First Nations Australian fishing traps/nets

Year level: Years 7-10

(please note students must be 13 years or older to use Oculus Quest)

This lesson plan is inspired by the content in the free CSER Maths in Schools Professional Learning Maths Online Course for Year 7-10 (See Practice and Pedagogies Module, Culturally Responsive Maths Pedagogy section) developed in consultation with ATSIMA. Enrol to find our more information at: https://www.mathematicshub.edu.au/MathsInSchoolsPL

We would like to thank the Australian Government Department of Education for funding the Maths in Schools Professional Learning Program and the CSER Lending Library Program.

Gunditjmara eel traps

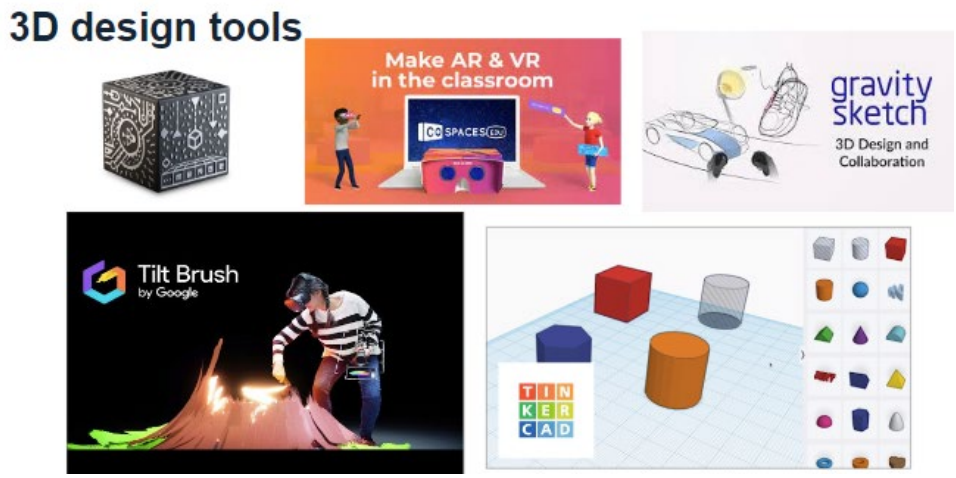
Image: Eel traps by Yvonne Koolmatrie (collection.maas.museum/object/134236)

Summary

In this lesson, students investigate First Nations Australian fish nets and use virtual reality to design and create their own interpretation or representation. The lesson includes:

- exploring fish nets to identify shapes and nets and their purpose
- investigating objects and technologies of First Nations Australians, analysing, and connecting surface area and volume, and exploring their relationship to capacity.

Students work in groups to explore a variety of fish traps and nets and then design and plan their own nets which they create using a 3D design tool.



This lesson example uses OpenBrush which is powered by Google's Tiltbrush application. OpenBrush is a VR experience that enables users to create and design in a 3D immersive environment with a VR headset. If you do not have VR headsets you can replicate this lesson using other 3D design tools, such as Minecraft, Gravity Sketch, TinkerCAD or others. We like tools such as OpenBrush and Gravity sketch as it allows students to create their own artefacts rather than being limited by a selection of 3D shapes.

