



CLICK THROUGHOUT

Koorie Perspectives in STEM

CSIRO Indigenous STEM Awards

There's a huge focus on the moment on STEM education. A new approach, STEM is about focusing on specific knowledge across the four learning areas of Science, Technology, Engineering and Mathematics; and the inter-relationship between them. Integrating Koorie perspectives into these four learning areas, supports a range of alternative viewpoints and a deeper engagement in these four learning areas.

It's believed that STEM education doesn't attract Aboriginal students, yet there are at the moment at least two Aboriginal astronomers, researching and working in Australia at the moment. [See VAEAI's [Koorie Seasons and Astral Calendars](#)]. In Derby WA, the community is celebrating Derby's first Aboriginal doctor [Vinka Barunga](#) —one of 6 graduates.

The Aboriginal and Torres Strait Islander Cross-Curriculum Priority was included in the original development of the Australian Curriculum—Maths and Science learning areas, however over time these were excluded. This is lamentable as it denied the opportunity to explore predominantly western systems of maths, technology, engineering and scientific understanding through an Aboriginal world view.

While there are no direct STEM content descriptors explicitly pertaining to Aboriginal histories and cultures, there are plenty of opportunities within, to take an Aboriginal viewpoint, to incorporate a cultural approach and approach STEM learning from a Koorie cultural perspective. Taking a different viewpoint, incorporating a cultural approach and encouraging students to explore alternatives might well be the key to greater relevance, engagement and participation.

This STEM edition of Koorie Perspectives in Curriculum offers some suggestions for STEM integration.

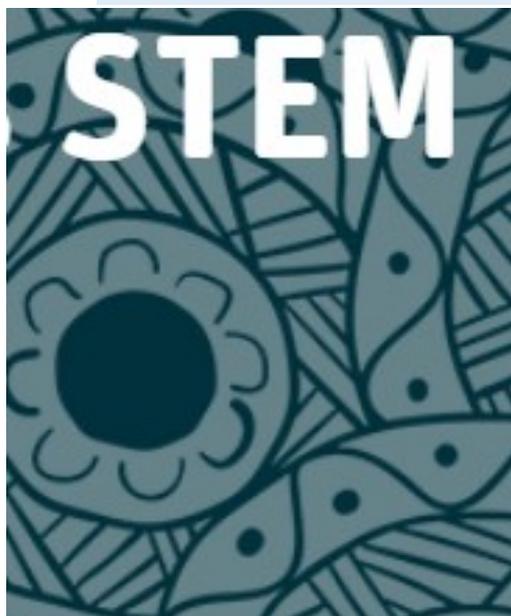
Aboriginal Summer School for Excellence in Technology and Science

The CSIRO runs the Aboriginal Summer School for Excellence in Technology and Science ([ASSETS](#)) program which is a nine day summer school for high-achieving Aboriginal and Torres Strait Islander Year 10 students with an interest in science and technology. ASSETS summer schools are run annually in Adelaide, Newcastle and Townsville in December and January.

During the summer school, scientists share their research and discuss study and career possibilities while Indigenous mentors and leaders help students strengthen their cultural connections. Students will also complete a group research project and present their findings at the closing ceremony.

After the summer school, the ASSETS leadership program supports students through Year 11 and 12. The program assists students to develop leadership skills and access work experience, mentoring and tertiary education opportunities.

All aspects of the ASSETS program are free for students. *While applications have closed for 2018, current year 9 students may be interested for the forthcoming year.*

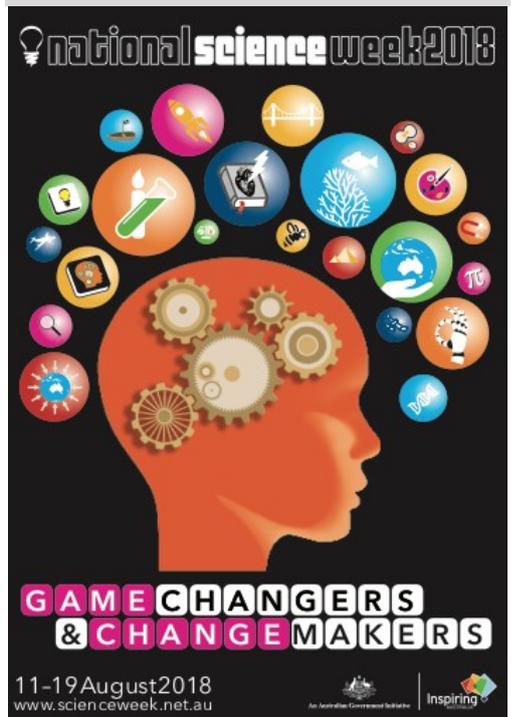


The Indigenous STEM Awards recognise, reward and celebrate the achievements of Aboriginal and Torres Strait Islander students and scientists who are studying and working in the STEM field, as well as the integral role schools, teachers and mentors have in supporting Aboriginal and Torres Strait Islander students in pursuing STEM education and careers.

Learn about the [2017 Indigenous STEM Winners](#) announced on 28 March 2018 at Wiluna Remote Community School, in WA, winner of the School Award.

Victorian Gunditjmara scientist and immunologist Dr. Misty Jenkins received the 2017 STEM Professional Career Achievement Award.

National Science Week 11-19 August



“You decide the kind of person you want to be and the legacy you want to leave and how you want to live your life, you go out and make that happen.

I love what I do; I love the joy of discovery, of the research science I think it’s fascinating and certainly that passion I like to share.”

Dr Misty Jenkins.

<http://engagingwomen.com.au/stories/dr-misty-jenkins/>

Gunditjmara scientist Misty Jenkins, spends her days studying microscopic cancer killers. Winner of the 2017 CSIRO Professional Career Achievement Award, Misty Jenkins is killing cancer with white blood cells, and encouraging more Aboriginal students to follow in her footsteps.

As a child, Misty Jenkins, a young Gunditjmara woman from western Victoria, was fascinated by the way the human body works and how it manages to protect itself from infectious diseases yet succumbs to viruses. She later became interested in a career in scientific research after discovering that Aboriginal Australians have some of the poorest health conditions in the world and are susceptible to so many infectious diseases.

Currently Dr Jenkins heads an immunology laboratory at the world-renowned Walter and Eliza Hall Institute of Medical Research in Melbourne and, with her team, is working toward finding a cure for brain cancer.

Immunotherapy, or priming the immune system to kill cancer cells, is one of the most exciting prospects for the treatment of brain cancer, which kills more people under 40 than any other cancer.

There have been no new treatments for brain cancer in 30 years, and the survival rate has barely changed, with just 20 per cent of people diagnosed with the disease still alive five years later.

Dr Jenkins has her sights set firmly on a goal now – to cure brain cancer. An inspiration to all, read more about Dr. Misty Jenkins.

Awarded Gunditjmara scientist aims to beat brain cancer



“I see a lack of Indigenous voices at the table across the industry and I want to see more Aboriginal and Torres Strait Islander people involved,” Dr Jenkins has said.

“It is essential to have an Aboriginal and Torres Strait Islander cultural lens applied to Western Science, just like it is important to have others with diverse backgrounds and genders in senior positions in our workplaces. “This breadth and depth of diversity is what is going to drive innovation.”

A strong promoter of STEM literacy of Aboriginal and Torres Strait Islander students, Misty Jenkins says “By being visible, you are showing students that STEM is a viable career and that you can discover things that have never been discovered before.”



<https://australiascience.tv/indigenous-stem-award-winners-become-role-models-for-communities/>

Bush Foods, Fibre Technologies, Seasons and Mathematics

Buxton Primary School in Victoria's .. is a very small school with only thirteen students. Using the Taungurung Language Program it teaches about Koorie Bush foods, seasons and maths.

Led by Taungurung Linguist Lee Healy with the support of principal Andrew Bagnall, the new program takes a holistic approach to teaching. Students have been learning about bush foods, fire as a resource for land management and farming, and tools, and have developed a pictorial bush food calendar.

