



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

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The Value of Agricultural Studies to Cater for Inclusion: Agricultural Is Numeracy

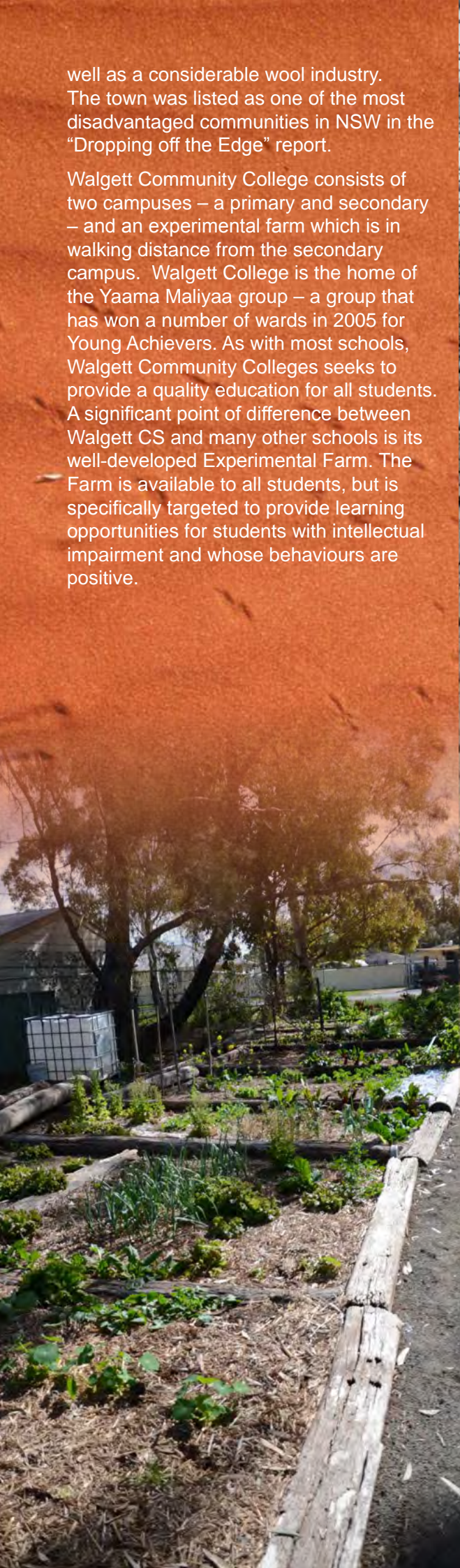
Walgett Community College

Walgett is located on the Barwon River and is the home to the XX nation.

It is often referred to as the "gateway to the opal fields" given its proximity to the famous Lightning Ridge. It was proclaimed a town in 1885. In its heydays, in the late 1800s, Walgett was a port that linked into the Murray-Darling network. Walgett is located on the Barwon River which feeds into the Darling River. The town is referred to by Banjo Patterson in two of his poems - *A Walgett Episode* and *Been There Before*.

Walgett was one of the towns visited by the Freedom Riders in 1965. The Freedom Riders protested against life-situations faced by Indigenous Australians. Considerable publicity was generated in Walgett where the group protested outside the Walgett RSL which was reported to have refused to admit Indigenous ex-servicemen into the Club.

In 2013, the town had a population of 2300, and is the hub for a large agricultural industry. Mainly growing Lucerne in recent years, the area had also crops of wheat, and cotton as



well as a considerable wool industry. The town was listed as one of the most disadvantaged communities in NSW in the “Dropping off the Edge” report.

Walgett Community College consists of two campuses – a primary and secondary – and an experimental farm which is in walking distance from the secondary campus. Walgett College is the home of the Yaama Maliyaa group – a group that has won a number of wards in 2005 for Young Achievers. As with most schools, Walgett Community Colleges seeks to provide a quality education for all students. A significant point of difference between Walgett CS and many other schools is its well-developed Experimental Farm. The Farm is available to all students, but is specifically targeted to provide learning opportunities for students with intellectual impairment and whose behaviours are positive.

Defining Success

Across the school there have been some successes in numeracy; most notable is the consistency in Year 9 over 4 of the past 5 years.