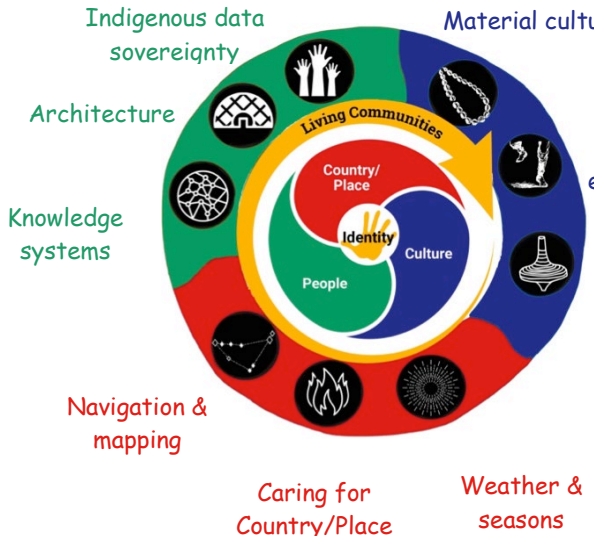
Note to teachers

- The term *fish traps* can often refer to both fish traps and fish nets and used interchangeably. As a guide, 'Fish traps or weirs are human-made structures, generally constructed from stone, that are positioned in an inter-tidal area' (ACARA, 2022). Fish nets are generally woven items which is the term used in this lesson.
- Use the notes at the bottom of the slides which provide cultural knowledge and questions for students.
- This lesson resource can be used and further developed for one or more lessons, for example, a double maths lesson.
- Slide 13 provides an image from *The First Inventors* SBS series. This video can be viewed in two ways:
    - If you have access to ClickView, you can show Story 1: Budj Bim Aquaculture from Episode 1 or
    - The full episode which features Budj Bim aquaculture is available from SBS on Demand.
- To prepare for the lesson and gain a deeper understanding of the context and the mathematics involved, see Maths in Schools online course for:
    - teacher background information
    - lesson ideas

Australian Curriculum: Aboriginal and Torres Strait Islander Histories and Cultures cross-curriculum priority

This lesson is based on the **Material Culture** rich context that connects to the key concept *Culture* in the Aboriginal and Torres Strait Islander Histories and Cultures cross-curriculum priority in the Australian Curriculum through the following organising ideas:

A_TSIC1: First Nations Australian societies are diverse and have distinct cultural expressions such as language, customs and beliefs. As First Nations Peoples of Australia, they have the right to maintain, control, protect and develop their cultural expressions, while also maintaining the right to control, protect and develop culture as Indigenous Cultural and Intellectual Property.



A_TSIC2: First Nations Australians' ways of life reflect unique ways of being, knowing, thinking and doing.

Australian Curriculum: Mathematics

Curriculum content that can be covered based on the context explored in this lesson, or extensions of this lesson, includes:

- describe the relationship between π and the features of circles including the circumference, radius and diameter AC9M7M03
  - ⇒ *investigating the applications and significance of circles in everyday life of First Nations Australians such as in basketry, symbols and architecture, recognising the relationships between the centre, radius, diameter and circumference*
- solve problems involving the circumference and area of a circle using formulas and appropriate units AC9M8M03
  - ⇒ *exploring traditional weaving designs by First Nations Australians and investigating the significance and use of circles*

- solve problems involving the volume and surface area of right prisms and cylinders using appropriate units AC9M9M01
    - ⇒ *investigating objects and technologies of First Nations Australians, analysing and connecting surface area and volume, and exploring their relationship to their capacity*

Connecting with Community

Learning opportunities can be further contextualised and deepened through a process of connecting with local Aboriginal and Torres Strait Islander Elders and Communities, and their knowledges and languages. **Acknowledging**, **consulting**, and **collaborating** with Community provides opportunities for two-way learning that is essential for creating, implementing, and evaluating resources, teaching and learning strategies, and curriculum content. All students benefit.

Required Resources

- CSER Slide deck: First Nations Australian fish nets and traps
- Student handout (see p. 11)
- Equipment: VR Headsets such as Oculus Quest with the OpenBrush (or TiltBrush) App downloaded onto the headset. https://openbrush.app/
- Access to Wi-Fi.
- Range of materials such as pencils and paper for sketching

Suggested steps

The following three parts are suggested steps to implement the lesson/s:

- **Part 1 – Fish traps and nets** involves an exploration of the rich context of Material Culture through First Nations Australians' fish traps and nets
- **Part 2 – Using VR** explores the use of VR
- **Part 3 – Design and create** provides the opportunity for students to design and create their own interpretation and representation of a fish trap using VR.

Part 1: First traps and nets

Step	Slide	Activity
1.	**Slides 1-3**	Introduce to students the topic, acknowledge Country/Place, and Warning slide
2.	**Slide 4**	Introduce students to the focus of the lesson ie First Nations Australian fish nets and that it in the maths curriculum and that through this context, they will be able to learn about some of the related maths situations that can be found in the maths curriculum.

3.	**Slide 5**	Let students know that they have a handout that they will use to think about some questions during the lesson. This first of these is, 'What do you already know about fishing nets and traps?' This handout could also be used to assess student learning.
4.	**Slide 6**	Follow up with Slide 10 and what students would like to learn about fishing nets and traps.
5.	**Slide 7**	Introduce and discuss with students the different types of fish traps and observable features eg: the use of circles, centre, radius, diameter and circumference, surface area, volume, and capacity
6.	**Slide 8**	View video link in slide (external link): https://nga.gov.au/on-demand/maker-unknown-jawun-bicornual-basket/
7.	**Slide 9-10**	View further examples of fish traps and how they are made.
8.	**Slide 11**	Consider the maths involved.
9.	**Slide 12**	This slide shows a grab from The First Inventors, Series 1, Episode 1 which could be viewed in full (47min). Discuss with students the features ie the weir wall, water channel and basket trap. What are their observations eg how does the intended use of the fishing trap/basket trap affect its design? Discuss: • How are circles used or applied in design of the fish traps? • How does the intended use of the fish trap impact on its design? • How can your design and making of a fish trap (your prototype) through the different mediums help to improve your design?

