

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

The Value of Aboriginal Education Workers

Purnululu Aboriginal Community Independent School

Opened in 1991, Purnululu Aboriginal Independent Community School was established to provide an educational service for the traditional owners of Purnululu National Park and adjacent lands. Today, the school serves the community of Wurreranginy (or Frog Hollow). Frog Hollow is a very small community of about 60 people and is approximately 230 km south of Kununurra, just off the Great Northern Highway. There are no facilities – such as store or medical centre - in the community, so the people access services from the Warmun community which is 35 kms north.

Having a campus in the World-Heritage-listed Purnululu National Park (NP), the school enjoys a close connection with country. Purnululu NP is an iconic land form of orange and black striped beehive mounds.

Within this collection of structures are many gorges and ravines that are home to ancient palms and rock pools. Picinnany Creek, Echidna Chasm, Cathedral Gorge and the Domes Walk make up part of the Purnululu NP experience. The drive of 53kms into the NP is along a very rugged tack that is accessible only with 4WD vehicles or via helicopter.

When originally opened, Purnululu School was located at two campuses. The main campus was located at Wurreranginy (which is more commonly known as Frog Hollow) community. The second campus was located at Kwarre, in the Purnululu National Park. Access issues to Purnululu NP in the wet season facilitated a decision to make the main education provision at Frog Hollow. Kwarre campus is now used for cultural trips.

The school is well resourced. Originally designed on eco-principles, the school has won a number of design awards. The building has since undergone further development to be more learner-friendly, particularly in the hot, wet season. The main building houses the school office, a resource room and two well-equipped classrooms. The buildings are now air-conditioned, and the classrooms have computers and interactive whiteboards. The main building has a multipurpose area to which the classrooms adjoin. A wide deck extends from the common area and is used for a multitude of activities. Other buildings include a stand-alone kindergarten/pre-primary classroom and a library/computer room. A kitchen, based on the eco-design model, provides a space with sheltered tables (inside and out) where the students are served snacks at morning recess and a cooked lunch each day. The original school building, a tin shed with verandah, is now an art shed as well as the ablution block.

As part of the Aboriginal Independent Community Schools (AICS) community, Purnululu also uses the Numeracy Portal to support the needs of the students and for the development of quality, targeted learning experiences. The teachers and Aboriginal Education Workers (AEWs) value the support of the AICS numeracy (and literacy) consultants who work closely with the staff at the school, and offer professional development opportunities for the Kimberly cluster of schools. A strong feature of the school is the central role of the AEWs who form the backbone to the school.

Defining Success

Purnululu uses the Aboriginal Independent Community Schools (AICS) Numeracy Strategy as its measure of success in numeracy. The AICS Numeracy Strategy is a comprehensive approach to improving numeracy that is assessed by achieving diagnostic tasks tied to Benchmarks at year level. The Strategy has been in place at Purnululu for 5 years during which there has been notable improvement with many of the students working at year level on assessment tasks.



Aboriginal Education Workers are the Backbone of the School

In this case study, the term Aboriginal has been adopted as the people in Purnululu are from the region and hence of Aboriginal descent. Purnululu has three Aboriginal Education Workers (AEWs) at the school. Two of the AEWs have worked at the school for 25 and 20 years respectively and have worked with many principals and teachers. Over successive principals and teachers, the AEWs have received significant support and professional learning so as to be able to work as partners with their teachers.

From early in the history of the school, some twenty years ago, an early principal encouraged the AEWs to undertake training and professional development in mathematics (as well as other curriculum areas). They were also encouraged to take small groups in the classroom, and to be an active member in the classroom. The AEWs are able to work independently and take both small and whole group lessons in mathematics (and other curriculum areas).

Roles of the AEWs in the Classroom

The high skill and confidence levels of the AEWs makes them an integral part of the teaching experience at Purnululu School. They take on many roles within the school, and are proactively supported by the teachers and principal. They have a large repertoire of skills and knowledge in the teaching context, but also have strengths in language and culture that are valued by the teachers.

Code Switching

As members of the local community, the AEWs speak the home language of the students. Often students have difficulties in understanding both the language of mathematics (specific terms – e.g. square, numbers, positional terms etc) and/or the ways in which mathematics is conveyed to students due to the ways in which concepts are embedded in SAE. The AEWs work alongside the teachers and undertake translation of the teachers. Where there are no terms in the home language, the AEWs will use the mathematical term but scaffold the explanation in the home language.

