

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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VET: Training for Life

Wongutha Christian Aboriginal Parent-Directed School (CAPS)

Wongutha Christian Aboriginal Parent-Directed School (CAPS) is based in the small rural community of Gibson, some 20kms north of Esperance. The school is located 5kms from Gibson and is within sprawling farmlands. The school has a strong Christian ethos and strong pastoral care both in the boarding and academic components of the school. The school opened in 1954 as a training facility for Aboriginal men but morphed into its current format in 1990. It is now a senior secondary boarding school catering for up to 72 students who can come from all over Western Australia. There are two boarding residences – one for the boys and one for the girls – each equipped with a gym, TVs and pool tables.

Originally established as an agricultural training centre, it retains much of this focus. The school is located on 50 acres of land, but the larger property (managed by Wongutha CAPS) is 3000 acres. The

school operates agricultural activities on approximately 800 acres of that land with the rest being leased to farmers. The agricultural component of the school is a very salient feature of the facilities and learning environment.

The mantra of the school is to prepare students for life beyond school. The focus of the school is to assist Aboriginal students to successfully transition into work. The school offers a number of vocational courses including general construction; metals and engineering; automotive servicing; stock and station; conservation and land management; hospitality; tourism; and business. The students can undertake Cert 1, 2 and 3 in the areas offered by the school. Students can also work their way through the driver's licence process (Keys for Life) so that by the time they graduate, they will have a driver's licence. The Keys for Life program is valued highly by the students and is quite an incentive for students to return to boarding after term breaks.

The students are supported in becoming work ready through initially starting with chores available at the school – such as cleaning, kitchen work, helping in the ever-expanding produce garden, general gardening and small maintenance work. Once they are showing work-ready skills, they are able to undertake work in the nearby town of Esperance where the school has partnered with a number of the local employers to provide work placements. Students are then able to commence traineeships or certificates in areas in which they are interested. The school continues to support students after they have completed Year 12 if they wish to continue their learning. For example, one student completed Year 12 three years ago but has remained at the school and is currently completing his Cert 4 in Agriculture and Training. He is employed as a farm assistant at the school and provides a strong role model to the students. Some of the practical activities undertaken through the construction program include:

- building the Boarding Manager's home (with the help of some outside tradesmen). This was achieved in a one year time frame;
- revamping an old home on campus;
- building roundabouts;
- constructing a large shade house where students can rest during breaks;
- building outdoor furniture using timbers from the property, as part of preparations for the construction work experience;
- servicing vehicles by practising on the school vehicles; and
- practical maintenance activities that draw on the VET areas on offer in the school.

The school is staffed by many long term teachers, many of whom have been with the school for two decades or more. The longevity of employment has helped the stability of the school, and students are familiar with the staff. There is a small turnover of staff and this is seen as a positive as these people can bring new ideas into the school.

Background to the Initiative

The aim of the school is ensure that students in Years 11 and 12 exit school with the work skills necessary for gainful employment and life after school. The school focuses on building work-readiness skills (including literacy and numeracy), building towards work experience in worksites, and then into formal certificates. As a Registered Training Office (RTO), the school offers VET courses in eight areas that have been targeted as highly employable areas for the students. The school has a highly structured work-readiness program that is built to transition students into viable work situations. Students undertake work-readiness skills training through activities at the school where they progressively build their skills, confidence and work ethos until they are ready for work experiences in the nearby Esperance. Many of the local industries and businesses support the students in work and are pleased with the levels of preparedness for work.

Defining Success

Wongutha CAPS defines success in very broad ways due to the backgrounds of the students who come to the school. As a boarding school, there is a greater success rate when students attend the four terms each year. Many may not have attended high school for some years, while others have been regular attenders in their communities. This diversity requires staff to consider "success" in very different ways. There have been many successes in terms of students obtaining very good jobs in their communities or surrounding areas including banks, trades, schools, mining, retail, etc. with the qualifications that they received while at the school. For other students, success has been aligned with regular attendance. For students who have attended the four terms over two years, the school is able to show significant gains in numeracy outcomes (as well as literacy) and the success in the vocational area. Wongutha CAPS enjoys considerable success with its VET focus and, based on school research, students are twice as likely to gain employment than their peers.



