

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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Embracing Change in Numeracy: Adopting Current Best Practice

Leonora District High School

Leonora is a mining town located approximately 240kms north of Kalgoorlie. It is located on the edge of the Central Desert Region and as a result has hot summers, cool winters and a very low rainfall average of about 233 mm per year. It has a population of approximately 1400 and services the mining communities in the surrounding area. The town consists of approximately 350 houses, 100 industrial sites, 3 mining type accommodation camps, a shady caravan park, two hotels and one motel. It was the site of the "Leonora Alternative Place of Detention" which was closed in 2014. In 2011, Leonora DHS won a district education excellence award for its work with the asylum seeker students based at the detention centre.

Within the main street, there are a number of facilities including a supermarket, post office, roadhouse, two service stations and one café. The area is mined for gold and nickel but in the recent past, the fall of these minerals has resulted in a considerable downturn in the population and economy of the town. A number of the stores in the main street have been closed. The town has a recreational centre and swimming pool in the main street. Highlights of the social calendar are the Leonora "Golden Nugget" shooting contest and the "Golden Gift" athletic carnival.

Gwalia, the site of the Sons of Gwalia mine, is an historical site of interest. The mine was closed in December 1963 and

the population dropped from 1500 to 40 and the town become abandoned. The town is in close proximity to Leonora. The town has been preserved and is a collection of tin houses that were occupied until the 1960s and Gwalia township is now a living museum.

Leonora DHS is a comprehensive school catering from pre-prep through to Year 12. It has a range of quality facilities on its campus including two specialist computer labs, new science laboratory, home economics room, design and technology centre, kindergarten, pre-primary centre, library, new dual purpose classroom and administration office, oval, large and operational Stephanie Alexander garden, and a large enclosed undercover assembly and activity area. All classrooms contain computers and the school is fully networked. The productive garden supplies produce for the food program offered by the school.

Students enjoy the foods grown in the garden and experience a wide range of vegetables that would not otherwise be available in the community.

Leonora DHS is located 20kms out of the remote zone so teachers do not receive many of the benefits of teachers working in the schools close to Leonora. This impacts on the school to attract teachers to the school. The school leadership team has sought to build a strong team environment at the school so that teachers can feel part of a sharing and nurturing work environment. This helps teachers to feel part of a team, while also ensuring that information can be shared among teachers (as opposed to a silo teaching culture). The school has been developing a whole school numeracy program so that teachers can work collaboratively to provide a consistent experience to their students.

Defining success

The successes at Leonora DHS can be seen as improvement over time. Using a recognised test that measures literacy, numeracy and non-verbal achievement, the InCAS testing scheme has shown pleasing growth across year levels.

As can be seen on the table below, there is an increase across the year levels of students who are achieving benchmark – for example, in Year 1 there was an increase from 23% achieving

benchmark to 46% the following year. Similarly, the number of student who are 2 years below benchmark has been in decline. The school has emphasised a focus on improving the learning achievements of students who have been identified as being one year behind the benchmark level. What is clear from the data is the improvement in numeracy achievement of students in all year levels.

2014 LDHS InCAS Maths Age Scores

YEAR	1	2	3	4	5	6	7	8	9
Total # students	13	13	9	19	11	10	6	5	1
% at or above benchmark	23%	15%	22%	5%	0%	0%	0%	0%	0%
% <1 year below	46%	31%	0%	16%	0%	0%	0%	0%	0%
% <2 years below	23%	54%	33%	31.5%	0%	20%	0%	0%	0%
% >2 years below	7.6%	0%	44%	47%	100%	80%	100%	100%	100%

2015 LDHS InCAS Maths Age Targets

YEAR	1	2	3	4	5	6	7	8	9
Total # students	13	13	9	19	11	10	6	5	1
% at or above benchmark	46%	30.5%	22%	14%	0%	0%	0%	0%	0%
% <1 year below	46%	42.5%	16.5%	23.5%	0%	10%	25%	0%	0%
% <2 years below	7.6%	27%	38.5%	39%	50%	50%	50%	50%	100%
% >2 years below	0%	0%	22%	23.5%	50%	40%	25%	50%	0%

Upward Trending in Numeracy Learning: What works...

