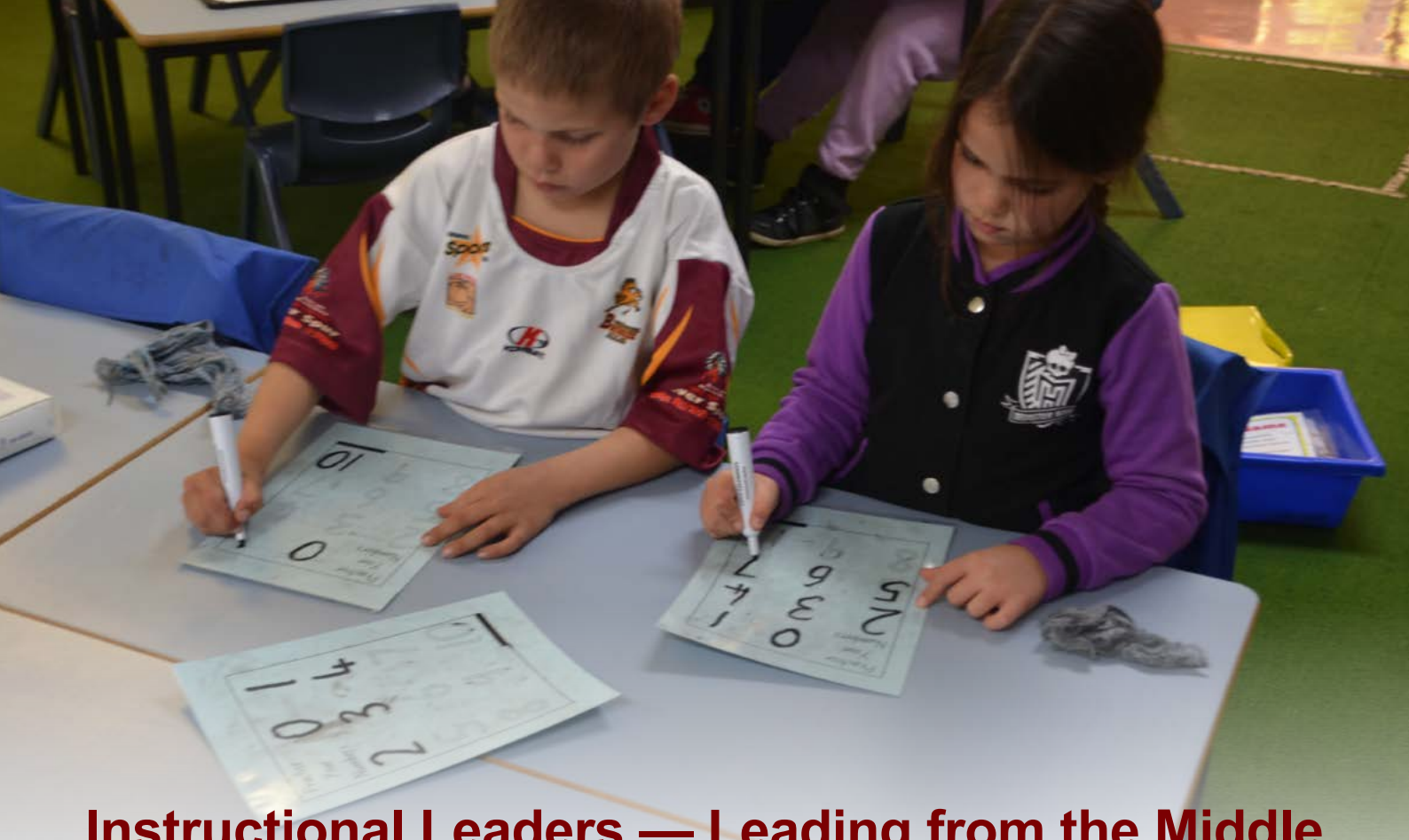
In any week, teachers also prepare students for focus lessons that will be undertaken in the following week so that students are primed for the learning that will be undertaken in the next week. This helps to build student knowledge and confidence before they commence new work.