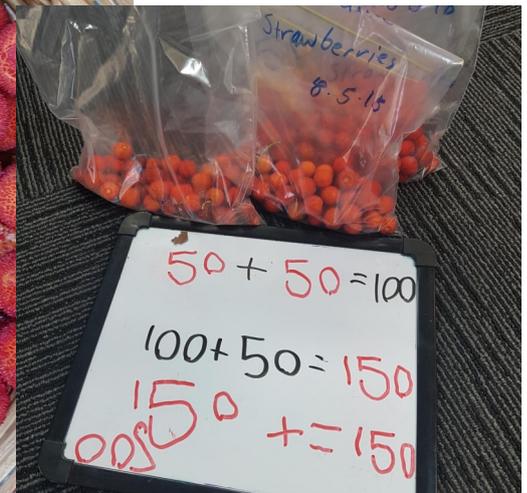
Students have also applied for a grant to purchase bush foods for environmental, health, and native habitat reasons, and they will be presenting their learning to with an opportunity to teaching simple Taungurung commands, vocabulary, and growing practices for various bush food plants which have been historically prominent in that part of the world.

Each class is run outside, on two and a half acres of land the school is revegetating back to native, indigenous flora.

The program is incredibly powerful from a cultural understanding perspective. "The conversations students are engaging in will lead to a deeper respect for, appreciation of, and understanding for the important of protecting and advocating for Indigenous rights" says Buxton Principle Andrew Bagnall.

Do you have a Bush Tucker expert in your region? Learning about bush foods is a great introduction to Australian plant species.

Koorie plants, Koorie people : traditional Aboriginal food, fibre and healing plants of Victoria by Zola and Gott is currently out of print but available in many lending [libraries](#).



(VCDSTC015) Explore how plants and animals are grown for food, clothing and shelter.

(VCDSTC016) Explore how food is selected and prepared for healthy eating.

(VCDSTC025) Investigate food and fibre production used in modern or traditional societies.

(VCDSTC026) Investigate food preparation techniques used in modern or traditional societies.

(VCDSTC036) Investigate the role of food preparation in maintaining good health and the importance of food safety and hygiene.

Gugorrak, native strawberries collected for the Taungurung Language Program at Buxton Primary School.





Maths as Storytelling

MAST is a pedagogical approach developed by Dr Chris Matthews, an Aboriginal mathematician and educator from the Quandamooka Nation (Moreton Bay, Queensland) to explore new ways of teaching algebra to students who are under-achieving. The approach focuses on stories, and explores how symbols and their meanings can communicate these stories. The approach focuses on stories, and explores how symbols and their meanings can communicate these stories.

Through a five-steps Maths as Storytelling process, students explore the meaning of symbols and how symbols can be used to tell and create a story, explore simple equations by acting out a story and identifying its mathematical elements, and create their own symbols to represent the story using concrete materials. They share their symbols with the group (this step gets students used to writing within different symbol systems, and helps develop a standard classroom symbol system), and

EMU Maths

EXTENDING MATHEMATICAL UNDERSTANDING (EMU) is a research-based intervention program developed by Dr Ann Gervasoni of Monash University. EMU has been shown to improve children's knowledge and confidence with mathematics. The program offers intensive learning opportunities for students who are experiencing difficulty in learning mathematics in the early years and beyond. Thornbury Primary School in Melbourne's inner north have been using the program in the early years for a number of years with great success.

Importantly it provides professional learning that offers individual or groups of teachers' expertise and leadership in mathematical learning. Underpinning the program is an accreditation process that ensures that

all involved maintain ongoing learning in this essential curriculum area and have the expertise to deliver professional learning to their colleagues, and work within a whole school approach to improving learning and teaching for all.

THE EMU Maths specialist teacher courses each involve field-based learning and a six day spaced learning program. The field-based learning component involves teachers planning and implementing an EMU Program throughout the year. The six day program involves workshops, data analysis and reviewing video excerpts simulating 'behind-the screen sessions'. Professional interaction, critical reflection, associated discussion and professional reading are important aspects of the program.

For information about dates, venues and registrations see the [EMU page](#).

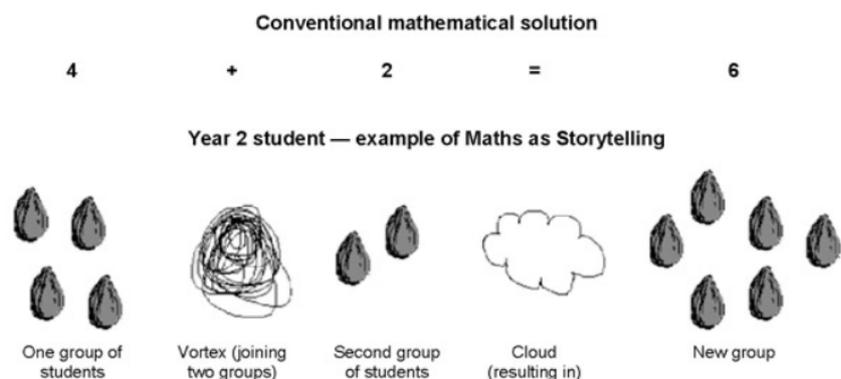
then modify the story (a key step in introducing algebraic ideas) with help from the teacher.

The MAST approach can help students understand more complicated equations, e.g. algebra explains Dr Matthews in [Creating your own symbols: Beginning algebraic thinking with Indigenous students](#). MAST is the first product of the Minjerribah Maths Project which was set up to answer the following questions. Can we improve achievement and retention in Indigenous mathematics by re-focusing mathematics teaching onto the pattern and structure that underlies algebra? In doing this,

are there Indigenous perspectives and knowledges we can use? Can we at the same time provide a positive self-image of Indigenous students?

MAST is an attempt to work from the story-telling world of the Indigenous student through to the formal world of algebra by experiences with the creation of symbols that have personal meaning.

The story telling starts with simple arithmetic but moves quickly to algebraic thinking. It brings enables Indigenous students to bring their everyday world of symbols into mathematics.



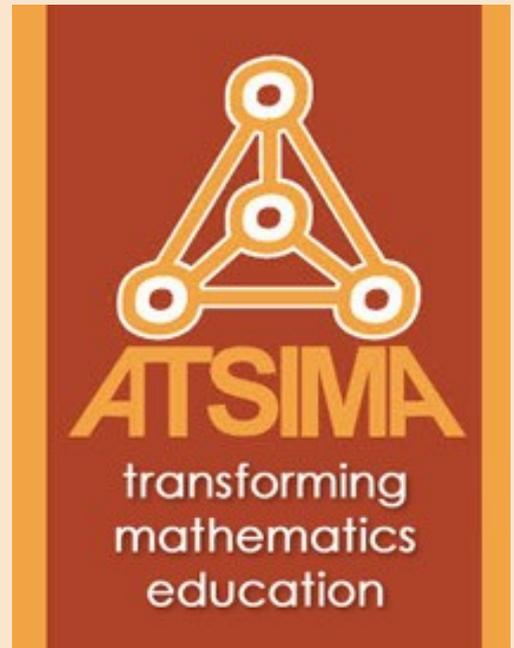
ATSIMA

The Aboriginal and Torres Strait Islander Mathematics Alliance is a national body that seeks to bring together organisations, communities, institutes and individuals with the goal of inspiring, promoting and improving mathematics outcomes of Aboriginal and Torres Strait Islander students.

