

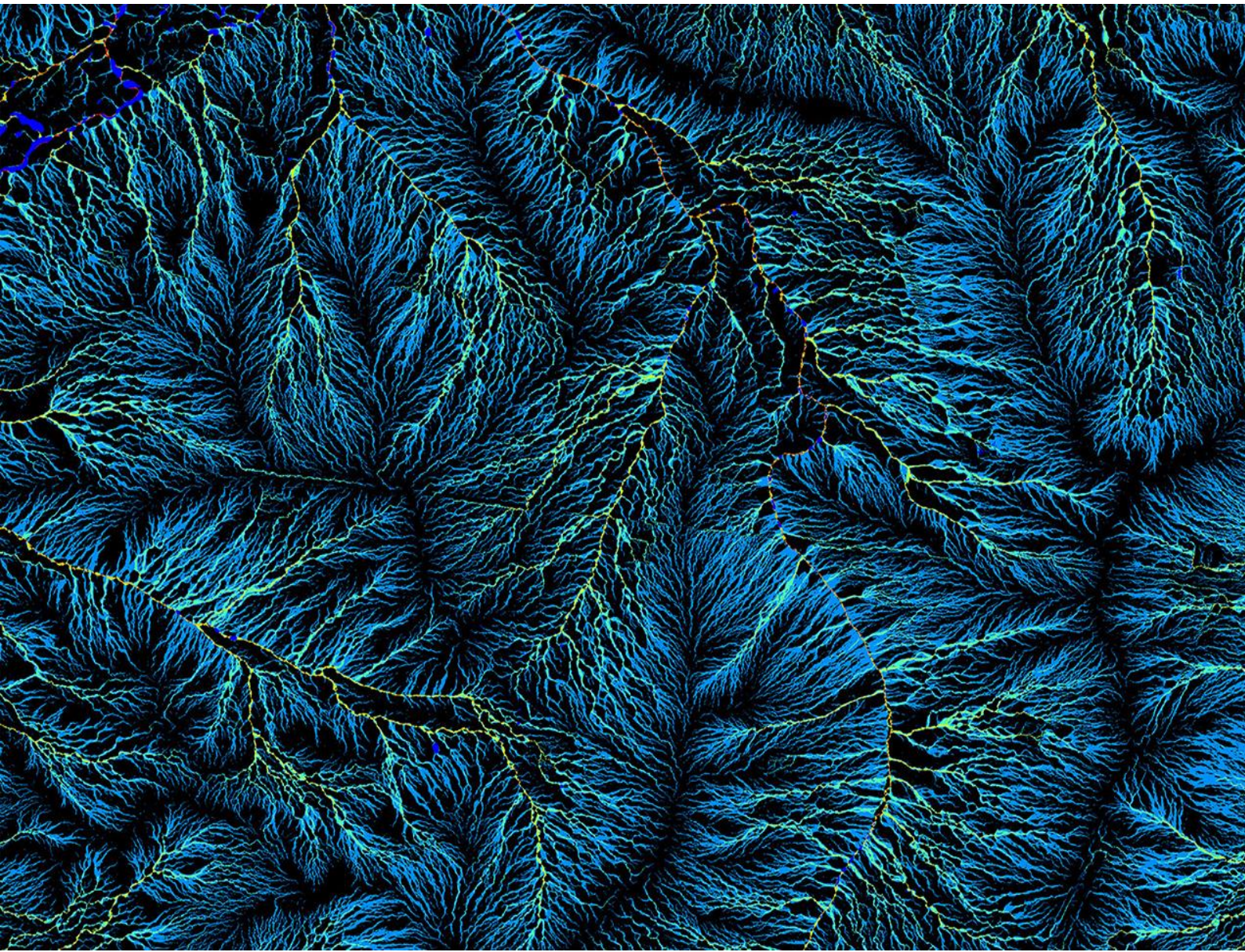


# Deadly in Generation STEM Insights 2025

## Generation STEM

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## Deadly in Generation STEM 2025 Snapshot of Findings

“This program is a great way to break down the fear some non-Aboriginal teachers have of involving culture into the curriculum. It’s a good first step to build confidence.” — Educator

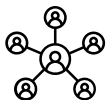
### Program strengths



Educator professional learning sessions increased educator confidence to teach with a Traditional Indigenous context.



Students reported stronger cultural pride, new STEM interests and deeper connections to Country following participation in STEM camps.



Elders, Knowledge Holders and camp leaders created culturally safe, intergenerational learning spaces for students during STEM camps.



STEM camps boosted students’ wellbeing, resilience and peer networks.

### Program challenges



Program delivery learnings highlighted challenges around camps, including recruiting students, managing student behaviour, scheduling and competing priorities for camp leaders prior to camp.



Resourcing to develop educational tools and provide support that responds to the diverse needs of educators teaching STEM with a Traditional Indigenous context.

### MEL improvements



Learnings from this project will support an improved application of the Ngaa-bi-nya evaluation framework for future monitoring, evaluation and learning activities.