	2010	2011	2012	2013	2014
Year 3					
Year 5					
Year 7					
Year 9					

Unlike, other stories in this project, the Walgett CC story focuses on practices for students who have intellectual impairment or other disabilities, and how the school has built an agricultural experience for the students so that they can learn and thrive, and development skills for employment. There has been considerable success with this program for this targeted group of learners.



Walgett Agricultural Experimental Farm

The Farm is located within walking distance from the secondary campus. Somewhat different from the usual agricultural school, the Walgett Farm is very experimental in its ethos. Students undertake work with both crops and animals to explore cause and effect, but also to develop new ways of thinking about agriculture and farming.

The Farm has an animal section where there are poultry (chickens, turkeys and guinea fowl); potty calves and goats that have been hand raised; llama, sheep and cattle. The students take responsibility for feeding and caring for the animals while they also undertake studies associated with the animals. There is also the agricultural component of the Farm where there are small market gardens, permaculture and broad scale farming. There is also an aquaponics farm that over a year will yield 150kg of fish for the table.

The school has invested considerably in the infrastructure of the farm so that there is a chain mesh security fence around the perimeter of the Farm. This is to protect the animals from the dogs in the town. There has been extensive irrigation installed throughout

the farm; cattle pens and weighing station installed; quality fencing (star and picket with 4 strands of wire) around the animal areas; spaces for teaching are being upgraded to include air-conditioning and standard classroom tools. Collectively these add to the quality learning experiences for the students while ensuring the learning is at a level commensurate with good practice in the farm industry.

The school has also employed two full time workers on the farm. One is an instructional leader who works with the students but also on the overall design of the farm and experiences for the students. The second is a retired farmer who works as a farm hand and advisor to the works being undertaken. The two men work collaboratively as there are different orientations to farming such as permaculture and broad-scale farming. Similarly one has strength in plants, the other in animals. Collectively the different views ensure the students experience the breadth of approaches to farming. There are no chemicals used in the agricultural plot. The students learn about the symbiotic relationships between plants and animals.

Agriculture and Numeracy

The experiences provided to the students at the Farm are varied but most activities have some numeracy component.

Animal Husbandry

The life cycles of the animals feature in the work undertaken by the students. The students recently implanted one of the goats with a 'plug' to facilitate ovulation. This plug could be inserted for two weeks after which the Nanny needed to put with a Billy goat. The students transported the Nanny to a goat stud farm to become fertilized. While the Nanny was being serviced, the students participated in a muster at the station. The students measure the gestation period and await the arrival of the kids. In some years, the Nannies produce multiple births and this is studied by the students. The measurement of time is applied to the reproduction process as students map the gestations period and the growth of the offspring.

The Farm has a range of poultry – chickens, turkeys and guinea fowls. There are roosters among the chickens and students again measure the gestation period, and the duration for hatching of eggs. Students write up their observations, and keep records.

Stock Management

There are a number of cattle on the Farm. These range from potty calves through to 500kg beasts. The students weigh the larger beasts each day, and plot their measurements so that they can see the growth. They also measure the feed to see the relationship between feed and growth. This process is followed with many of the animals, including the chickens and goats, so that the students gain the measurement skills, but also recording the growth rates and then being able to see relationships between variables.

The animals are tethered and students learn to handle them, but also in the process, they come to be confident with them. Students start with the smaller animals and progress to the bigger cattle.

Again, the stock management process is a monitored process where the students keep records, and graphs to show how the animals are changing. There are also explorations of inter-related variables (such as feed and growth) that are explored by the students.



Crop Trials

The Farm is currently rolling out an experimental crop of Barley. It has been planted out of season to see the impact of the planting. Students are measuring and recording the growth rates to monitor the outcome of the planting. There are no scientific research centres in the region, so the Farm is seeing itself as filling a very important void in the region.

The barley crop trial epitomizes the philosophy of the Farm where there are no mistakes. There are experiments that sometimes work, and at other times, they don't. The key thing is to keep trying till the right path is found. Students learn this with plants, and their growth cycles, the impact of climate and so forth.