Transitioning to Work

Wongutha CAPS has a very structured work program for students. The overall timetable is built around life skills for learning and work. Monday through to Wednesday tend to focus on academic programs, while Thursday and Friday are VET focused. Tuesdays include a work program day. On Tuesdays early sessions are for functional numeracy (and literacy) associated with lifelong learning. In mathematics, practical numeracy is the focus of mathematics lessons. In these sessions, students are expected to undertake activities that have a strong practical focus, and are part of their vocational learning. Measurement, time and money handling are a large part of the Tuesday morning. The Gateway work program is the first step in the transition to work. This program is about building the necessary numeracy skills needed for work so the mornings are spent on literacy and numeracy while the afternoons are spent developing

work readiness skills. In contrast, those students who already have the work readiness skills are placed in work placements for a full day. This is either as work experience or part of a formal work program (such as a Certificate in one of the nominated VET areas, or a traineeship). On Thursdays and Fridays, students undertake literacy and numeracy in the morning, and VET courses in the afternoon session.

In the VET courses that students undertake as part of their education, they study (and apply) the mathematics that are needed for those courses. For example, in the building or metals courses, students are expected to learn the skills of measurement in a very practical and applied context. Students will have very practical experiences of measuring up items as they would experience in a work context. The VET courses offer a valuable context for learning many mathematical concepts and processes.

Wongutha CAPS Timetable 2015									
Monday		Tuesday		Wednesday		Thursday		Friday	
8.30-8.45 Devotions		8.20-8.50 Exercise		CHAPEL SERVICE 8.30-9.20am		8.30-8.45 Devotions		8.30-8.45 Devotions	
8.50am START		8.50am START				8.50am START		8.50am START	
Maths		Practical maths / Ag maths		MENTOR TIME 9.20-9.40am		Maths		Maths	
9.40 class change						9.40 class change		9.40 class change	
English		10.10-10.30am RECESS		Oral Communication		English		Training for Life	
10.30-10.50am RECESS		Work Readiness		10.30-10.50am RECESS		10.30-10.50am RECESS		10.30-10.50am RECESS	
English				English		English		VET	
11.40 class change				11.40 class change		11.40 class change		11.40 class change	
Maths				Maths		VET Language		VET	
12.00-12.45 LUNCH		Group 1 Group 2		12.00-12.45 LUNCH		12.00-12.45 LUNCH		12.00-12.45 LUNCH	
Group 1	Group 2	Life Skills / Computers Ag Prac		Maths		VET		Traneship Time	
Computer/ Driving/ Guitar	Health								
1.50 class change									
Health	Bible	Ag Prac Life Skills / Computers		Computer/ Driving/ Piano Keyboard					
2.30-2.35 BREAK				2.30-2.35 BREAK					
Bible	Computer/ Driving/ Guitar	Ag Prac Life Skills / Computers		CLUBS Spopr, Music, Artefacts, Art, Horses, Photography		VET		VET	
MENTOR TIME 3.15-3.30pm									
Staff meeting (monthly)		Finish 3.30pm		Finish 3.30pm		Finish 3.30pm		Finish 3.30pm	

Meeting the Numeracy Needs of the Students

Students come to Wongutha from all regions of Western Australia. Some students have attended school regularly and have achievements that are expected for their age. However other students may come to the school with very low levels of literacy and numeracy. After commencing at the Wongutha CAPS, although they may not achieve benchmark, these students often show gains and considerably more growth than would be expected for a given year. As part of the overall program, the goal is to ensure that the students will be able to perform well in work and in life, so literacy and numeracy are priority areas. Rather than draw on the National Curriculum, Wongutha CAPS draws on the Western Australian Certificate of Education (WACE) curriculum to structure the learning outcomes since many of the students are well below benchmark. Most do not pass the OLNA (Online Literacy and Numeracy Assessment) test at the end of Year 10, requiring particular numeracy programs to be developed across the senior secondary years. The WACE curriculum allows for 8 levels of achievement that form the basis of the numeracy curriculum.