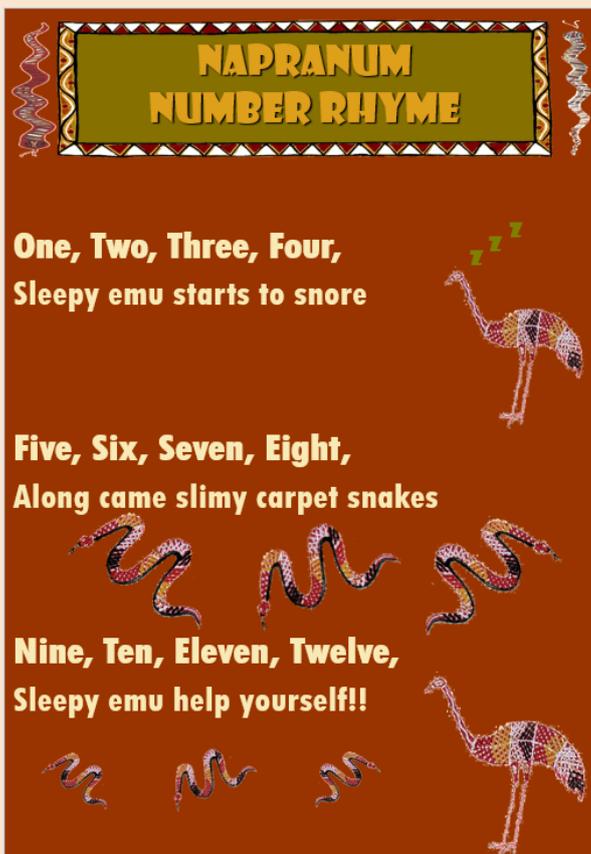
Every two years ATSIMA hosts a National Aboriginal and Torres Strait Islander Mathematics Conference. This year's [National ATSIMA conference](#) is being held from the 10th - 13th July 2018 in Melbourne.

On the question of creating an

Indigenous Mathematics Curriculum, the 2016 ATSIMA conference, held in Wollongong NSW identified the urgent need to develop an Indigenous mathematics curriculum as a step towards supporting Indigenous students' identity in the teaching and learning of mathematics. This call recognises that education and the curriculum is culturally laden, and that it explicitly and implicitly teaches the values and norms of the Western culture. It is envisaged that an Indigenous mathematics curriculum will be the meeting place of these two knowledge systems, where both are valued and connections are celebrated. To facilitate this discussion, the 2018 ATSIMA conference will bring together Indigenous people to discuss Indigenous knowledges and connections with mathematics.



The conference delegates will then have an opportunity to work through ideas for the development of an Indigenous mathematics curriculum.



**NAPRANUM
NUMBER RHYME**

**One, Two, Three, Four,
Sleepy emu starts to snore**

**Five, Six, Seven, Eight,
Along came slimy carpet snakes**

**Nine, Ten, Eleven, Twelve,
Sleepy emu help yourself!!**

Naparanum number rhymes were written by teacher aides, and by parents from the Naparanum community in QLD as part of the Parents as First Teachers (PAFT) project, and ARC Linkage project, Sustainable education capacity building: Empowering teacher aides to enhance rural and remote Indigenous students' numeracy outcomes in 2008.

YuMi Deadly Maths

Naparanum Rhymes and other customised resources can be found on the YuMi Deadly Maths (YDM) website, a unique mathematics pedagogical approach developed to improve teachers' capacity to teach mathematics. YuMi from the Kriol Yumi (you and me) aims for the highest level of mathematics understanding through activity that engages students and involves parents and community.

Originally designed for Aboriginal and Torres Strait Islander students, YuMi Deadly Maths has been successfully applied in a range of teaching programs. With a focus on how to teach, an emphasis on big ideas and connecting mathematics topics, and a special pedagogy that starts and ends with students' reality, it is effective for all students. YDM follows the Australian Curriculum: Mathematics, and fits in with or extends many existing programs and teaching approaches.

YDM is about empowering teachers to go beyond their training and take control of planning and designing their own sequences of mathematics lessons. The approach is unique in its focus on creativity, structure and culture with regard to mathematics and on whole school change with regard to implementation. It never limits the type of mathematics experience the students are to receive and has four components: mathematics, mathematics learning, mathematics teaching, and school–community connections.

Information on YDM is included on the [Teach Learn Share](#) website.



The Story of 1

Is a BBC documentary about the history of numbers, and in particular the number 1, presented by former Monty Python member, Terry Jones.

[The Story of 1](#) looks at early evidence of counting, the use of numbers for simple arithmetic in Sumeria, the development of large numbers and their use for engineering in Egypt, the worship of numbers by Pythagoras and the theoretical mathematics of the Archimedes. It also looks at the use of numbers by the Romans, the development of Arabic numerals in India, the discovery of the number zero, the development of algebra in the Islamic world, the decline of Roman numerals in the west, and the development of the binary system.

From *The Story of 1*, have a look at this short light-hearted [clip](#) about the Walpiri in Central Australia, and how they made do without an extensive counting system. Discuss with your students.

Language no Barrier to Counting

Research done ten years ago suggests children do not need to know the words for numbers in order to be able to count, and that basic mathematical ability is hardwired in the human genome.

The results, published in the journal *Proceedings of the National Academy of Science*, cast doubt on suggestions from other researchers that counting words are needed for children to develop the concepts of numbers above three, according to study co-author Professor Robert Reeve.

That theory says that a vocabulary of counting words is needed for a person to conceptualise numbers above three.

The researchers tested 32 Aboriginal children between the ages of four and seven years old from two communities in the Northern Territory, Australia - one from the Warlpiri language group located on the edge of the Tanami Desert, and another from the Anindilyakwa language group on Gooite Eylandt in the Gulf of Carpentaria.

Both languages have very restricted vocabularies for numbers, limited to words for one, two, few and many.

The team also studied 13 English-speaking Indigenous children in Melbourne.

Reeve, and colleagues from Australia and the United Kingdom, asked the children to perform tasks such as putting down counters to match the number of times two sticks were tapped together.

They found that Warlpiri and Anindilyakwa-speaking children performed equal to or better than English-speaking children on tasks that involved numbers up to nine, despite the fact that they lacked the relevant words for those numbers.

"What you know about numbers isn't just encoded in your language, it's much more than that," Reeve says.

"In our view there are some very basic number competencies that are encoded in the genome in some way."

He says that innate 'number sense' possibly includes the ability to recognise and represent the number of objects in a set, and a basic ability to understand simple addition and subtraction.

Reeve adds that the study also has implications for the way numeracy is taught to very young children.

"Much of our education is currently based on language," he says. "We need to ensure that there is a mapping between these basic concepts and the concepts you're trying to teach."

Article reproduced from [ABC News](#) 19.8.08

Woiwurrung Counting Song

Sung to the tune of 'One little two little three little Koorie boys'

Ganbu	1
Bindjirru	2
Bindjirru ganbu	3
Ganbu	1
Bindjirru	2
Bindjirru ganbu	3
Ganbu	1
Bindjirru	2
Bindjirru ganbu	3
Bindjirru ba bindjirru	4
Marnang!	5

This Woiwurrung Counting song was developed for the Woiwurrung Language Program at Thornbury Primary School. Listen to an extended version by [clicking on the song](#).

- ③ The Western concept of mathematics with which we are all so familiar is by no means the only one
- ③ Many, if not all, ancient cultures developed some sort of mathematical system
- ③ It is important to appreciate and understand the worth and merit of these systems from ancient but often living and evolving cultures as occur in indigenous communities today.
- ③ Ethnomathematics can be more relevant in some communities and cultures than ‘Western’ mathematics
- ③ An understanding of different ethnomathematic systems can enhance our greater understanding of mathematics, so we are not limited by western perspectives alone.



Winner of the 2017 CSIRO Indigenous STEM Professional Award and champion of Aboriginal and Torres Strait Islander STEM participation, Dr Chris Matthews is a Noonucal man from QLD, a mathematician and chair of the Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA).

According to Dr. Matthews, "Maths has always been a multi-cultural discipline and academia recognises that all cultures had different forms of maths, so there's a great opportunity for Aboriginal and Torres Strait Islander people to make their contribution to mathematics." He joins Amy McQuire from Brisbane's Aboriginal Community Radio 98.9fm to talk about why it's important to open up a new conversation about how we teach maths and science to our kids, and how Aboriginal people had our own sophisticated system of mathematics. Listen to the [podcast](#) of their conversation.