Marketing and Sales

Through the vegetable gardens, the students learn about plant growth and nutrition. The students sell the vegetables to teachers and community. At one stage, they provided the lettuce for the local roadhouse, ensuring that they had their nominated amounts of lettuce each day. This produced a substantial financial gain for the students which they returned to the Farm for reinvesting in the produce.

The students also sell their produce to the teachers. They have to estimate what vegetables and fruit will be ready for sale in the coming week, prepare order sheets, cost the prices the various products, distribute the order sheets, and collate the orders. During the week, they must prepare the crops for the orders, and then compile the orders with the accounts. They then distribute the orders, take money and give change. Collectively, these tasks require considerable mathematics and problem solving. The real life context provides a strong rationale and motivation for the learning of mathematics.

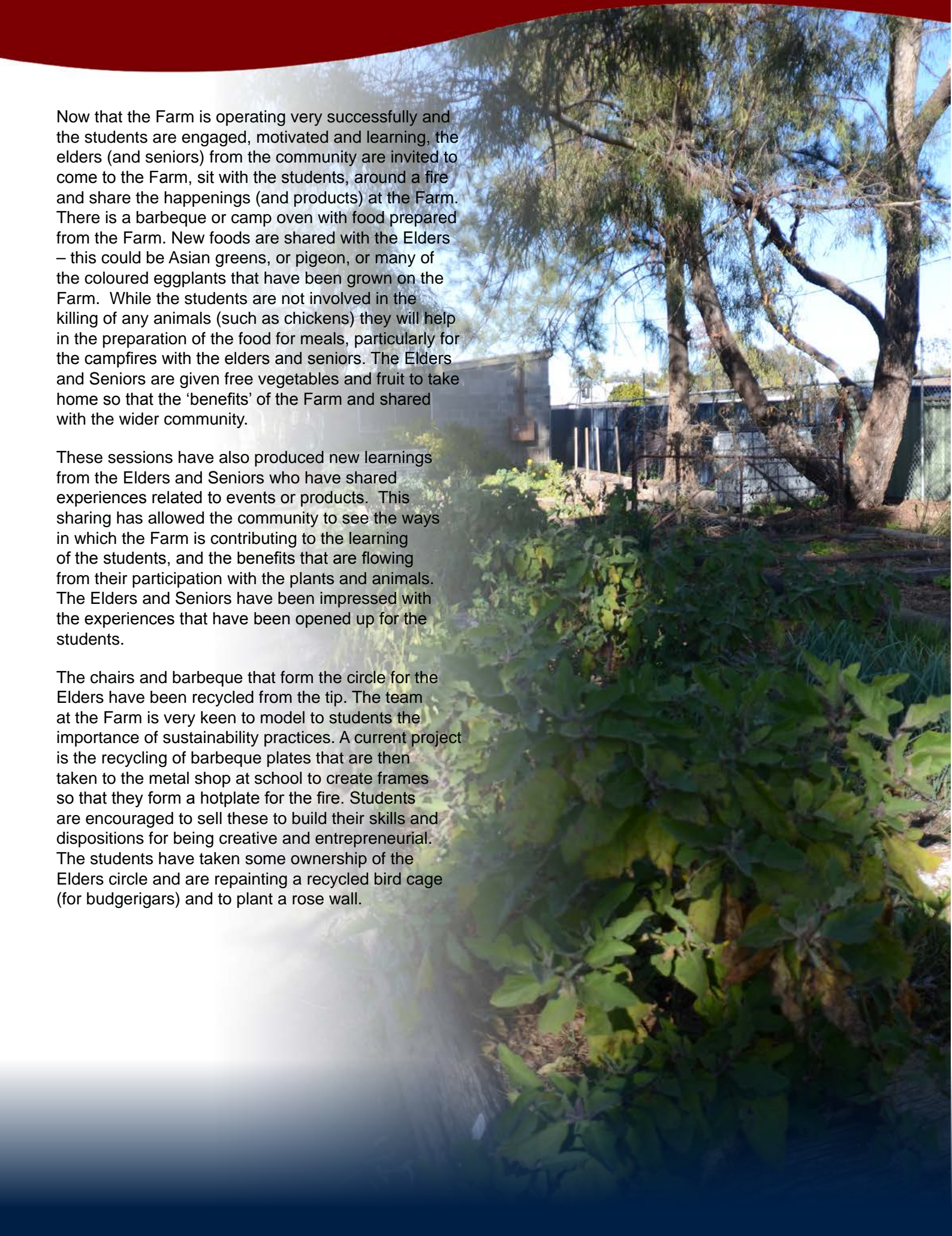


Elders' and Seniors' Days

Now that the Farm is operating very successfully and the students are engaged, motivated and learning, the elders (and seniors) from the community are invited to come to the Farm, sit with the students, around a fire and share the happenings (and products) at the Farm. There is a barbeque or camp oven with food prepared from the Farm. New foods are shared with the Elders – this could be Asian greens, or pigeon, or many of the coloured eggplants that have been grown on the Farm. While the students are not involved in the killing of any animals (such as chickens) they will help in the preparation of the food for meals, particularly for the campfires with the elders and seniors. The Elders and Seniors are given free vegetables and fruit to take home so that the 'benefits' of the Farm are shared with the wider community.

These sessions have also produced new learnings from the Elders and Seniors who have shared experiences related to events or products. This sharing has allowed the community to see the ways in which the Farm is contributing to the learning of the students, and the benefits that are flowing from their participation with the plants and animals. The Elders and Seniors have been impressed with the experiences that have been opened up for the students.

The chairs and barbeque that form the circle for the Elders have been recycled from the tip. The team at the Farm is very keen to model to students the importance of sustainability practices. A current project is the recycling of barbeque plates that are then taken to the metal shop at school to create frames so that they form a hotplate for the fire. Students are encouraged to sell these to build their skills and dispositions for being creative and entrepreneurial. The students have taken some ownership of the Elders circle and are repainting a recycled bird cage (for budgerigars) and to plant a rose wall.