Development of a School Wide Numeracy Plan

Leonora DHS has developed a comprehensive Numeracy Plan that is based on research and the elements of best practice advocated by Western Australian Department of Education – including the *First Steps Program* and *Getting it Right*, along with the National Partnerships Program and the National Curriculum: Mathematics. The school has also worked with other schools in the state to access and refine documents from these schools and adapt them for their own context. Collectively, these have provided a strong base for the numeracy changes that have occurred at the school that has resulted in an upward trending of student performance.

The school has proactively developed a school-wide numeracy plan that is expected to be used by all teachers at the school. Across the school and across time, members of staff have been able to provide input into the elements that are seen as important for the numeracy (and literacy) plans at the school. The high priority of numeracy in the curriculum is represented in the two hour numeracy block that is in the second session of each day. Elements of teaching that are seen as important and valued are represented in the school model. The model has been a collective exercise among the staff where elements of what are seen to be important and valued are negotiated and, where relevant and important, are added to the model.





As part of the whole school numeracy plan, Leonora DHS has developed a four-part lesson structure. This is a four-part process comprising of the elements shown in the table below. It aligns with the literacy program so that there is a consistency in the models being used for the key learning areas within the school. The model for lessons has been developed as part of a consultative process with the school leaders and the teaching staff.

1. Previewing the lesson and warming up	2. Engage and recal	3a. Modelled session	3b. Guided small group/ whole class application of skills	4. Reflection session
	Revise and tune in	Model and teach	Practice	Reflection and assessment
What am I looking for (WILF)? What are the focus questions for the day? What do I want the students to learn?	What is being explicitly taught and what is being revised? Are students using mathematical language to describe their thinking?	What is my focus? What skills, knowledge and understandings need to be explicitly taught? What are the steps involved in the explicit teaching of the focus areas? Can my students tell me what they are learning about?	What is the focus skill? How can I break down the skill into steps to explicitly teach it? What activities will consolidate the skills, knowledge and understandings taught in the modelled session? Can my students tell me what they are learning about?	Reflect on the focus questions and what was learnt. Have students learnt what was explicitly taught?
Whole class 10-15 mins	Whole class 10 mins	Whole class 10-15 mins	Small groups: 10-15 mins per rotation or whole class with 15-20 mins of independent work – depending on students' age and challenge level	Whole class 10-15 mins

(Taken from the Leonora DHS Numeracy Planner.)

Teachers use this plan for the numeracy lessons and are expected to develop their teaching within this model.

Numeracy “Expert”

The school took the initiative to employ a senior person – equivalent to level of Deputy Principal - to focus on the development of the whole-school Numeracy program. The person employed for this role had strong expertise in numeracy/mathematics curriculum, pedagogy and assessment. Working in a highly consultative manner, the curriculum coordinator provided input and took advice on the development of the numeracy program. The whole school plan was developed in consultation with staff and was based on contemporary research and practice, and incorporates many of the elements that are seen as valuable learning approaches for learners, and particularly for Indigenous learners.

The school also has a Deputy Principal who has a strong background in numeracy and offers on-going support to teachers in their numeracy planning, assessment and use of data. As a teaching Deputy, she also takes the

mathematics classes for the junior secondary sector. An active part of her role is to work with teachers by dropping into classes to provide support for teachers. The current numeracy plan means that the deputy can walk into any class and should know the content being taught and where teachers should be in their overall lesson given the structure of lessons that have been adopted at the school. In this approach, the Deputy is then able to support teachers in the active teaching phase of a lesson, or provide targeted support if requested by a staff member. For example, a teacher may be struggling with reflection or the effective wrapping up of a lesson that ties in with the intended learning of that lesson. With the current approach, the Deputy knows the approximate timing of a lesson so can be available at a given point in a lesson and come into that lesson at the nominated time and offer the requested support.

$$1\frac{2}{3} + 2\frac{1}{6} =$$

$$\frac{4}{6} + \frac{1}{6} = \frac{5}{6}$$





Effective Assessment: Using data to inform teaching

Leonora DHS has adopted an interactive assessment program to inform the teaching of numeracy. Recognising the needs and interests of their learners, the school uses a testing program that engages students and incorporates an element of non-verbal behaviour. Because the test is on-line, and there is a keen interest in computers among the students, the students do not feel threatened by the test, and in most cases, do not realise they are being tested. The test is a short test that keeps students actively engaged with the content. The information is available immediately and is downloaded for the teachers who have results the following day. Teachers are then able to use this data to inform their teaching.