Ethnomathematics

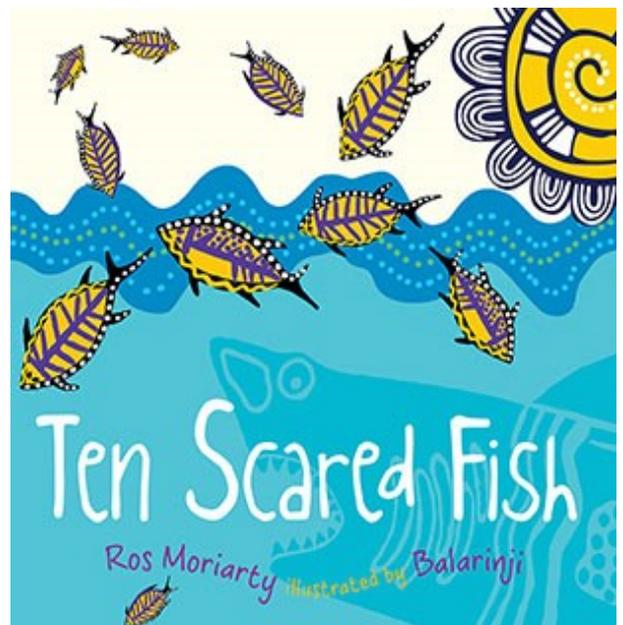
The term ethnomathematics was used in the late 1960s by a Brazilian mathematician, Ubiratan D'Ambrosio, to describe the mathematical practices of identifiable cultural groups.

According to Dr Kay Owens, Lecturer in Australian Teacher Education, some see ethnomathematics as the study of mathematics in different cultures, others as a way of making mathematics more relevant to different cultural or ethnic groups, yet others as a way of understanding the differences between cultures. But perhaps the most powerful claim for the newly recognised discipline has been made by D'Ambrosio himself:

“Mathematics is absolutely integrated with Western civilization, which conquered and dominated the entire world. The only possibility of building up a planetary civilization depends on restoring the dignity of the losers and, together, winners and losers, moving into the new. [Ethnomathematics, then, is] a step towards peace.”

Ubiratan D'Ambrosio, The Chronicle of Higher Education, 2006

Delve deeper by [reading more](#) from Dr. Owens, and exploring the AIATSIS Ethnomathematics in Australia [online collection](#).

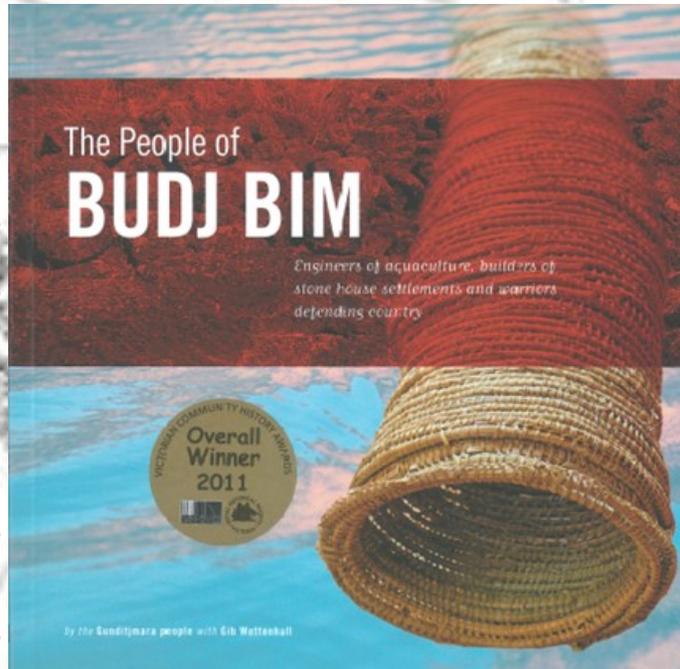


Ten Scared Fish is an animal counting book with a difference. Following the river to the sea, the reader meets and counts the animals until finally ten little fish meet a big scary shark! By Ros Moriarty, author of Listening to Country, and founder of a non-profit organisation, Indi Kindi, supporting pre-literacy education.

World's first engineering project predates Stonehenge

Lake Condah in the Budj Bim world heritage area is one of the world's most ancient examples of traditional aquaculture, dating back at least 6600 years and preceding Stonehenge or the Pyramids of Egypt, consisting of complex systems of traps and ponds engineered by the Gunditjmarra people. Regarded as the world's first engineering project, the extensive and elaborate system of channels and dam walls were used over millennia predominantly for catching short-finned eels for consumption and trade. SBS reported further [here](#).

Gunditjmarra people demonstrated a sophisticated understanding of engineering, physics and aquaculture in the design of elaborate stone fish traps at the 100 sq.km eel farm at Lake Condah in Victoria. They made these fish farms by creating complex systems of canals, linked weirs and ponds out of river stones. Lake Condah shows evidence of a very large, settled community that harvested and smoked eels to trade. Some of the traps are thought to be up to 40,000 years old. They may be some of the oldest surviving human-made structures in the world.



It's disappointing to see Indigenous people underrepresented in engineering. Our ancestors are the original engineers. They have a deep knowledge and understanding of the land and the sky. They used their knowledge to form a lifestyle, innovating to solve everyday problems and live comfortably.

Tamina Pitt, software engineering intern at Google's Sydney office



Watch this clip to see why Budj Bim is a World Heritage site for Gunditjmarra.



World Heritage bid for Budj Bim

The [Budj Bim region](#), formerly known as Mt. Eccles, is listed as a National Heritage Landscape. In January 2017, the Budj Bim region was put on Australia's list for World Heritage nomination to recognise the unique cultural heritage of permanent houses, fishtraps, channels and weirs for growing and harvesting eels created by Gunditjmara people 6600 years ago. World Heritage bodies will be assessing Budj Bim, and then make a listing recommendation to the World Heritage Committee in [mid-2019](#). Australia currently has 19 World Heritage listings, if successful Budj Bim would be the 20th, and the first solely based on Indigenous cultural value and significance.

The Budj Bim Cultural Landscape must be on Australia's World Heritage Tentative list for at least 12 months before the United Nations' World Heritage Committee make a determination on its nomination.

Read more on the Australian Maritime Museum [blog](#), from [ABC News](#) and a comprehensive overview by Ian McNiven on [The Conversation](#).

Research Lake Condah, Budj Bim and traditional eel farming methods and purposes.

if successful Budj Bim would be the 20th, and the first solely based on Indigenous cultural value and significance.



On the opposite side of the world the catching of eels seems to have employed similar trapping methods. These eel traps known as [eel bucks](#) or eel baskets were used on the River Thames in London, England until the 20th Century. Eel was a staple food in London at the time. They bare a remarkable similarity to Victorian Koorie eel traps.

Bridging art and science with eels

From one engineering feat to another, Melbourne's Webb Bridge was designed by artist, Robert Owen in collaboration with Denton Corker Marshall, architects. The design developed out of a desire for a symbolic and poetic demonstration of reconciliation and Indigenous history provided a source of its inspiration.

The bridge is an analogy of Koorie fishing traps and the flow of the river below. The decommissioned rail bridge, symbol of European culture, is reconciled with the natural and Indigenous past. The resulting structure suggests a new link between the old and new, past and future. A pedestrian/cycle bridge crossing the river Yarra within Melbourne Docklands, the scheme is not only a practical solution to the physical site, conditions and program requirements, but also demonstrates a commitment to art and innovative architecture in the development of the precinct. As such, the project addresses aesthetic, historical and symbolic issues as integral components of its design.

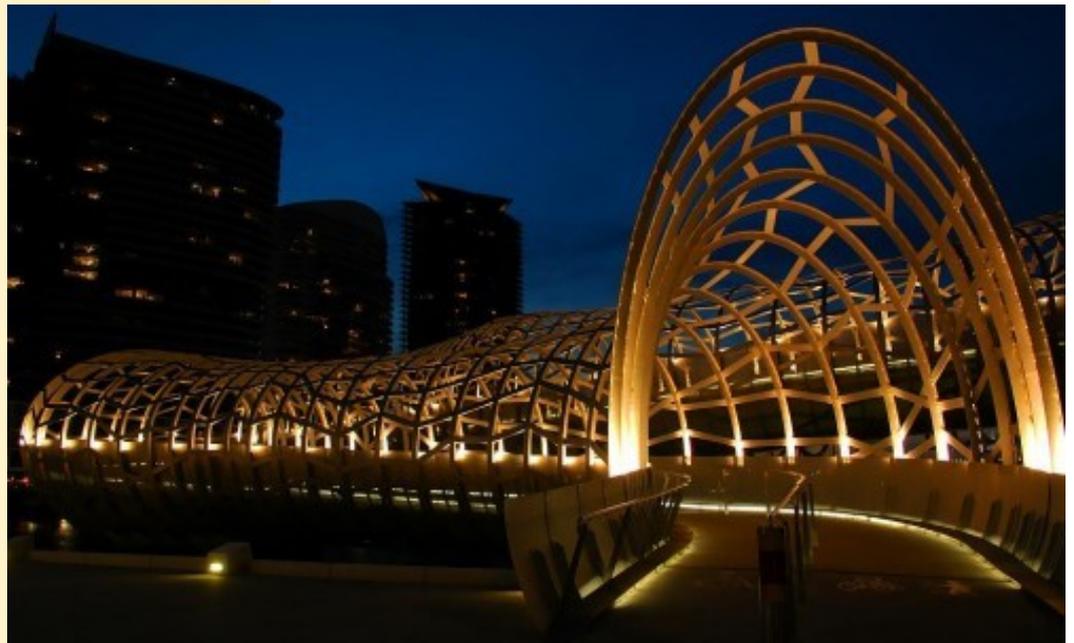
Webb Bridge won the prestigious RIAA Joseph Reed Urban Design Award 2005 and commendation for Urban Design in the National Awards.