The AEWs often use pictures and/or diagrams to assist with the translation of many of the mathematics terms, particularly when there are not equivalent terms in the home language.

Leading Small Groups, and Whole Class Activities

With the considerable diversity in the classrooms, the AEWs have an important role to support the diversity of learners. The AEWs take smaller groups of learners and work with them on the activities.

There are also times when the AEWs take the whole class – sometimes in the introduction of lessons or through orientation activities that are undertaken at the start of the lesson. There is often a seamless partnership between the teachers and AEWs in transitioning between activities in the lessons.



Working Relationships

There were many ways in which there are highly productive, and empowering relationships being adopted and sustained at Purnululu. These include the AEWs/Directors being highly involved in key decision making processes at the school through to ensuring that the AEWs are well prepared for their work in the classrooms.

The selection of teachers to Purnululu is a partnership with the school and the community. Teachers are interviewed (usually by phone) by members of the Community Council, who are often the AEWs at the school, so that community members have input into the selection of staff. This gives the community members a strong sense of being an integral part of the selection of those that they would like to be working in their school (and community).

Teachers play an important role in maintaining good relationships with the community – both inside and outside the school. The AEWs see good teachers as those who are able to mix in with the community and be a part of it. Respect of the community and its members is easily seen by community members who have a keen sense of the values that teachers and outsiders bring to the school and wider community. Being astute observers of behaviours and people, the AEWs can easily see teachers who are honest and who can work respectfully with the AEWs and the wider community.





Inclusion and Preparation of AEWs to Work in Classrooms

Genuine inclusion of the AEWs in decision making is important so that the AEWs feel they are valued and have valid contributions to make to the classroom.

The teacher needs to take time to get to know their AEWs, their strengths and interests. By knowing what the AEWs like to do in the classroom – such as working in small groups, strengths in particular interest areas (content or age groups) – teachers can plan to make the best opportunities for success for all parties – students, AEWs and teachers. If the AEWs are concerned about something they are to teach and not feeling confident with the work, they may avoid the teaching rather than confront the teacher. Taking time early in the working relationship to learn what the AEWs can do, like to do, and what they would also like to learn to do, builds a very strong teaching partnership that will build success for all parties.

Teachers should co-plan with AEWs. AEWs need to know what is happening in the lesson and what is expected from them in a lesson. Prior to a mathematics lesson, the AEW needs to know what the activity will be and what his/her role will be in the lesson. Ideally some time needs to be allocated for the teacher and AEW to discuss what is happening in

lessons – the learning intentions, the activities to be undertaken, and the role of the AEW in that lesson. Some teachers have adopted the practice of explicitly outlining the goal or learning intent of the lesson – this helps orientate the students, but also helps both teacher and AEW keep to the intended focus of the lesson.

Planning for the coming week (or longer) can also include co-planning with the AEW. It can be difficult to find the time in a busy teaching day to explain expectations and activities, but without knowing what is expected of them, the AEWs can feel ill-prepared for the task/s ahead of them. Two strategies have been used to help with time for co-planning. The school has managed to find time (and money) to pay the AEWs to remain back at school one day each week to be involved in planning with the teacher. At other times, the principal has been able to cover the class while the teacher and AEW co-plan. It is recognized that the AEWs also have community roles so may be time poor in after-school time. Consequently, it is recognized that some flexibility in finding time to co-plan may be necessary but it is a valuable time for the teacher and AEW to work together.





Opening up Learning Opportunities for AEWs

The AEWs at Purnululu have been able to access many opportunities for professional learning in mathematics – both in content knowledge and pedagogical content knowledge. This has been a long-standing practice at the school. Some of the professional learning opportunities have been structured activities operated by the Association of Independent Schools of Western Australia (AISWA) at their Aboriginal Independent Community Schools conferences. These conferences include targeted workshops for AEWs or workshops conducted in clusters of schools. The roving AISWA consultants who visit the school on a regular basis also work with the AEWs when requested. The AEWs have also participated in various national conferences. The skills that have been learned in these forums have included many practical activities that can be used in the classrooms.

Where possible, when a teacher attends professional development, they take an AEW with them. Where there are invitations to present their practice to forums, both teacher and AEW will co-present so that there is a shared ownership of the classroom practices.