Explicit Teaching

There is a recognition that the students need to be aware of the expectations of social norms, classroom norms and mathematical norms. Teachers tell the students what they are about to learn, but also explain what they are expecting from the students in terms of their mathematics as well as the behaviours they are expecting in the class. Rather than giving vague positive comments, teachers name the preferred mathematical and social behaviours that students exhibit – such as “It’s good to see you have no gaps or overlaps, just like we had talked about, great work” when watching the student completing an area task. Similarly, the teacher named the social behaviours she observed as students went about their group work – such as helping peers, giving good advice to peers, staying on task (as she worked one-on-one with another student).



Instructional Leaders — Leading from the Middle

An Instructional Leader has been appointed to the school in a full-time capacity. Initially appointed to work on the early years of schooling to build the skills and knowledge of the beginning students, the role has been extended to all years of schooling. The Instructional Leader has a number of key roles – to support the learning of teachers, to implement a common program, to provide advice to teachers on their planning, and to work with teachers to decipher assessments and to build learning plans for the individual students based on those assessments. The Instructional Leader undertakes observations of teachers and provides feedback on their teaching, as well as modelling lessons contiguous with the model being adopted by the school.

Teacher Learning

As part of the model of professional learning adopted at Wilcannia CS, teachers undertake professional activities to enhance their understandings of quality practice. Teachers are provided with research-based professional reading that they undertake on a weekly basis. The instructional leader works with the teachers in a weekly student-free time that has been specifically allocated to teacher learning. Teachers undertake academic reading around numeracy/mathematics to build their understandings of quality learning and pedagogy.

Building Teachers' Pedagogical Skills

The Instructional Leader works closely with the teachers to support their in-class teaching skills. Depending on the needs of the teacher, the Instructional Leader may undertake a range of activities with the teacher including modelling lessons so that the teacher is able to see how to implement the Wilcannia CS model; observing teachers and providing feedback; through to helping teachers with planning their lessons and units of work so that they are building the model into their planning for learning. The school has built a supportive model so the Instructional Leader is able to move in and out of classes and to support teachers as they undertake their teaching in mathematics.

Supporting Teachers' Assessment-for-Learning Skills

The Numeracy Continua adopted at the school, and the associated assessments, requires teachers to undertake interviews with the students to monitor their understandings and progress. The teachers are initially supported so that they are familiar with the model and then the protocols for assessing learning. Once this has been developed, teachers are then supported in the interpretation of the data and what needs to be undertaken to scaffold students to new levels of mathematical understandings. The Instructional Leader supports the teachers with this work until they are comfortable with their understandings of the processes.

Benefits for Learning and Learners

The approaches undertaken at the school have had significant mathematical gains for the learners, as well as improving overall behaviours at the school. Working on positive learning behaviours was a touchstone to the reforms at the school since it was seen to be critical to have good behaviours if learning were to occur.

Being explicit and clear in expectations of learning and behaviours removes any grey areas and so allows students to be very clear about expectations of them. Removing any points of potential confusion with regard to expectations allows students to engage with the intent of the lesson in a very productive manner. This enables more learning to occur.

Knowing where students are in terms of the learning of mathematics allows teachers to identify appropriate learning activities to take the students to new levels of understanding. This pushes students learning into new areas that are suitable for their personal learning.

Sharing data in ways that can be accessible to families and communities enables families to understand where their children are in terms of mathematics and where they are against national/state expectations, so that families are informed about their children's actual learning in mathematics. This has been powerful for families to know where their children are in their learning. These discussions include families in their children' learning journeys and can also provide families with ideas of how they may also support their children in learning.