Consider the [engineering challenges](#) in the building of Webb Bridge.

[Join this panel](#) of engineers, architects and landscape architects as they discuss the history and future direction of tunneling and bridge building. Produced by the ABC RN program By Design and held during the Australian Science festival in Canberra in 2007. One of the panellists is Webb Bridge co-architect Bill Corker of Denton Corker Marshall, elaborating on art and science coming together, recycling and engineering challenges in building Webb Bridge.

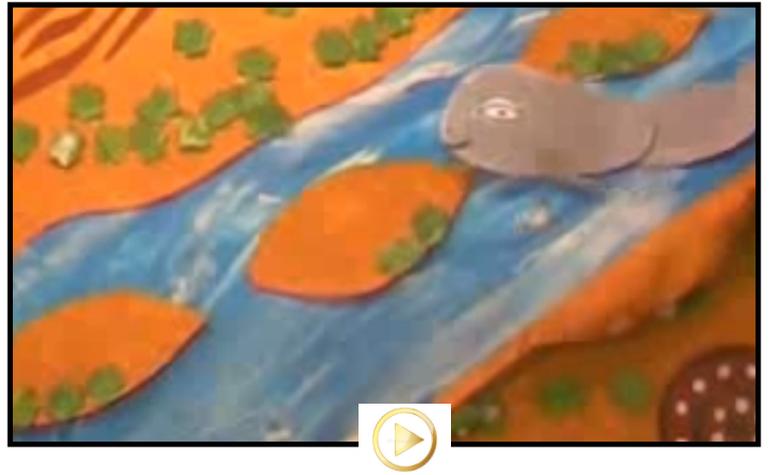
"This bridge is going to be an experience to cross, fun to cross, a pleasure!"

Bill Corker, architect



Eel traps as inspiration for Webb Bridge in Melbourne's Docklands

Intriguing Eels

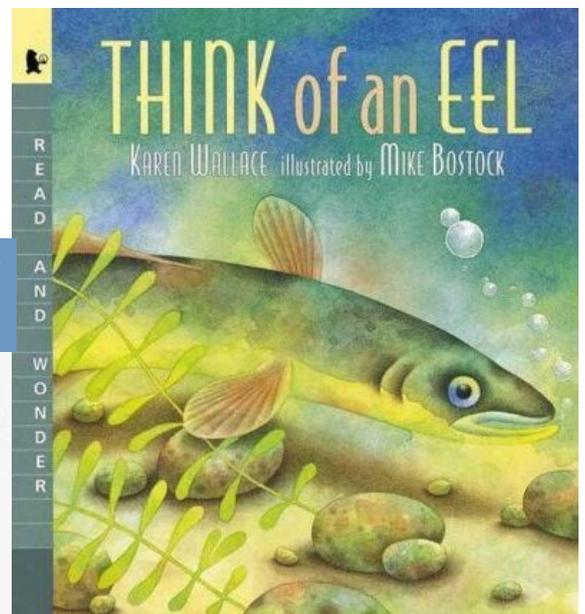


Eels are significant culturally for many reasons beside food and trade. Watch this Dreaming Story from Yamba NSW, about the Giant Eel and the making of the rivers in that region.

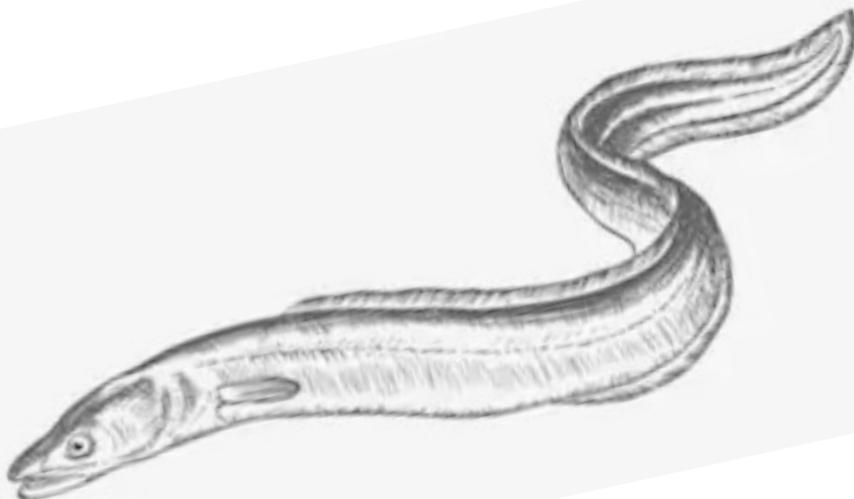
Recreated by the students from Ulmarra Public School in 2009, the story of the Giant Eel was originally shared with the students by local Elder Uncle Ron, and interpreted by the students as a beautiful animation. The Yaegl and Bundjalung people are traditional custodians of the coastal areas around Yamba, Iluka and Maclean.

Keen to know more about eels? Learn about the longfin eels' remarkable journey to their breeding grounds from Sydney's Centennial Parkland ponds out into the Pacific Ocean and all the way to the Coral Sea in this program produced by the ABC's Catalyst.

Download the VCAA Victorian Aboriginal Languages comprehensive [sample unit](#) about Eels, easily modified and adapted for other learning areas.



From across the oceans, and in graceful verse that matches the rhythm of an eel's movement, THINK OF AN EEL relates the little-known lifestyle of a most intriguing fish. Children follow an eel from the day he is born, deep in the Sargasso Sea, to his years spent in the ocean, then join him on a trip up a freshwater river and return with him back to the sea, where he has his offspring. Fluid watercolor illustrations depict the sea and river setting in a story as captivating as it is true.



Victorian Curriculum:

[VCGGK052](#) The Countries/Places that Aboriginal and Torres Strait Islander people belong to in the local area: *Geography Level D: Places and our connections to them.*

[VCGGK068](#) Natural, managed and constructed features of places, their location and how they change

Elaboration: identifying constructed features such as eel traps and exploring activities in local rivers and lakes: *Geography F-2: Places and our connections to them.*

[VCGGK080](#) The many Countries/Places of Aboriginal and Torres Strait Islander peoples throughout Australia, and the custodial responsibility they have for Country/Place, and how this influences views about sustainability: *Geography 3-4: Diversity and significance of places and environments.*

[VCGGK082](#) Types of natural vegetation and the significance of vegetation to the environment, the importance of environments to animals and people, and different views on how they can be protected; the use and management of natural resources and waste, and different views on how to do this sustainably: *Geography 3-4: Diversity and significance of places and environments.*

[VCGGK083](#) Similarities and differences in individuals' and groups' feelings and perceptions about places, and how they influence views about the protection of these places: *Geography 3-4: Diversity and significance of places and environments.*

[VCGGK120](#) Spiritual, cultural and aesthetic value of landscapes and landforms for people, including Aboriginal and Torres Strait Islander peoples, that influence the significance of places, and ways of protecting significant landscapes: *Geography 7-8: Landforms and Landscapes.*