The AEWs have seen many changes over time, and have participated in a large range of professional development activities. They have a wealth of knowledge and a large repertoire of skills that are invaluable in the classroom. The beginning teacher (first year graduate) has been able to access the knowledge of her AEW for 'what works' in her classroom. Being able to access and bring their knowledge into the classroom has been a recognition and validation of the skills of the AEWs at Purnululu.

Formal training has also been accessed by the AEWs to support their professional qualifications. The AEWs have undertaken Cert 3 training, and moving to Cert 4. One AEW is now enrolling in a Bachelor of Early Childhood through Batchelor Institute as she is keen to take responsibility for the learning of the children in the early years. In the re-registration of the school, the preschool/kindy area was not accredited due to the qualifications of the staff. The community (and school) recognize the importance of the foundations of pre-school activities, so a local person would be an ideal person to operate this level of schooling. Not only initial encouragement is needed, but on-going support is essential to bring about success for staff to undertake further studies.



Benefits for Learning and Learners

Having Aboriginal workers in the school provides a strong role model for students who can see that there are successful people in community, and who have important roles in education.

Aboriginal Education Workers have strong connections with community and have a strong knowledge of the events in community that can help teachers to better understand the learners in their classroom.

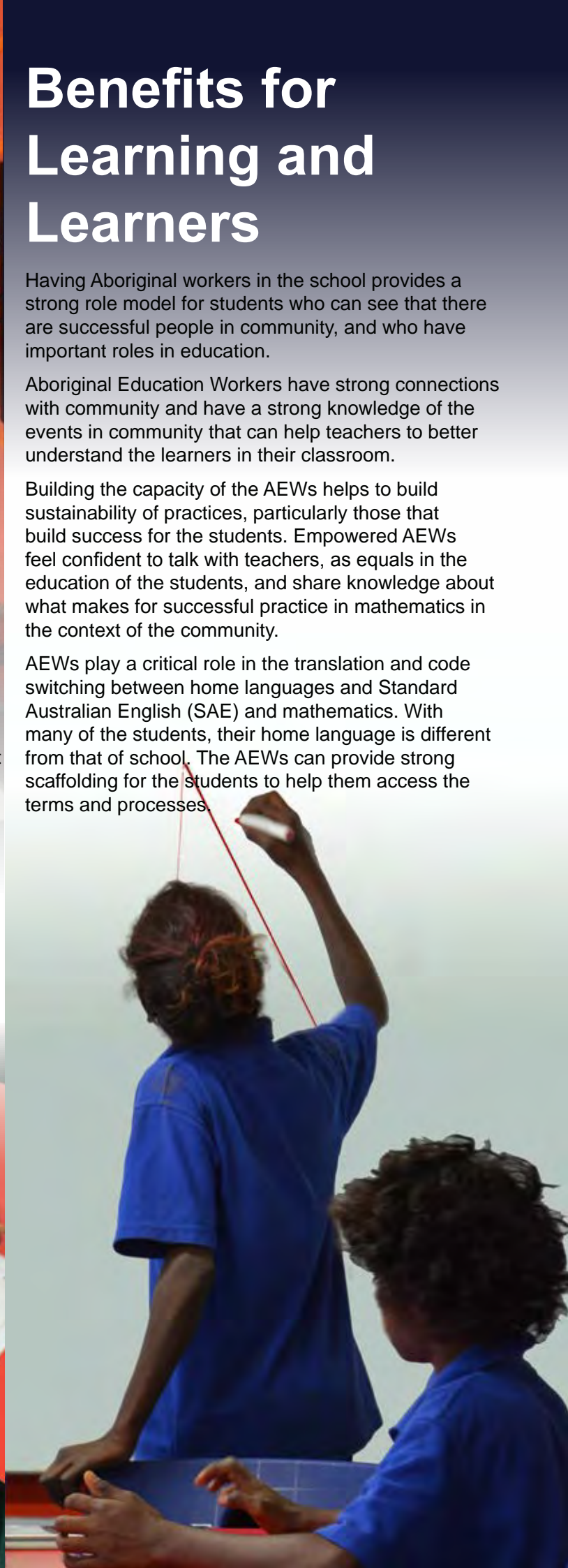
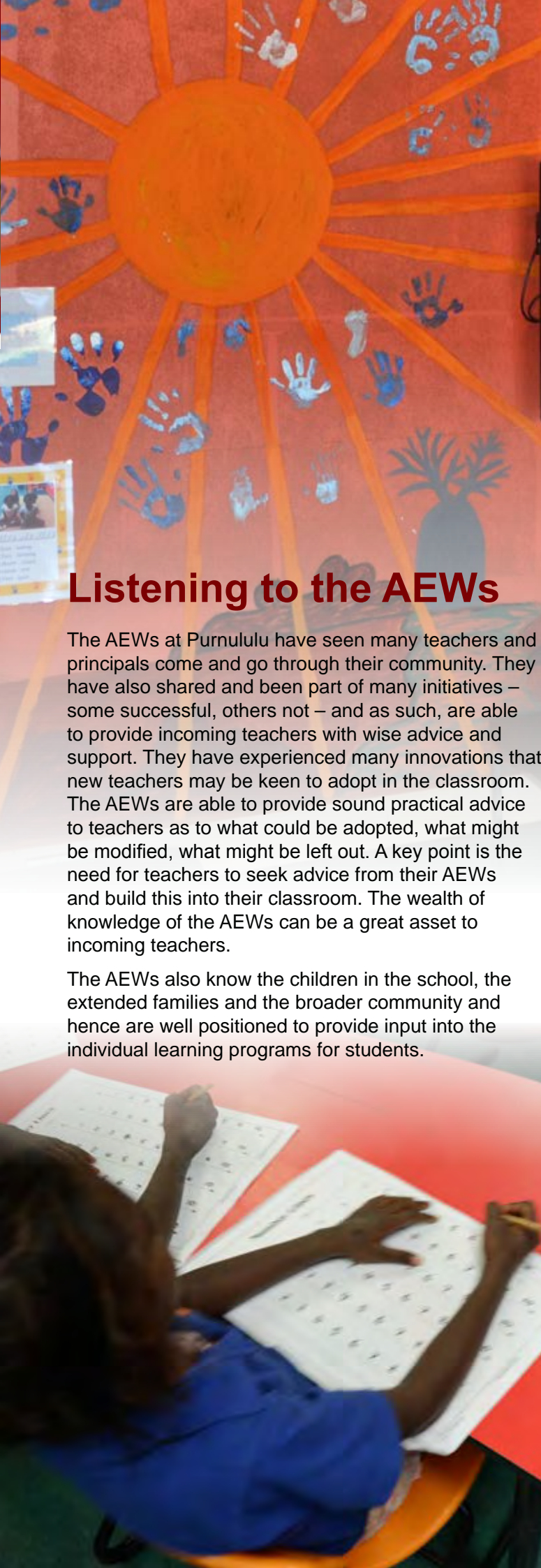