The tests are conducted on a regular basis. Teachers are now regularly informed of the forward steps being

made by their students. In some cases, it can be possible for teachers to be unsure if their students are progressing but through these tests, they are able to see the growth in learning. The school has adopted an approach of celebrating small steps as this helps teachers to see the gains being made by their students. At the school level, the tests also provide the staff with information of overall gains being made over time. The data shown in the 'success' section of the report have enabled the school to map the gains being made by students over the various years. These data are a testament to the changes being made at the school, but also encourage the teachers to continue in their teaching methods as they appear to be bringing about positive learning growth.



individual learning plans

As the test results show, there is considerable diversity across given year levels. There are some clusters of students within classes that are working at similar levels, so the school has taken the approach that students might be in a group learning plan. In some cases, the learning needs of an individual student may be quite unique so some students will be on an individual learning plan.

At this point in time, there are a number of students who are working at or above benchmark level so there is now a push at the school to cater for the upper-end of the learning needs of students and how best to cater for and extend this cohort of students.

Vocabulary Pre-loading

As in most remote communities, students speak a home language and school language. The students are taught explicitly about code-switching and teachers encourage the use of Standard Australian English when in the classroom. This means that most lessons require some prompting around the mathematical language in the early phase of a lesson. Either explicitly teaching the mathematical terms or reminding students of the language has been a widely encouraged strategy across the school. Teachers have also been made aware of whether there is testing of mathematics or the mathematical language when assessing student learning.

Use of Digital technologies

Teachers are encouraged to use manipulatives and technologies to support and engage students. Most teachers have interactive whiteboards in the classrooms which have been found to engage students and keep students on-task, particularly if the students are able to interact with the boards themselves. Students have also been found to engage when using their own small whiteboards so there are class sets in each room. iPads are also popular across the school. Professional learning has been provided for teachers to help them use these resources in their classrooms.





Preparing teachers prior to coming to Leonora DHS

When a teacher shows an interest in being part of the Leonora DHS, the school sends potential teachers various policies of the school. Potential employees are then able to be informed about – the ethos of the school, the expectations of the schools of the incoming staff, and how the programs of the school are operationalised. This helps incoming staff make an informed decision to be part of the school. It also helps the school ensure that staff coming into the school are well prepared to be part of the school culture.

Preparing teachers once at Leonora DHS

New teachers are given substantial documents prior to their commencement at the school so that they commence their first day at the school quite prepared for the ways of working at Leonora DHS. As with many remote schools, Leonora is staffed largely by new graduates who often need support in their early career development. Leonora provides all incoming teachers with a folder that contains all information required for the Numeracy teaching at the school. The contents of the folder include:

- Curriculum framework for the school as the school has a sequential plan across the four terms where particular content drawn from the National Curriculum Framework is identified. This is to ensure that significant content is covered by the various year levels.
- Numeracy lesson planner – the lesson block for numeracy is a 2 hour session with a particular 4 part format. This is outlined and modelled for teachers to use.
- Links with the standards of teaching.

When commencing at the school, new teachers are given half a day one-on-one time with the leader of Numeracy. At this session new teachers are provided with time to be inducted in the ways of the school, and how numeracy practices are enacted across the school. Teachers are able to seek clarification about the information provided in the folder so that there is a clarity of purpose and practice in the teaching of numeracy.

The leadership team has sought to develop a very strong ethos whereby teachers are always able to ask any of the leadership advice on how to teach, plan, and/or assess students. Advice is readily available for all teachers without prejudice so that teachers are able to feel free to access information on how to improve their teaching.

Teachers are expected to attend regular professional learning sessions each fortnight. Particular foci are developed for each session with significant developments in education and research shared with the teachers. There are some sessions also offered on weekends where teachers would be paid. The new teachers are encouraged to also undertake a graduate teacher program offered by The Department to help with their transition into teaching.