[VCGGK137](#) Land and resource management strategies used by Aboriginal or Torres Strait Islander peoples to achieve food security over time: *Geography 9 – 10: Biomes and food security.*

[VCGGK149](#) Application of environmental economic and social criteria in evaluating management responses to an environmental change, and the predicted outcomes and further consequences of management responses on the environment and places, comparing examples from Australia and at least one other country: *Geography 9 – 10: Environmental change and management.*

[VCHHK078](#) The diversity and longevity of Australia's first peoples and the significant ways Aboriginal and Torres Strait Islander peoples are connected to Country and Place (land, sea, waterways and skies) and the effects on their daily lives: *History 3 – 4: First contacts.*

[VCHHK105](#) How physical or geographical features influenced the development of Aboriginal and Torres Strait Islander peoples' communities, foundational stories and land management practices: *History 7 - 8: Aboriginal and Torres Strait Islander peoples and cultures.*

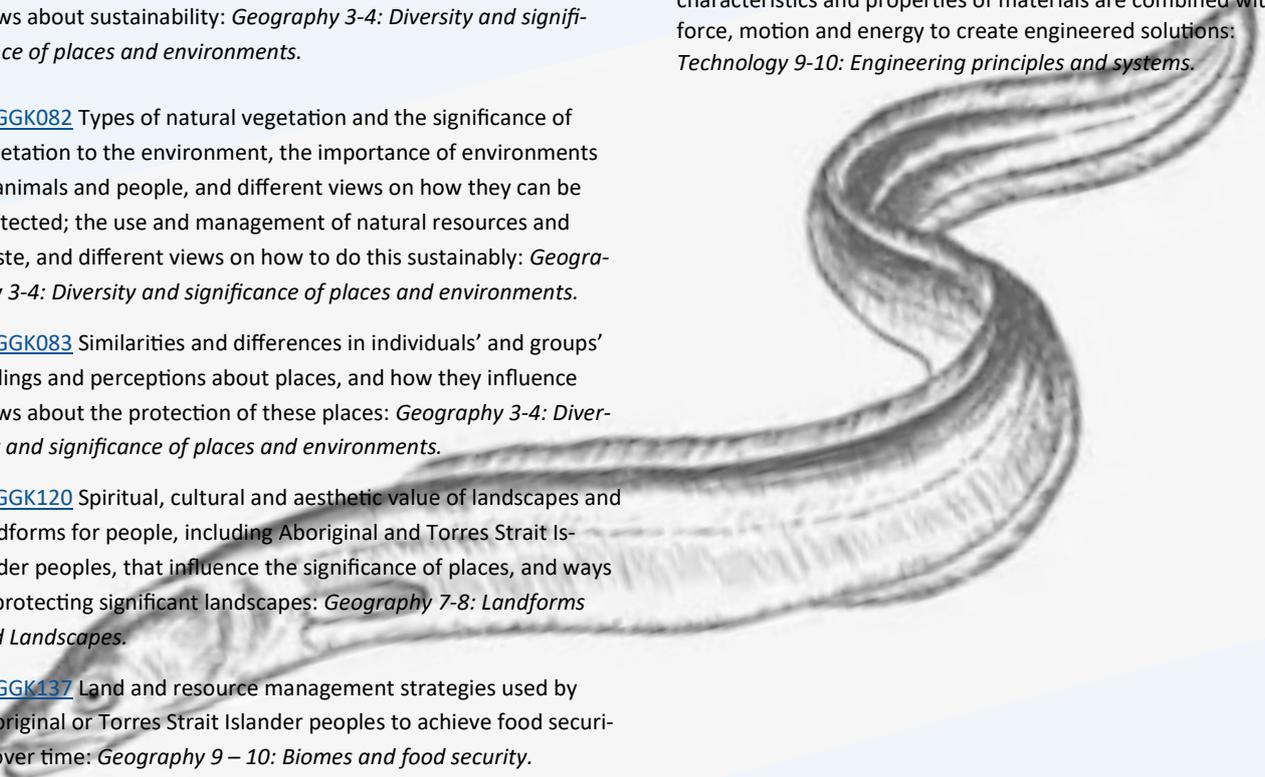
[VCHHK106](#) The significant beliefs, values and practices of Aboriginal and Torres Strait Islander peoples and cultures including trade

with other communities, causes and effects of warfare, and death and funerary customs: *History 7 – 8: Aboriginal and Torres Strait Islander peoples and cultures.*

[VCDSTC024](#) Investigate how forces and the properties of materials affect the behaviour of a designed solution: *Technologies 3 - 4: Engineering principles and systems.*

[CDSTS055](#) Explain how designed solutions evolve with consideration of preferred futures and the impact of emerging technologies on design decisions: *Technology 9-10: Technologies and Society.*

[VCDSTC056](#) Investigate and make judgements on how the characteristics and properties of materials are combined with force, motion and energy to create engineered solutions: *Technology 9-10: Engineering principles and systems.*



Bark Canoes



This is the only remaining 19th-century Aboriginal canoe from the Melbourne region. Scottish immigrant John Buchan collected the canoe in the 1850s from local Aboriginal people camping near his home overlooking the Yarra River at Studley Park.

The site where the Merri Creek joins the Yarra, upstream from Buchan's Kew home, was a traditional camping ground and ceremonial site. The river flats and lagoons of the Yarra River were favoured places for the Wurundjeri people, providing a plentiful supply of fish, eels and birds' eggs. Canoes provided an easy means of travelling through the lagoons and into reed beds.

This canoe carries evidence that it was made after European arrival. There are several sharp cuts in the edge of the bark that have been made by a metal axe. Three types of rope have been used to tie the canoe into shape; two of these are handmade, but the third is machine-made European twine. Most striking are the three metal straps (taken from a wooden barrel) that maintain the canoe's shape; we shall never know if the Wurundjeri makers incorporated the bands into their traditional techniques, or whether Buchan later slipped the bands over the canoe.

Recent analysis shows that the bark comes from Mountain Ash, which grows in the ranges east of Melbourne. This suggests that Wurundjeri steered the canoe 50 or more kilometres down the Yarra, moving through their land. The return journey, later in the season, would have been made by foot, the canoe being left to rot slowly by the river.

*Reprinted with minor changes from Museum Victoria:
<https://museumsvictoria.com.au/treasures/details.aspx?img=4&Path=6&PID=34>*



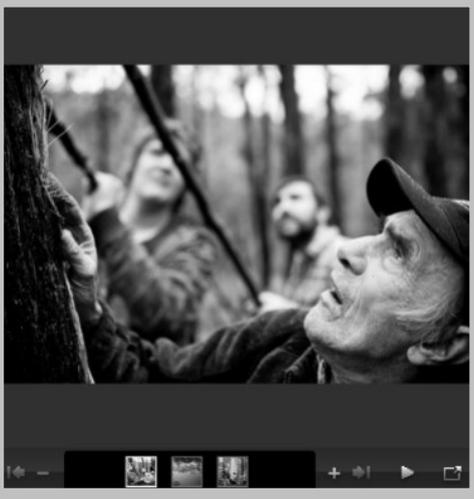
Aboriginal men in canoe, taken at Coranderrk Aboriginal Station (c. 1883) by Fred Kruger (NGV)



The scarred tree at Howitt Park along the Bataluk Cultural Trail in Gippsland, Victoria is a canoe tree and is protected under the Aboriginal Heritage Act 2006. The stand out features are the height and size of the scar on the tree.



MORE VIDEOS



Boorun's Canoe

Boorun was a pelican, the first of the Gunnai/Kurnai people who came to Gippsland. When Boorun first travelled to the area, he carried with him a bark canoe. As he walked, Boorun heard a tapping sound coming from his canoe. At the deep water inlets, Boorun stopped and turning over his canoe he discovered, much to his surprise, that there was a woman in it. She was Tuk, the musk duck and she became his wife and mother of the Gunnai/Kurnai people.

Boorun's Canoe is the title of an Aboriginal cultural arts collaboration by artist Steaphan Paton, his grandfather Uncle Albert Mullet (RIP) and photographic artist Cameron Cope.