Building the capacity of the AEWs helps to build sustainability of practices, particularly those that build success for the students. Empowered AEWs feel confident to talk with teachers, as equals in the education of the students, and share knowledge about what makes for successful practice in mathematics in the context of the community.

AEWs play a critical role in the translation and code switching between home languages and Standard Australian English (SAE) and mathematics. With many of the students, their home language is different from that of school. The AEWs can provide strong scaffolding for the students to help them access the terms and processes.

Listening to the AEWs

The AEWs at Purnululu have seen many teachers and principals come and go through their community. They have also shared and been part of many initiatives – some successful, others not – and as such, are able to provide incoming teachers with wise advice and support. They have experienced many innovations that new teachers may be keen to adopt in the classroom. The AEWs are able to provide sound practical advice to teachers as to what could be adopted, what might be modified, what might be left out. A key point is the need for teachers to seek advice from their AEWs and build this into their classroom. The wealth of knowledge of the AEWs can be a great asset to incoming teachers.

The AEWs also know the children in the school, the extended families and the broader community and hence are well positioned to provide input into the individual learning programs for students.



Tinkering Table



Advice to Teachers

The AEWs advise that incoming teachers should develop good relationships with their AEWs and accept them as good partners in the learning environment of the school. AEWs have usually been working in the school and the community and have a wealth of knowledge that can be helpful to teachers.

There needs to be an on-going dialogue between the two.