Originally lead by members of the leadership team, the Professional Learning sessions are being transitioned so that leaders within the school are also able to lead sessions. Teachers are expected to attend every session. There has been negotiation with the staff that attendance at the meetings is teacher professional learning that enables them to accumulate leave and be able to trade this time for nominated pupil-free days and be able to leave the school a day earlier at the end of the year in lieu of the professional learning time spent in after school time.

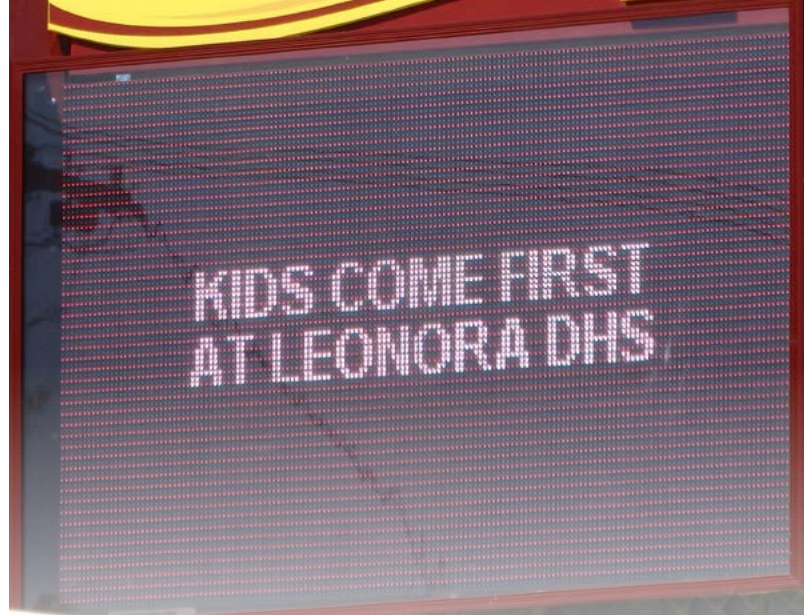
Benefits for Learning and Learners

There are two levels of benefits offered through the Leonora approach – for both teachers and students.

Teachers are supported to adopt contemporary practice into their repertoire of teaching skills. The support offered prior to commencing at the school, the induction at the school, and the on-going support while at the school, assists teachers to learn new teaching, planning and assessment models that help in the development of quality teaching practices.

Many of the numeracy practices adopted by the teachers have subsidiary aims – building students' confidence in themselves as learners; encouraging turn-taking through games; building confidence and competence in communicating in Standard Australian English.

The students have shown considerable gains in numeracy since the school has adopted the numeracy program. There has been a consistent closing of the gap in the students' learning of numeracy concepts and processes over time.





Advice to Teachers

Effective planning, teaching and assessment practices are critical to building an effective numeracy program that brings about success for learners. Teachers need to have solid, school-wide planning in place so as to maximise learning for students.

Teachers need to provide quality learning for students and have a strong, committed belief that students can learn mathematics.

School leadership teams must take a strong leadership role in providing teachers with access to contemporary thinking, research, and practice in what constitutes quality programs in remote contexts. Working in a consultative manner among the leadership team, the school team and the community, with expert input to stimulate discussion (and practice) as to what may work best in a given context, helps bring about the development of a program suitable to the needs of the students.

Accessing available support to nurture growth should be a priority for teachers – those new to the profession as well as those who have been in the profession for some time. Leadership teams need to make this support available to teachers in a way that creates an atmosphere of trust and respect.

The emphasis on learning mathematics is critical for bringing about successful learning.

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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Teachers are able to share learning, resources and support for each other.
	A consistent approach across the school benefits learners.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> 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.	<ul style="list-style-type: none"> Use student data to map ongoing success over time.