Part 2: Using VR

10.	Slide 13-14	Experiment in OpenBrush. It is recommended that students are exposed to the OpenBrush environment prior to engaging in an activity brief so they understand the environment and the possibilities. Provide a short amount of time each (e.g. 5 mins) for students to explore the various colours and paintbrush textures by drawing and decorating their name.

The amount of time you allow for design and creation in the next session can be dependent on how much time you have in your lesson or classroom. We have put the minimum time we have used with a group of students but

you could extend this to be 30 minutes design and 1hour create or undertaken as a series of lessons for students to research, design and create.

Part 3: design and create

11.	Slide 15	Let students know that they're now going to design their own fishing traps using a Rapid design challenge in 10 minutes based on the process outlined on the slide
12.	Slide 16	Tell students when they are sketching their design, to think about: • What are you catching? (Barramundi? Crab? Eel?) • What material is it made from? • What does it look like? • How does it make sure fish won't escape? • How big is the trap? • How many fish can it hold? Start timer on slide – 10mins.
13.	Slide 17	Students share their creations. Discuss: • What are the common structures, design elements across the different structures built? • How are they similar/different? • What shapes and objects are used? What skills did you apply? What maths is involved? What are the common elements across the different structures built?
14.	Slide 18	Students complete the last section of the handout ie what they have learned about First Nations Australian fishing nets eg: • What did you learn? • What shapes and objects are used? • What skills did you apply? • What maths is involved?

Saving and sharing work: OpenBrush is working on updates to its app. If the ability to save work is not possible, use another tablet/smartphone to record or take photos of a 'cast' of the VR creation. Students collaboratively prepare a presentation or record a video presentation that describes their original artwork inspiration in detail (artist, techniques used, era, etc) and their new VR design motivation and underpinning concept. Students also explain their collaborative design process and the digital materials used to achieve their goal. Students reflect on the success of their VR artwork in line with their design goals.

Why is this relevant?

Learning mathematics, History and Science through the context of First Nations Australian material culture – fishing nets - supports students to:

- ⇒ Deepen their relationship with Country/Place and the natural environment
- ⇒ Explore First Nations Australians perspectives and develop understanding of First Nations' cultures
- ⇒ Value Aboriginal and Torres Strait Islander peoples' cultures and traditions
- ⇒ Consider sustainability
- ⇒ Use cutting edge technology to interpret and represent First Nations Australian architecture.

Students learn about how Virtual Reality (VR) and other new technologies are transforming and providing new opportunities to consider technologies that have been developed and used over 1,000s of years. This lesson demonstrates cutting-edge practices in harnessing digital technologies for various design processes across creative industries

In this activity, students are engaging the core concepts of Computational Thinking and Design Thinking skills to deconstruct First Nations Australians' fish nets and design and create their own interpretation. Students are using design documents, project management, teamwork and planning in order to build their VR creation.

Assessment

Use students' creations and the table (see Handout) with student questions/answers to monitor and assess learning.

For this activity, students collaboratively prepare an oral presentation or video presentation and viewing of their completed VR artwork. In their presentation, ask students to address specifics such as their:

- ∉ A title for the creation
- ∉ Description of 3D art materials used
- ∉ Process of 3D art techniques used
- ∉ Process of the technical design and development, including collaboration process
- ∉ Photos or recorded evidence of casting
- ∉ Any identified challenges and how they were resolved

Students can be provided with feedback from peers and the teacher. As well as a self-evaluation. Students should address, not only the art development but also the technical design and development.

Checklist	**Yes/No/Partially**	**Comments**
Students describe applied techniques and processes when making their VR creation/representation.		
Students demonstrate project planning processes (in the form of sketches and		

documents) for the design and development of their creation/representation.		
Students explain how the design of their creation/representation, particularly with the use of VR, enhances meaning for an audience.		
Students explain the purpose of their creation/representation and the motivation behind it and use of materials to support their intention.		
Students demonstrate effective collaboration skills, including teamwork and co-management of the project.		