The project tells the story of Gunai/Kurnai elder Uncle Albert Mullet as he teaches his grandson Steaphan Paton and other young men in his family how to build a traditional bark canoe. The project captures the canoe's creation through to its successful floating by Steaphan and his family, and in doing so highlights the importance of transferring intergenerational knowledge and the preservation of cultural traditions and pride.

Boorun the Pelican, our Gunai ancestor, came to Gippsland carrying a bark canoe on his head. Canoes are part of our story of who we are and where we come from. I want to respect my ancestors by continuing the tradition of canoe-making and safeguard it for future generations.

Aboriginal Artist Steaphan Paton.

[Watch](#) the video of Uncle Albert Mullett and Gunai community members make a bark canoe. Filmed at Lake Tyers, Victoria by Uncle Sandy Atkinson, c.1993. Consider design and sustainability principles.

[Listen](#) to Steaphan Paton and photographer Cameron Cope talking to the ABC's Richard Stubbs about Boorun's Canoe, and how such a significant project saw the skills of building a bark canoe passed from Gunai/Kurnai Elder Uncle Albert Mullet to his grandsons.

Victorian Curriculum:

[VCDSCD022](#) Sequence steps for making designed solutions: *Design and Technologies f–2: Creating Designed Solutions, Planning and managing*

[VCMMG142](#) Make models of three-dimensional objects and describe key features: *Mathematics Level 3: Measurement and Geometry, Shape.*

[VCSIS051](#) Participate in guided investigations, including making observations using the senses, to explore and answer questions

Elaborations: manipulating objects and materials and making observations of the results: *Science f - 2 : Science Inquiry Skills, Planning and conducting*

[VCSIS107](#) Identify questions, problems and claims that can be investigated scientifically and make predictions based on scientific knowledge.

Elaborations: recognising that the solution of some questions and problems may require consideration of social, cultural, economic or moral factors in addition to results from scientific investigation: *Science 7 - 8 : Science Inquiry Skills, Questioning and predicting.*

[VCDSTS013](#) Identify how people create familiar designed solutions and consider sustainability to meet personal and local community needs: *Technologies, Design and Technologies f–2: Technologies and Society.*

[VCDSTC017](#) Explore the characteristics and properties of materials and components that are used to create designed solutions: *Technologies, Design and Technologies f– 2: Technologies Contexts, Materials and technologies specialisations.*

[VCDSCD019](#) Visualise, generate, and communicate design ideas through describing, drawing and modelling: *Technologies, Design and Technologies f– 2: Creating Designed Solutions*

[VCDSCD021](#) Use personal preferences to evaluate the success of design ideas, processes and solutions including their care for environment: *Technologies, Design and Technologies f– 2: Creating Designed Solutions*

[VCDSTC024](#) Investigate how forces and the properties of materials affect the behaviour of a designed solution: *Technologies 3 - 4: Engineering principles and systems.*

[VCDSCD030](#) Select and use materials, components, tools and equipment using safe work practices to produce designed solutions *Technologies, Design and Technologies 3– 4: Creating Designed Solutions, Producing.*

[VCDSCD038](#) Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions *Technologies, Design and Technologies 5 - 6: Creating Designed Solutions, Investigating.*

[VCDSCD040](#) Apply safe procedures when using a variety of materials, components, tools, equipment and techniques to produce designed solutions: *Technologies, Design and Technologies 5 - 6: Creating Designed Solutions, Producing.*

[VCDSTS054](#) Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved: *Technologies, Design and Technologies 9–10: Technologies and Society.*

[CDSTS055](#) Explain how designed solutions evolve with consideration of preferred futures and the impact of emerging technologies on design decisions: *Technology 9-10: Technologies and Society.*

[VCDSTC056](#) Investigate and make judgements on how the characteristics and properties of materials are combined with force, motion and energy to create engineered solutions: *Technology 9-10: Engineering principles and systems.*

[VCGGK052](#) The Countries/Places that Aboriginal and Torres Strait Islander people belong to in the local area: *Geography Level D: Places and our*

connections to them.

[VCGGK068](#) Natural, managed and constructed features of places, their location and how they change

[VCGGK080](#) The many Countries/Places of Aboriginal and Torres Strait Islander peoples throughout Australia, and the custodial responsibility they have for Country/Place, and how this influences views about sustainability: *Geography 3-4: Diversity and significance of places and environments.*

[VCGGK082](#) Types of natural vegetation and the significance of vegetation to the environment, the importance of environments to animals and people, and different views on how they can be protected; the use and management of natural resources and waste, and different views on how to do this sustainably: *Geography 3-4: Diversity and significance of places and environments.*

[VCGGK083](#) Similarities and differences in individuals' and groups' feelings and perceptions about places, and how they influence views about the protection of these places: *Geography 3-4: Diversity and significance of places and environments.*

[VCGGK120](#) Spiritual, cultural and aesthetic value of landscapes and landforms for people, including Aboriginal and Torres Strait Islander peoples, that influence the significance of places, and ways of protecting significant landscapes: *Geography 7-8: Landforms and Landscapes.*

[VCGGK137](#) Land and resource management strategies used by Aboriginal or Torres Strait Islander peoples to achieve food security over time: *Geography 9 – 10: Biomes and food security.*

[VCGGK149](#) Application of environmental economic and social criteria in evaluating management responses to an environmental change, and the predicted outcomes and further consequences of management responses on the environment and places, comparing examples from Australia and at least one other country: *Geography 9 – 10: Environmental change and management.*

[VCHHK078](#) The diversity and longevity of Australia's first peoples and the significant ways Aboriginal and Torres Strait Islander peoples are connected to Country and Place (land, sea, waterways and skies) and the effects on their daily lives: *History 3 – 4: First contacts.*

[VCHHK105](#) How physical or geographical features influenced the development of Aboriginal and Torres Strait Islander peoples' communities, foundational stories and land management practices: *History 7 - 8: Aboriginal and Torres Strait Islander peoples and cultures.*

[VCHHK106](#) The significant beliefs, values and practices of Aboriginal and Torres Strait Islander peoples and cultures including trade with other communities, causes and effects of warfare, and death and funerary customs: *History 7 – 8: Aboriginal and Torres Strait Islander peoples and cultures.*

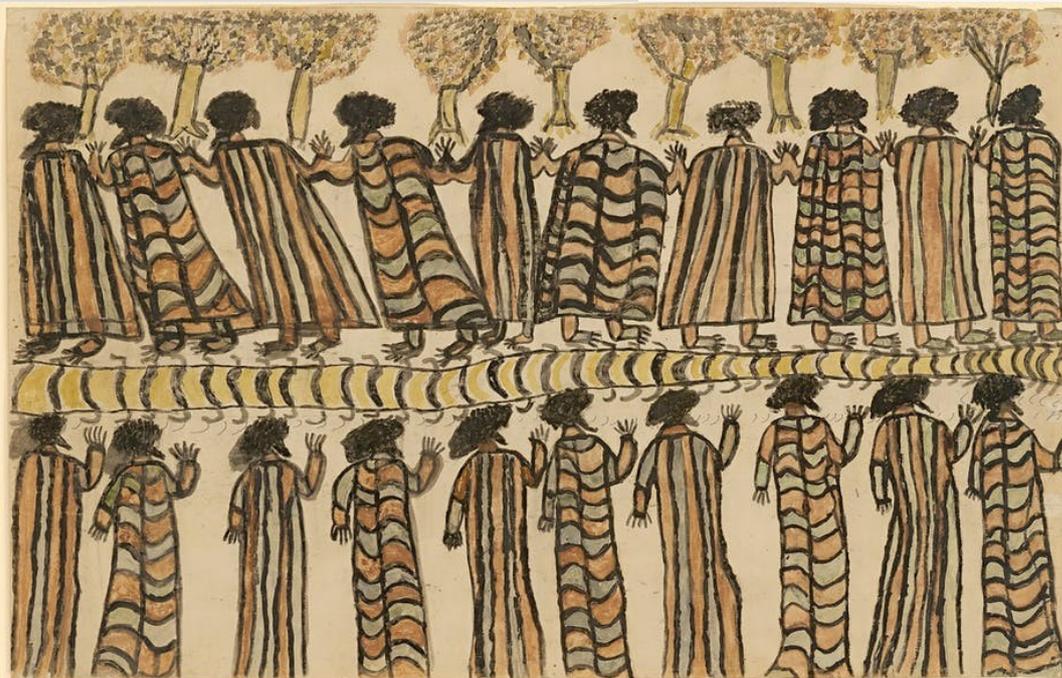
If paperbark is available, follow Thornbury Primary School's lead and make model canoes with your students based on the design principles of bark canoe making. Here students model Wurundjeri gurrong.