Key messages – summary

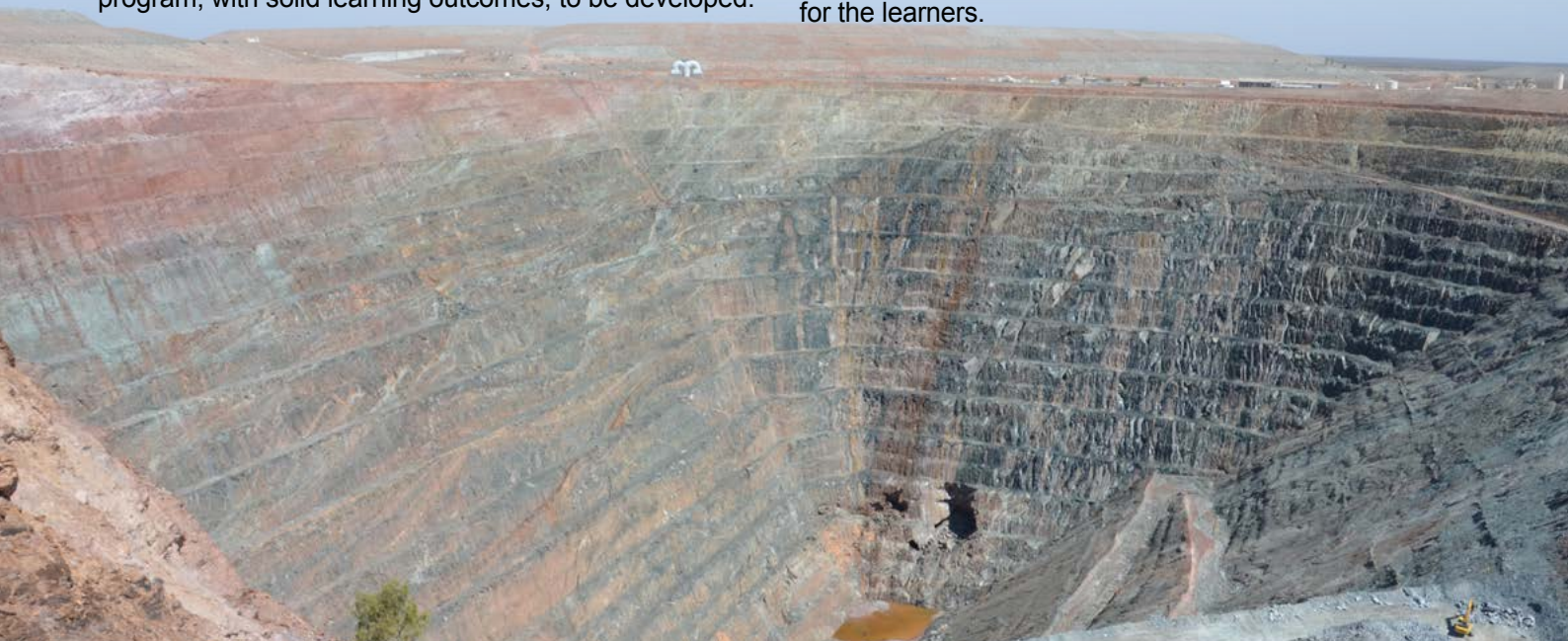
Building a whole school approach to numeracy learning is critical for learning. Consistency across the school not only provides students with clear indicators of what to expect in a mathematics lessons, it also assists teachers in many ways. Teachers develop a shared language and practice through which they can share ideas with peers. Having the same structure to lessons across the school, with a clearly structured curriculum, enables teachers to know what and when to teach, but also is very useful for incoming teachers. It is also assists with teachers coming into a class as they are very aware of what and how lessons will be conducted.

Working collaboratively across the school, with all stakeholders involved in the process, enables a quality program, with solid learning outcomes, to be developed.

Supporting teachers in developing quality numeracy practices is critical, particularly for new graduates.

Assessing students in ways that enable students to demonstrate their numeracy understandings, and then using this information to inform teaching is a productive teaching approach.

Focusing on small successes is important as it is often difficult to monitor the bigger gains of students. A process that enables accurate assessment of students' understandings is critical for teachers to be able to see the gains for their students, to celebrate the gains with the students and their families/community, and to build new learning experiences based on the new outcomes of assessment ensures that learning is accurately targeted for the learners.



School demographics

Year range	K-12	FTE teaching staff	11
Total enrolments	122	Non-teaching staff	12
Location	Remote	FTE non-teaching staff	8.6
ICSEA (school)	671	Indigenous students %	75%
ICSEA (distribution of students) (bottom quarter to top quarter)	88% 8% 4% 0%	Enrolments: Girls/Boys	59/63
Teaching staff	11	Language background other than English	4%
		Student attendance rate %	76%