- Mathematics Preliminary 1, 2, 3, and 4
- Mathematics Foundations 1, 2, 3 and 4

Students are tested upon entry to the school and placed in numeracy classes that match their achievement levels but the school also recognises that testing may not accurately reflect students' understanding so that once placed in a class, students who show greater understandings than measured on the tests are able to move up to other levels within the classroom structures. For example, the strands within preliminary level 3 include whole number, addition and subtraction; money; addition and subtraction of money; multiplication and division; multiplication and division of money; time; measurement; and chance and data.

Each student is given a mathematics/numeracy workbook in which the learning outcomes for their levels are shown. Students are able to mark off demonstration of achieving that learning outcome, on five occasions and then it is assumed that the students knows that mathematical concept or process. Students are in control of this monitoring of their own performance.

The language of mathematics has been problematic for students. They are able to do operations with numbers but have needed greater support when problems are posed in a contextualised problem. The school has been developing a wide range of strategies to address language issues in mathematics since most of the students speak Aboriginal English, with many speaking Kriol or a home language.





Grouping Students by Achievement

There are five phases of mathematics classes operating at a given time in the school. Students are not grouped by age, but rather by achievement. Students are grouped according to the levels of mathematics in the curriculum framework, and can move up (or down) depending on how they succeed in that class. This allows teachers to work with their students and for any student who is working at a level to progress into the next level without any timetable problems. However, in the higher levels (Foundations 3 and 4), transitions up into next levels are made at the start and/or middle of a year.

Money Handling

Money handling is an important life skill for the students at Wongutha. There is a considerable emphasis put on this aspect of numeracy. Links are made between the many activities undertaken on campus as well as in the mathematics classroom to build money handling competency.

Students are paid to work while at the school. Those who have few work ready skills are able to develop these through the tasks offered within the school and dormitories. These are quite manual – cleaning, cooking, gardening- and low level. As students develop work-ready skills, they are able to undertake more demanding and more independent work tasks for which they are given a higher pay. Finally, as students move into formal training arrangements with external providers, their pay increases again. Within these broad bands, the students also are paid differential rates depending on their work ethos so there is a sliding scale from 1-5 that rewards attendance, timeliness, attitude, etc. so that students are rewarded for having good work skills and attitudes.

“Payment” of students offers a very practical approach to money handling. Students are given their weekly pay on Wednesdays which they can choose how to spend. Each Friday, the students go into Esperance and have a shopping experience as well as buying their dinner. They are free to purchase what they like with their earnings but with a proviso that any ‘junk food’ is to be consumed in town and not brought back to campus. The school has initiated a healthy eating program and is teaching the students that some food items should be consumed as treats. Students are able to buy goods of their own choosing including clothes, treats, health