Once an everyday item for Koories in south-eastern Australia, possum skin cloaks were worn for warmth, used as baby carriers, coverings at night, drums in ceremony and for burial. Incised and painted with ochre, possum skin cloaks also mapped the identity of their owner, holding stories of clan and Country.

Today, possum skin cloaks are of continuing importance to Aboriginal people across the south-east of Australia, with new uses and contemporary ways of making. Check out the AIATSIS Possum Skin cloak online exhibition.

<https://aiatsis.gov.au/exhibitions/possum-skin-cloak>



William Barak's Figures in possum skin cloaks 1898. See <https://cv.vic.gov.au/stories/aboriginal-culture/contemporary-artists-honour-barak/barak-figures-in-possum-skin-cloaks/>

Wrapped in Culture – Exploring Identity Through Possum Skin Cloaks



This documentary follows the journey of Aboriginal children in Melbourne as they learn about the southeast Australian Aboriginal cultural practice of creating possum skin cloaks. The children created two cloaks through a series of workshops under the guidance of Kirrae Wurrong/Gunditjmara artist Vicki Couzens, Wiradjari and Yorta Yorta Elder Aunty Esther Kirby and Maree Clarke. Hear the children talk about what they learnt and what the project meant to them as we follow them over the five months it took to complete the

Koori artists Vicki Couzens, Lee Darroch, Maree Clarke and Treaehna Hamm began a movement of reclaiming the practice of possum skin cloak-making as a contemporary design practice in 1999. Prior to this Wergaia/Wamba Wamba artist Kelly Koumalatsos had also begun making cloaks in the 1990s.

This has resulted in new cloaks being made for the first time in more than 150 years. Today we see possum skin cloaks worn in Welcome to Country ceremonies, lectures, performances and in parliament. In this video Yorta Yorta artist Lee Darroch demonstrates how to sew the possum skins together to make a cloak. (As possums are protected in Australia, pelts are imported from New Zealand, where possums are considered a pest.)

<http://www.abc.net.au/news/2016-07-04/naidoc-week-possum-cloaks-key-to-cultural-revival/7567254>



Continuing the practice of making and wearing possum skin cloaks has strengthened cultural identity and spiritual healing in Aboriginal communities across Victoria.

Embodying 5,000 years of tradition, cultural knowledge and ritual, wearing a possum skin cloak can be an emotional experience.

In this story published online by Culture Victoria, eight Victorian Elders pictured on Country and at home in cloaks that they either made or wore at the 2006 Melbourne Commonwealth Games Opening Ceremony talk about the significance of the cloaks in their lives, explain the meanings of some of the designs and motifs, and reflect on how the cloaks reinforce cultural identity and empower upcoming generations.

Due to the fragility of possum skin cloaks, and because Aboriginal people were often buried with them, there are few original cloaks remaining. A Gunditjmarra cloak from Lake Condah and a Yorta Yorta cloak from Maiden's Punt, Echuca, are held in Museum Victoria's collection. Reproductions of these cloaks are held at the National Museum of Australia.



Mick Harding was the lead artist in the making of the Taungurung possum skin cloak. His country is in Central Victoria and extends from the upper reaches of the Goulburn River to Kilmore in the west, Mount Beauty in the east up to Benalla in the north. They are river people.

Click here to watch [Interview: Taungurung Elder Mick Harding](#).



Kooramook yakeen: possum dreaming

"Culture is the framework through which we connect to our Country, our Belonging. It defines and makes us who we are. Our language, stories, songs, dance, artefacts, cultural knowledge and practices demonstrate our continuing connections. Land, language and identity are fundamental to our Being. To know who you are, and where you come from, is to know your Place."

In this [essay](#), Kirrae Wurrong/Gunditjmara artist Vicki Couzens describes the importance of cloaks for spiritual healing in Aboriginal communities and in ceremony in mainstream society.



Victorian Curriculum:

[VCSSU044](#) Objects are made of materials that have observable properties: *Science f—2 : Science understanding, Chemical sciences.*

[VCSSU045](#) Everyday materials can be physically changed or combined with other materials in a variety of ways for particular purposes: *Science f—2 : Science understanding, Chemical sciences.*

[VCDSTS013](#) Identify how people create familiar designed solutions and consider sustainability to meet personal and local community needs: *Technologies, Design and Technologies f—2 : Technologies and Society.*

[VCDSTC015](#) Explore how plants and animals are grown for food, clothing and shelter: *Technologies, Design and Technologies f—2 : Technologies Contexts, Food and fibre production.*

[VCDSTC017](#) Explore the characteristics and properties of materials and components that are used to create designed solutions: *Technologies, Design and Technologies f—2 : Technologies Contexts, Materials and technologies specialisations.*

[VCDSCD021](#) Use personal preferences to evaluate the success of design ideas, processes and solutions including their care for environment: *Technologies, Design and Technologies f—2 : Creating Designed Solutions.*

[VCDSCD030](#) Select and use materials, components, tools and equipment using safe work practices to produce designed solutions *Technologies, Design and Technologies 3–4: Creating Designed Solutions, Producing.*

[VCDSCD038](#) Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions: *Technologies, Design and Technologies 5 - 6: Creating Designed Solutions, Investigating.*

[VCDSCD040](#) Apply safe procedures when using a variety of materials, components, tools, equipment and techniques to produce designed solutions: *Technologies, Design and Technologies 5 - 6: Creating Designed Solutions, Producing.*

[VCDSCD041](#) Negotiate criteria for success that include consideration of environmental and social sustainability to evaluate design ideas, processes and solutions: *Design and Technologies 5—6: Creating Designed Solutions, Evaluating.*

[VCDSTS054](#) Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved.

Elaborations: evaluating design and technology professions and their contributions to society locally, nationally, regionally and globally, for example Aboriginal designers collaborating with international craftspeople for local enterprises: *Technologies, Design and Technologies 9—10: Technologies and Society.*

[VCHHK089](#) The nature of convict or colonial presence, including the factors that influenced changing patterns of development, how the environment changed, and aspects of the daily life of the inhabitants, including Aboriginal and Torres Strait Islander peoples: *History 5—6: Historical Knowledge, The Australian colonies.*

[VCHHK106](#) The significant beliefs, values and practices of Aboriginal and Torres Strait Islander peoples and cultures including trade with other communities, causes and effects of warfare, and death and funerary customs: *History 7 - 8 : Historical Knowledge, Aboriginal and Torres Strait Islander peoples and cultures.*



“The inspiration for this painting came from an old postcard of Lake Tyers which my mother had in her collection. I have painted a different picture - the grey mission blanket has been replaced by a traditional possum skin” says Yorta Yorta artist Jenny Murray-Jones of her painting Possum Skin Cloak. Select her painting to read more about it in Culture Victoria's [Meerreeng-an Here Is My Country](#).

The original painting is held at the Koorie Heritage Trust, Melbourne.



Young student at Wooragee Primary School learning about possum skin coats (djnabi) in her Dhudhuroa Language class. Photo courtesy of Bec Crawley.



And a final word ...

We are always seeking to improve our resources and to make them useful, relevant and highly readable. We invite you to email through suggestions including how you as educators incorporate Aboriginal perspectives, especially Victorian ones in your teaching and curriculum.

This STEM feature and previous *Koorie Perspectives in Curriculum Bulletins* and briefs are available on the [VAEAI website](http://vaeai.org.au).

Produced by the Victorian Aboriginal Education Association Incorporated (VAEAI), 2018.

Any enquiries, feedback and suggestions are welcomed, by contacting VAEAI on (03) 94810800 or emailing vaso@vaeai.org.au.

For more Koorie Perspectives, see the VAEAI [Koorie Education Calendar](#).



Boorun's Canoe, Gippsland