For further advice, examples and support around assessment please visit the Digital Technologies Hub at digitaltechnologieshub.edu.au/teachers/assessment.

Curriculum links

Links with the Australian Curriculum: Digital Technologies| Processes and production skills - Generating and designing

Year band	Learning area	Content description
Years 7-8	Digital Technologies	select and use a range of digital tools efficiently and responsibly to share content online, and plan and manage individual and collaborative agile projects (AC9TDI8P12)
Years 9-10	Digital Technologies	select and use a range of digital tools efficiently, including unfamiliar features, to create, locate and communicate content, consistently applying common conventions (AC9TDI8P11)

Links with the Australian Curriculum: Design and Technologies

Year band	Learning area	Content description
Years 7-8	Design and Technologies	Use project management processes when working individually and collaboratively to coordinate production of designed solutions (ACTDEP039)
Years 9-10	Design and Technologies	Develop project plans using digital technologies to plan and manage projects individually and collaboratively taking into consideration time, cost, risk and production processes (ACTDEP052)
Years 9-10	Design and Technologies	apply innovation and enterprise skills to generate, test, iterate and communicate design ideas, processes and solutions, including using digital tools (AC9TDE10P02)

Links with Australian Curriculum: Science

Year band	Strand	Content description
Year 7	Science as a human endeavour	investigate how cultural perspectives and world views influence the development of scientific knowledge (AC9S7H02) ⇒ investigating how First Nations Australians have developed sustainable harvesting practices and cultural protocols based on deep ecological understandings
Year 10	Science Inquiry: Communicating	write and create texts to communicate ideas, findings and arguments effectively for identified purposes and audiences, including selection of appropriate content, language and text features, using digital tools as appropriate (AC9S10I08)

Links with Australian Curriculum: History

Year band	Strand	Content description
Year 7	Knowledge and understanding: Deep time history of Australia	the technological achievements of early First Nations Australians, and how these developed in different places and contributed to daily life, and land and water source management (AC9HH7K05) ⇒ exploring aquaculture practices developed by early First Nations Australians, such as eel traps of the Gundtitmara People at Budj Bim, Victoria, the mollusc harvesting of the Kombumerri People of the Gold Coast, Queensland, and stone fish traps used by the Ngemba People at Brewarrina, New South Wales

Further reading and resources for teachers

1. Teacher Background Information about First Nations Australian architecture can be found on the Year 7-10 Maths in Schools online course at: Material culture
2. Maclean, K., Bark, R. H., Moggridge, B., Jackson, S., & Pollino, C. (2012). Ngemba water values and interests: Ngemba Old Mission Billabong and Brewarrina Aboriginal fish traps (Baiame's Nguunhu). Australia: Commonwealth Scientific and Industrial Research Organisation.
   Retrieved from https://publications.csiro.au/rpr/download?pid=csiro:EP127320&dsid=DS1
3. ACARA Australian Curriculum: Science Teacher Background Information, p. 56, https://www.australiancurriculum.edu.au/media/5157/ccp-tbi-7-10.pdf
4. First Footprints episode 4 *25:00-28:30* https://www.youtube.com/watch?v=VbtWCwtRikQ
5. https://www.smh.com.au/national/secrets-of-the-stones-20030313-gdgf3f.html
6. https://aboriginallivinglanguages.sa.gov.au/lesson/lesson-nine-weaving/
7. https://indigenousknowledge.unimelb.edu.au/curriculum/resources/weaving-design-into-local-materials
8. NGA.gov.au https://nga.gov.au/on-demand/this-place-artist-series-yvonne-koolmatrie/
9. Kurri Winth-amaldi (Murray Cod: River Creator) of the Ngarrindjeri people – Weaving https://www.youtube.com/watch?v=AfxACpTbjSc
10. https://www.youtube.com/watch?v=m2cGW0GSYjk
11. https://aiatsis.gov.au/explore/fishing
12. https://www.sbs.com.au/sites/sbs.com.au.home/files/first_inventors_2023_ep_1_story_1.pdf

Author: Dr Caty Morris

This resource has been funded by the Australian Government Department of Education.

Handout: First Nations Australian Fish nets

What I already know about First Nations Australian fish nets?	What I want to learn about First Nations Australian fish nets?	What have I learned about First Nations Australian fish nets?