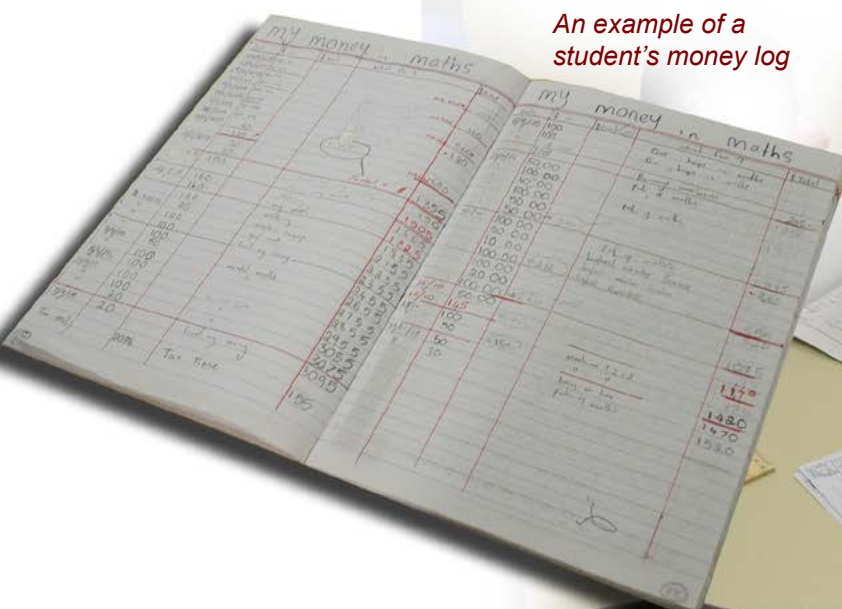
products and phone credits. This process helps with money handling and budgeting skills. The students are also encouraged to develop their communication skills by undertaking their purchasing on their own. Staff will assist students in the early stages through encouragement but the communication skills are seen to be an invaluable component of the field trips.

LEVEL	In school	Work experience	Certificates/ traineeships
5	\$30	\$45	\$60
4	\$25	\$35	\$45
3	\$20	\$25	\$35
2	\$15	\$20	\$25
1	\$10	\$10	\$10

Weekly pay schedules for levels of work undertaken by the students.

Within the context of lessons, some of the teachers also incorporate money activities as a reward system. Students are “paid” for completing tasks, correct responses, attending on time, and other classroom activities using play money. Students keep a ledger of their income and must keep a running tally. This helps to build many mathematical concepts and processes, but also builds a familiarity with money handling skills. The use of the money (which looks like real money) provides a motivational environment to ‘earn’ dollars, keep a record of earnings, pay taxes, and ultimately use the money (at the end of a term) to purchase goods. Large amounts of money are ‘paid’ to students so that they develop skills with handling (and talking about) large numbers.

An example of a student's money log



my money in maths	
date	description
1/10	100.00
2/10	100.00
3/10	100.00
4/10	100.00
5/10	100.00
6/10	100.00
7/10	100.00
8/10	100.00
9/10	100.00
10/10	100.00
11/10	100.00
12/10	100.00
13/10	100.00
14/10	100.00
15/10	100.00
16/10	100.00
17/10	100.00
18/10	100.00
19/10	100.00
20/10	100.00
21/10	100.00
22/10	100.00
23/10	100.00
24/10	100.00
25/10	100.00
26/10	100.00
27/10	100.00
28/10	100.00
29/10	100.00
30/10	100.00
31/10	100.00
1/11	100.00
2/11	100.00
3/11	100.00
4/11	100.00
5/11	100.00
6/11	100.00
7/11	100.00
8/11	100.00
9/11	100.00
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22/12	100.00
23/12	100.00
24/12	100.00
25/12	100.00
26/12	100.00
27/12	100.00
28/12	100.00
29/12	100.00
30/12	100.00
31/12	100.00



Practical Mathematics

There is an emphasis at the school on aspects of practical mathematics. The teachers have identified key mathematical concepts that students require for life and work. These have included money handling, time and measurement activities (particularly in the building and mechanical trades). As noted earlier, the Tuesday mathematics lessons are centred on practical mathematics for the VET programs, but across the mathematics lessons as a whole, there is a concerted effort for students to understand the key practical concepts that they will need for life beyond school.

Teacher Professional Development

There has been considerable professional development for the teachers at Wongutha CAPS in the area of numeracy education. As a senior secondary school setting with many students struggling with numeracy, teachers needed support in how to identify students' levels of understanding, and how to scaffold students to new levels of understanding. The school has benefitted from the input of a consultant from AISWA (AICS) who has worked extensively with the teachers in the diagnosis of students' learning and pedagogy. There has been a distinct advantage enjoyed at Wongutha where teachers have remained at the school for extended periods of time – some more than 2 decades. This has ensured that the investments in professional development have been maintained at the school.