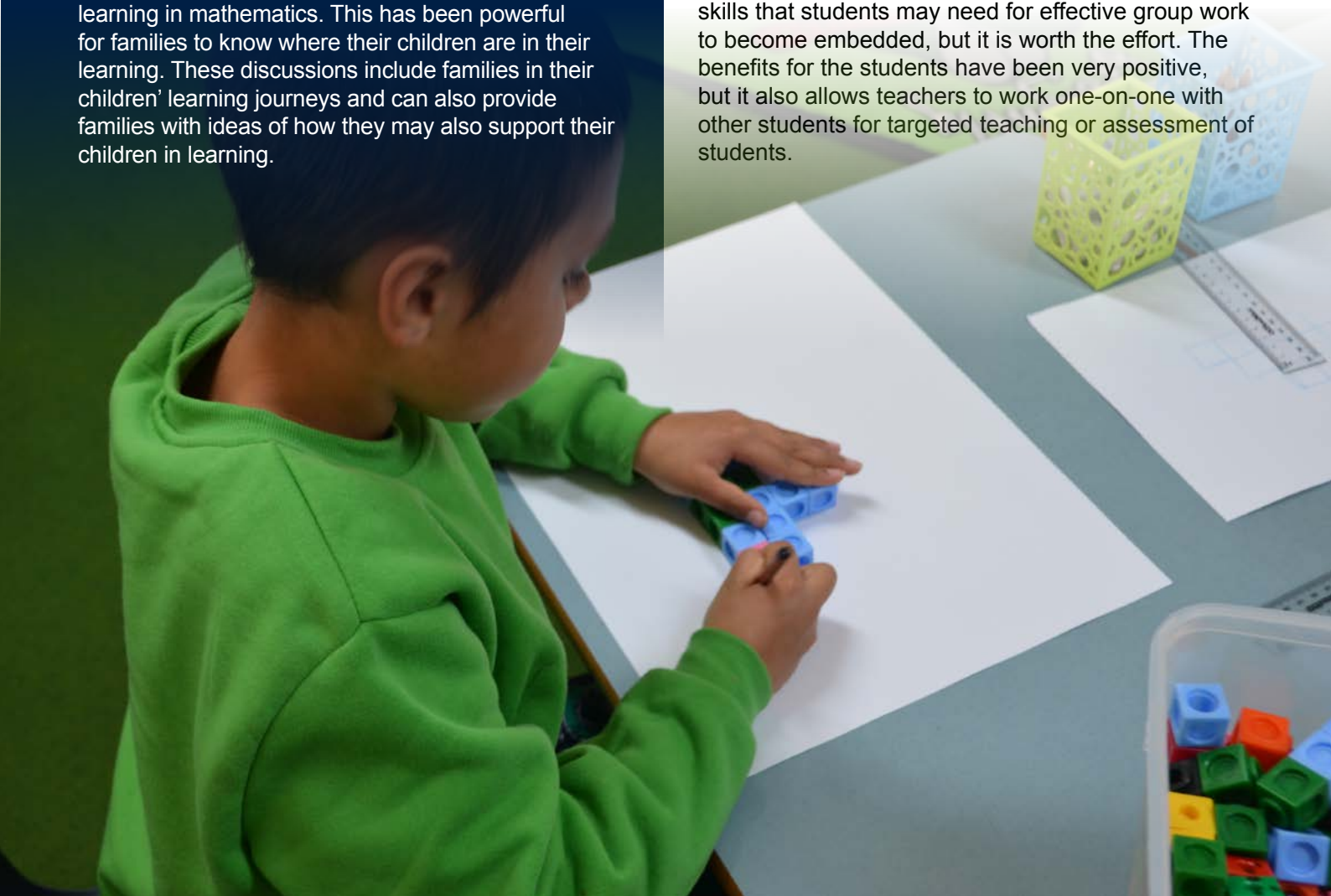
Advice to Teachers

Developing positive learning behaviours is a critical part of the classroom (and school) ethos. Students need to learn how to be learners. Spending time on developing positive learning behaviours flows on to learning mathematics and developing positive cultures within the classroom.

Having good, reliable data to inform teaching is critical for learning. Without knowing (as opposed to thinking or guessing) where students are, teachers are unable to target teaching appropriately for the needs of the learning. Regular monitoring of students can produce surprises – student may be ahead of assumed knowledge, or may not fully understand some of the key concepts in mathematics – so data is critical to informed decision-making. Data enables an informed view of where students are actually performing in mathematics.