Model for Quality Learning

General Principle	Implications for Mathematics	Focused Strategies
AEWs should be supported to learn mathematics teaching skills and practices	Build mathematics and pedagogy knowledge for the AEWs so that they can take and lead mathematics activities in the classroom.	<ul style="list-style-type: none"> Encourage and support AEWs to attend professional learning activities. Where possible, involve the AEWs in professional development activities that teachers also access. Teachers can work with AEWs to support their teaching in classrooms. Provide support and guidelines to the AEWs for activities so they are clear of their role and outcomes.
	Involve AEWs in planning.	<ul style="list-style-type: none"> Involve the AEWs in planning for learning and their role in the planned activities. Build opportunities in the school day (or after school) so that the planning is a dedicated time (rather than ad hoc).
	Support AEWs to develop their skills for the future – further education.	<ul style="list-style-type: none"> Build the skills of the AEWs so that they are preparing to lead teaching of mathematics in their community.
Listen to and seek advice from AEWs	AEWs know the students and have experience that can help the learning of mathematics.	<ul style="list-style-type: none"> Proactively seek input from the AEWs to guide teaching of mathematics. They have a breadth of experiences that can inform better teaching practices.
Get to know the AEWs – their strengths and interests in maths	Spend time learning about the AEWs – what they enjoy, what they see as their strengths, and what they can contribute to teaching.	<ul style="list-style-type: none"> Build activities in differentiated learning activities that can be led by the AEW. These should be in the areas of strengths/interest so as to build and maintain confidence and strengths. Empower the AEW to be the expert in particular areas of mathematics so that students can see and enjoy the AEWs strengths.
AEWs can lead culture and language activities	Mathematics can be difficult to learn, particularly when in another language. AEWs can support translation and code switching to assist learning mathematics.	<ul style="list-style-type: none"> AEWs have strong home language and can use this to help students understand mathematics concepts and processes as well as expectations of learning and activities. AEWs can code switch so that students can engage with the meaning of mathematics. Terms and processes can be negotiated in home language.

Key Messages – Summary

The AEWs can be a great asset to the school and can provide teachers with a wealth of knowledge, provided teachers are willing to invite and accept that knowledge.

Investing in AEWs in terms of their professional development is an invaluable strategy. In the case of Purnululu, the AEWs have worked with the school for 20+ years and have experienced many innovations. AEWs who have good knowledge and feel they have much to contribute to the school are more likely to want to remain connected to the school. Being involved in professional development activities makes the AEWs confident in what they know and helps them to speak up about education issues within the school and community. AEWs need to feel valued and knowledgeable about education if they are to be involved in the education of their children.

Involve the AEWs in culture – at Purnululu, the AEWs ran a one day cultural induction at the school prior to the commencement of the year. Over the day, they teach the teachers about their culture and what teachers need to do to work with their children and community. The AEWs are the experts and it is productive for the teachers to learn from them about the topics in which they are the experts. In this way, the AEWs lead the conversation about schooling.

AEWs have a wealth of experience to offer teachers. Being a constant at the school, the AEWs are able to provide informed views about what works (and what has not worked) at the school and with their children. Being open and willing to seek and accept the advice of AEWs

can help teachers to transition into the new school and classroom, and to build effective learning practices in mathematics.

AEWs serve an important role in sharing news about the school with the wider community. When they know what is happening and can understand the teaching process, they are able to share information with parents, talk about the good things that are happening at the school and with the children (rather than just talking about behaviour) and are able to enjoy seeing and sharing students progressing through levels. They are also able to share with families events that are happening in the school (such as open days, or family events) and encourage community participation in the school.

Teachers and principals tend to move through community while the AEWs have remained the constant at the school. Some started so as to be involved with their children's education but this has now morphed into their grandchildren's education. In one case, one of the AEWs had 9 of her grandchildren at the school so has a very strong personal investment in education. AEWs want their children to succeed and want to be part of that process. It is important for teachers to include the AEWs in that process.

School Demographics

Year range	PP-7	FTE teaching staff	9
Total enrolments	12	Non-teaching staff	0
Location	Very Remote	FTE non-teaching staff	0
ICSEA (school)	830	Indigenous students %	100%
ICSEA (distribution of students) (bottom quarter to top quarter)	21% 30% 27% 22%	Enrolments: Girls/Boys	6/6
Teaching staff	9	Language background other than English	91%
		Student attendance rate %	100%