Benefits for Learning and Learners

The strong emphasis on transition into work and life beyond school has many benefits for the students. In addition to the likelihood of employment after school, the students are well prepared for work experiences through the work readiness program, and many local employers welcome the students for workplace learning.

Staging mathematics lessons around the needs of learners and having a visible learning trajectory for mathematics has enabled teachers to target the numeracy needs of the students. The learning trajectory also provides teachers with a coherent program across the mathematics experience for the students.

Teaching mathematics in a very applied manner has prepared students for workplace experiences but also for life.

Advice to Teachers

Students in the senior years of schooling may vary considerably in their levels of mathematics so identifying their levels of understanding and then providing experiences to cater for those levels, building into higher levels, is the key to success.

Build key practical mathematics into the learning program so that students can learn the mathematics they need for life beyond school.

Identify the key learnings that students need in numeracy and develop these so that students are able to be functionally numerate for the world they will encounter beyond school.

The VET context provides a positive learning experience for mathematics – it shows the relevance of mathematics/numeracy in the workplace, and hence the need to learn mathematics.

Having a clear curriculum provides teachers with a pathway for learning and a structured program across the school. This reduces duplication and keeps the focus on the learning needs for progression. The program also provides a catalyst for professional discussions among the staff.



Model for Quality Learning

General Principle	Implications for Mathematics	Focused Strategies
VET provides a context for learning mathematics	VET provides both a catalyst for the need to learn mathematics as well as providing a meaningful context within which to use mathematics.	<ul style="list-style-type: none"> Identify the mathematics that is needed within a given VET program and ensure that students are competent with this mathematics. Build learning mathematics into the applied VET area so that students are able to see the mathematics in the context of work. Provide targeted learning sessions that teach the mathematics needed for the practical context.
Develop a curriculum that meets the students' needs	Develop a learning pathway that caters for the mathematics needed by the students.	<ul style="list-style-type: none"> Develop a curriculum that meets the needs of the students. Identify the mathematics with which students enter the school, and then provide targeted learning activities to cater for their needs. Provide opportunities for students to move flexibly through the learning pathway.
Provide practical mathematics learning experiences	Identify the key mathematics that students need to know for life after school.	<ul style="list-style-type: none"> Provide learning experiences for the students to enable them to develop the mathematical life skills they need – e.g. money handling, budgeting, time, measurement.
	Build mathematics into the VET teaching in explicit ways so that students can see the application of mathematics.	<ul style="list-style-type: none"> Make explicit links between the mathematics taught in the classroom with the mathematics being used in the work context.
Provide professional learning opportunities for teachers	Provide teachers with professional learning to support their teaching, particularly for teachers who are teaching outside their teaching areas.	<ul style="list-style-type: none"> Access external consultants to support teachers' learning. Develop learning communities within the school to share learning experiences, and celebrate the success in classrooms. Teachers work collaboratively to develop a coherent mathematics curriculum/program across the school so that they can share ideas and learn from each other.



Key Messages – Summary

VET provides a meaningful context for learning (and applying) many mathematical concepts. Students need to have good understandings of many mathematical concepts in order to succeed in the workplace and life. VET provides a context where students can see the relevance and the need to learn mathematics.

Teachers need to understand how to identify students' levels of understanding and then to provide targeted learning experiences for those students.

Identifying key concepts for VET contexts allows teachers to target particular mathematical concepts and processes.



School Demographics

Year range	11-12	FTE teaching staff	13.4
Total enrolments	72	Non-teaching staff	14
Location	Remote	FTE non-teaching staff	8.4
ICSEA (school)	603	Indigenous students %	100%
ICSEA (distribution of students) (bottom quarter to top quarter)	100% 0% 0% 0%	Enrolments: Girls/Boys	36/36
Teaching staff	16	Language background other than English	100%