Data should be used to inform subsequent teaching. Using a research-based model for mathematics is useful in planning for students' learning. Identifying their current levels of performance, and then plotting this on the continua of learning, enables the teachers to work out where to go next in the learning journey for each student.

Group work is an invaluable tool for teaching in multi-age classrooms. It does take some time to build the skills that students may need for effective group work to become embedded, but it is worth the effort. The benefits for the students have been very positive, but it also allows teachers to work one-on-one with other students for targeted teaching or assessment of students.



Model for Quality Learning		
General Principle	**Implications for mathematics**	**Focused strategies**
Quality teaching builds success	Develop and implement strategies to support the learning of mathematics.	Adopt a model for teaching, learning and assessment that suits the needs of the teachers and students (numeracy continua). Use quality data to inform practice.
Provide teachers with support	Instructional Leaders to support teacher learning.	Observe and provide feedback to teachers. Provide model lessons to show teachers how to teach mathematics well and within the parameters of the school model. Provide teacher release time for teachers to engage with research-based readings to expand teacher knowledge. Support teachers in data interpretation and the development of strategies for targeting learning needs based on assessments.
Data should inform teaching	Collect data on students' current understandings in mathematics and use this to inform teaching.	Use recognized and valid assessment tools to assess student learning. Identify students' learning needs and then plan teaching interventions to scaffold learning. Personal learning plans can be developed for each student so that their individual needs are met and achieved. Carefully track and monitor learning so that success can be observed. Share students' learnings and growth with the students and their families.

Model for Quality Learning (cont)

General Principle	Implications for mathematics	Focused strategies
Provide professional support for teachers	Provide personnel to work with teachers to develop their teaching in mathematics to build a coherent and consistent school program.	Instructional leader works with teacher in the classroom –modelling quality teaching mathematics that is the desired model within the school, observing lessons and providing feedback to teachers. Instructional leader works with teachers on their classroom data – how to collect data, how to analyse the data, how to build new experiences for the students based on the data. Assist teachers with planning for learning based on the principles of the school model and their data.
	Create spaces for teachers to learn and grow.	Provide time release for teachers to explicitly focus on professional learning – supported by middle leadership and is research based.
Be clear, explicit and consistent	Students need to know what they will be learning in mathematics, and how they can demonstrate their learning.	Provide students with the intentions for learning in the introduction to the maths lesson and then what is expected of them to show their learning. Explicitly name good learning and good behaviours so that students are clear about why they are being praised or recognised. Being consistent in mathematics lessons enables the students to know what to expect and then how to engage as learners.
Develop positive learning behaviours	Students need to learn how to be learners of mathematics.	Provide explicit teaching of appropriate social behaviours that are required in the mathematics classroom – such as group work, completion of work. Explicitly state what positive behaviours – both mathematical and social – that students demonstrate so that they are aware of the good work they have done (and why it is good).

Key Messages – Summary

Quality teaching practices build learning in mathematics. Creating spaces for teachers to learn new approaches to teaching, and build their own understandings of learning mathematics are touchstones to improving learning outcomes for students.