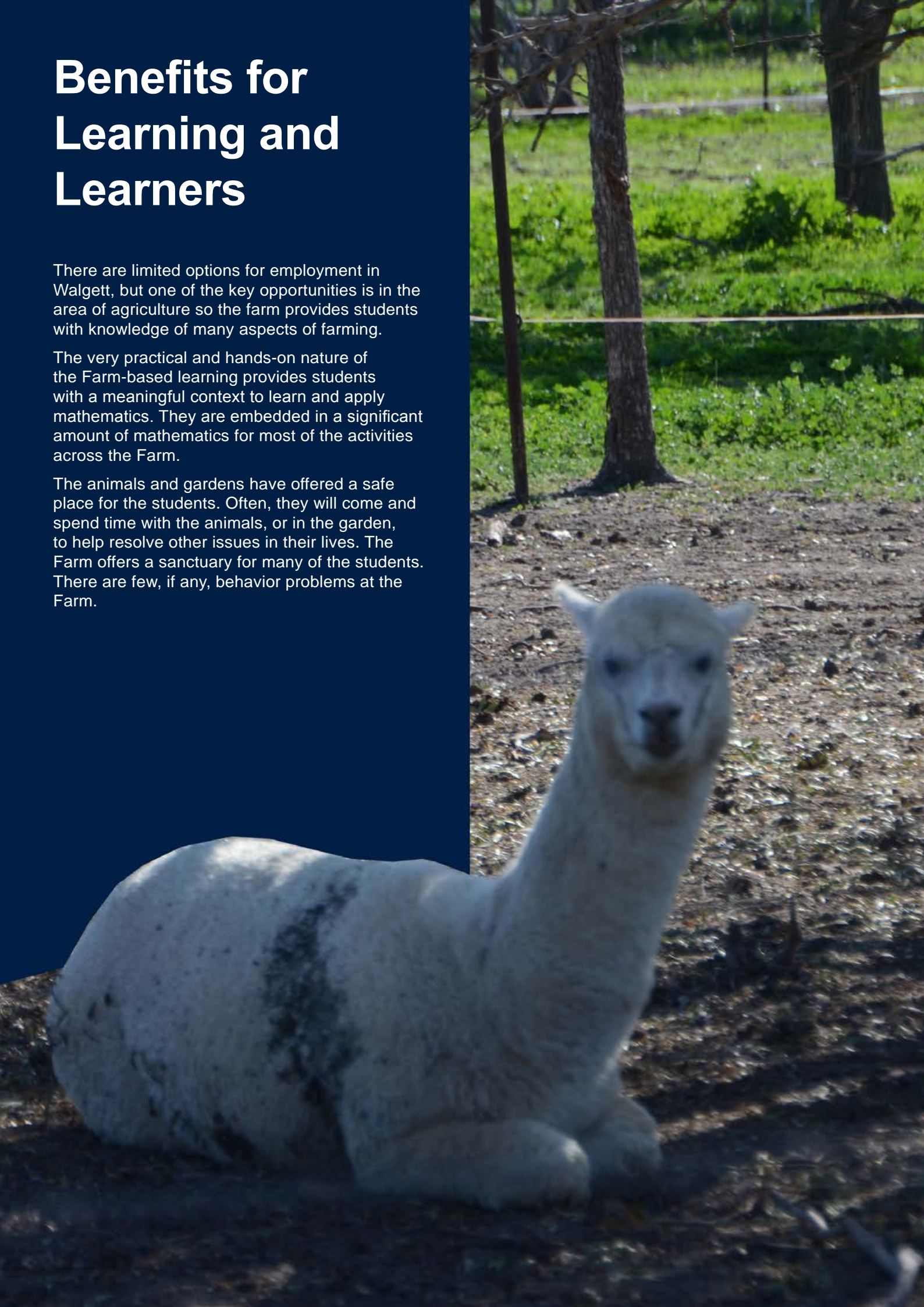


Benefits for Learning and Learners

There are limited options for employment in Walgett, but one of the key opportunities is in the area of agriculture so the farm provides students with knowledge of many aspects of farming.

The very practical and hands-on nature of the Farm-based learning provides students with a meaningful context to learn and apply mathematics. They are embedded in a significant amount of mathematics for most of the activities across the Farm.

The animals and gardens have offered a safe place for the students. Often, they will come and spend time with the animals, or in the garden, to help resolve other issues in their lives. The Farm offers a sanctuary for many of the students. There are few, if any, behavior problems at the Farm.





Advice to Teachers

Having very applied, meaningful and real contexts for learning and applying mathematics enables learners of all levels of inclusion, to be engaged and happy in their learning. The Farm has provided a very real context for the students to learn many mathematical concepts and processes and to apply that learning in meaningful ways.

The whole farm experiences provide a wide range of learning experiences for the students that cannot be achieved in the standard classroom.

Establishing the Farm can be expensive but there are many other parts of the farming experience that can be free. Orphaned animals can be placed at the farm and the hand-raising of the animals offers much positive learning for students.

Be sure to share the learnings and experiences of the farm with the wider community. Not only will community members learn about the farm, but the students can learn from the community members and use this knowledge in developing the Farm.

Models

In terms of the mathematics learning that has been facilitated through the Agricultural School, the mathematics is very hands-on and applied. Students see the relevance and purpose of mathematics in a very real context. The monitoring of stock and plants; the planning, programming and budgeting activities that are part of the Farm experience provide students with an engaging context in which to use, apply and problem solve using mathematics.



Model for Quality Learning

General Principle	Implications for mathematics	Focused strategies
Learning is hands on, practical and applied.	Mathematical concepts and processes are undertaken for many activities in the Farm.	Weighing and measuring stock and feed. Graphing and recording data. Sales and profits from produce.



Key Messages – Summary

The many experiences of the farm – from animals to plants – offer a rich learning context for mathematics. The students see the relevance and purpose of mathematics.

While there are many everyday activities associated with the practices on the Farm, it is important that students also record their data so that they see trends over time and are better able to undertake some of the key processes of mathematics – application, prediction, interpreting etc.



School Demographics

Year range	U, 7-12	FTE teaching staff	18.4
Total enrolments	95	Non-teaching staff	9
Location	Remote	FTE non-teaching staff	9.4
ICSEA (school)	661	Indigenous students %	98%
ICSEA (distribution of students) (bottom quarter to top quarter)	86% 9% 4% 1%	Enrolments: Girls/Boys	57/38
Teaching staff	10	Language background other than English	2%
		Student attendance rate %	69%