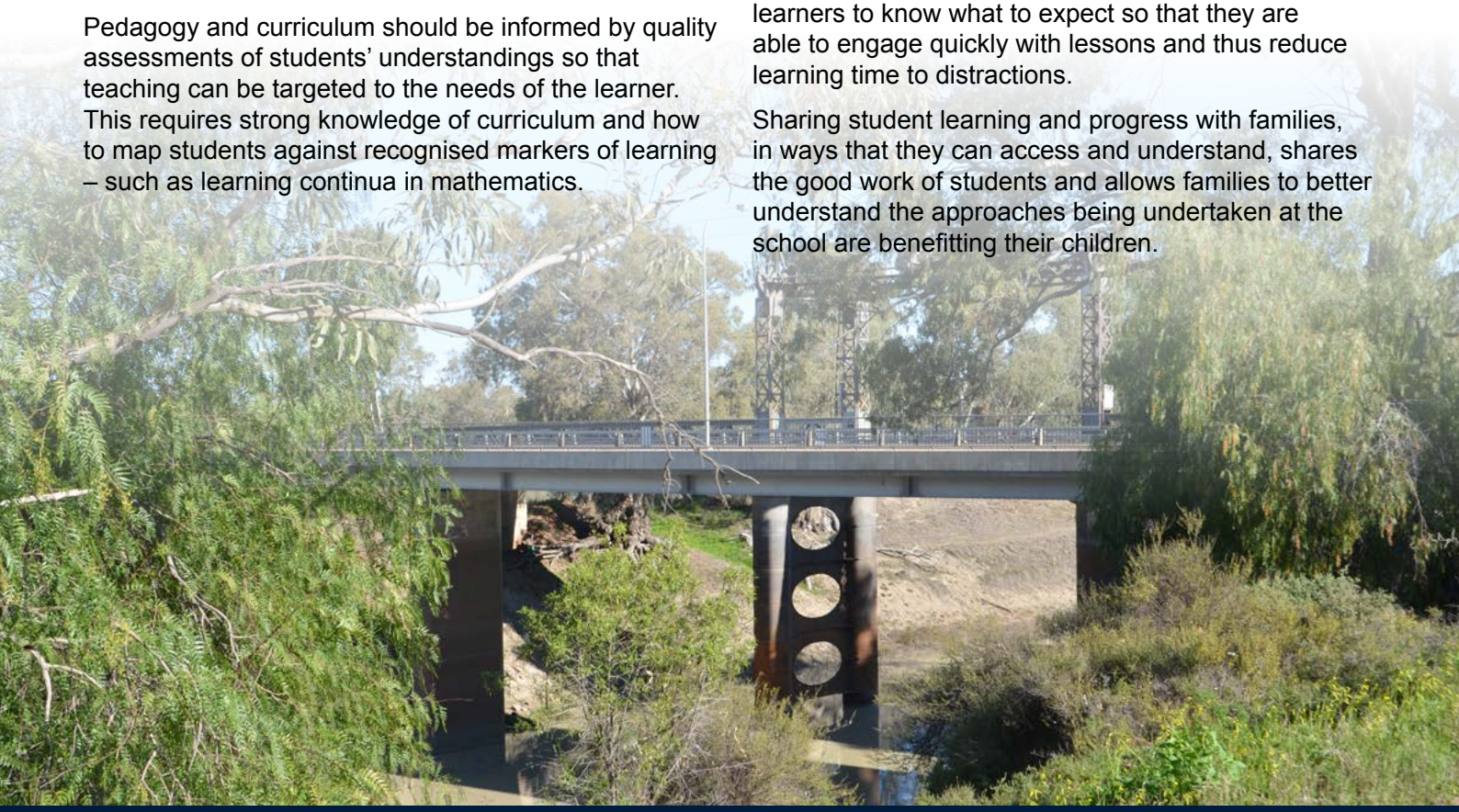
Providing support for teachers (and other staff) to build their knowledge and skills in mathematics helps to build quality learning environments.

Pedagogy and curriculum should be informed by quality assessments of students' understandings so that teaching can be targeted to the needs of the learner. This requires strong knowledge of curriculum and how to map students against recognised markers of learning – such as learning continua in mathematics.

Teaching should be explicit so that students are aware of what they will learn, and what they need to display in order to show they have learned concepts. By knowing the expectations for learning, students are better able to engage with the lesson rather than trying to 'second-guess' the teacher.

Being consistent in terms of learning, expectations, models of lessons, timing of the day etc, enables learners to know what to expect so that they are able to engage quickly with lessons and thus reduce learning time to distractions.

Sharing student learning and progress with families, in ways that they can access and understand, shares the good work of students and allows families to better understand the approaches being undertaken at the school are benefitting their children.



School Demographics

Year range	P-12	FTE teaching staff	13
Total enrolments	83	Non-teaching staff	9
Location	Very Remote	FTE non-teaching staff	6.9
ICSEA (school)	613	Indigenous students %	98%
ICSEA (distribution of students) *(bottom quarter to top quarter)*	95% | 5% | 1% | 0%	Enrolments: Girls/Boys	48/35
		Language background other than English	95%
Teaching staff	12	Student attendance rate %	64%

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