“I noticed my sense of culture increased a lot after doing the camp. I had a lot more respect for my culture, looking at it in more of a modern society way, looking at Aboriginal culture and going, ‘how do we actually use this already in modern society’, nobody really talks about it until you come to these [camps].” - Student

# Table of Contents

<b>Deadly in Generation STEM 2025 Snapshot of Findings</b>	<b>1</b>
<b>Table of Contents</b>	<b>2</b>
<b>Executive Summary</b>	<b>3</b>
<b>Glossary</b>	<b>6</b>
<b>Introduction</b>	<b>7</b>
<b>Program description</b>	<b>8</b>
<b>Methodology</b>	<b>9</b>
<b>Summary of findings</b>	<b>13</b>
<b>Detailed findings and discussion</b>	<b>17</b>
<i>Findings related to educator professional learning</i>	17
Satisfaction	17
Value of professional learning modules	17
Educator capability	18
<i>Findings related to STEM camps</i>	21
Landscape	21
Resources	23
Ways of Working	26
Learnings	31
<b>Continuous improvement considerations</b>	<b>41</b>
<i>Educator professional learning – with a Traditional Knowledge context</i>	41
<i>STEM camps for Aboriginal and/or Torres Strait Islander students</i>	42
Practices to continue	42
Practical considerations for running STEM camp activities	42
<b>Conclusion</b>	<b>43</b>
<b>References</b>	<b>44</b>
<b>Appendix 1</b>	<b>0</b>
<b>Appendix 2</b>	<b>0</b>
<i>STEM Camp data tools</i>	0
<i>Educator Professional Learning data tools</i>	3
<b>Appendix 3</b>	<b>6</b>
<i>Camp leaders and supervisors: Knowledge Circle for sharing and decision making (program practice -not an evaluation tool)</i>	6

# Executive Summary

Deadly in Generation STEM (the program) is part of the 10-year Generation STEM initiative (2018–2028), funded by the NSW Government and delivered by CSIRO, to attract, support and retain more NSW students in STEM education and employment pathways. The program is currently delivered in two NSW regions: Kamilaroi Country (Moree - Narrabri) and Dharawal Country (Illawarra)<sup>1</sup> and delivers educator professional learning (PL) to primary and secondary educators; and holds two STEM camps for Aboriginal and/or Torres Strait Islander<sup>2</sup> students (years 8 – 10) each year (See Appendix 1 for the impact pathway).

This report provides an analysis of progress towards the program’s outcomes achieved in 2025, incorporating evidence from all program participants, including educators, students, and adult camp contributors (Elders, Traditional Knowledge Holders<sup>3</sup>, STEM professionals, and community leaders)<sup>4</sup>. The report was delivered by a non-Indigenous evaluator from the CSIRO Impact and Evaluation team, working closely with the Deadly in Generation STEM program team and Aboriginal camp leaders to apply a strengths-based and reflexive evaluation methodology. In 2025, the Ngaa-bi-nya evaluation framework (Williams, M., 2018) was applied to this program evaluation for the first time, focusing on a single subcomponent of the evaluation: the analysis and reporting of data collected for the STEM camps. A significant number of direct quotes were included to more fully and directly represent the views of Aboriginal and/or Torres Strait Islander program participants.

This report found that progress was observed against program outcomes for key program participants: students and educators. In addition to this and building on insights from 2024, outcome evidence emerged, related to strengthening the leadership capabilities and pathways of camp leaders. This report captures these expected and emerging learnings: (See Appendix 2 for full list of data collection tools):

## **Educator professional learning sessions**

In 2025, the program demonstrated strong progress toward its educator professional learning (PL) outcomes, significantly improving educators’ capability and confidence to deliver STEM learning within Traditional Indigenous Knowledges contexts. Satisfaction levels were high, with 96 per cent of

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<sup>1</sup> these two regions were selected because they are NSW STEM Activation Precincts, with high growth in STEM industries.

<sup>2</sup> CSIRO uses the preferred terminology of Aboriginal and Torres Strait Islander people (individual/person) or Peoples (distinct societies). Where appropriate the term Indigenous is also applied throughout this document and used respectfully in reference to Aboriginal and Torres Strait Islander people, programs and initiatives.

<sup>3</sup> These participants identified as Knowledge Holders rather than Elders, explaining that they had not been formally initiated into the role of Elder.

<sup>4</sup> Ethics approval for this evaluation project was granted by CSIRO’s Social and Interdisciplinary Science Human Research Ethics Committee (CSSHREC)

surveyed educators reporting they were very or extremely satisfied with the session. The most valued components of the PL included: linking Indigenous Knowledges to the curriculum; learning about cultural considerations in classroom practice; and planning investigation-based projects.

Educators reported capability improvements across key areas—teaching with traditional context, implementing investigation lessons, and using investigation-based learning methods—indicating meaningful skill development. The learning environment was described as supportive and thought-provoking, helping educators reflect on what Two-way Science education meant for their students and school. Many educators intended to embed Indigenous perspectives more confidently and respectfully, drawing on cultural context models and hands-on STEM resources provided during the session.

Opportunities for strengthening future PL centred on expanding hands-on, practical components and streamlining resource materials to better support implementation in lower primary settings and the new science curriculum.

### **STEM camps for Aboriginal and/or Torres Strait Islander students**

The program delivered two STEM camps in 2025, supporting Aboriginal and/or Torres Strait Islander students (Years 8–10) to explore STEM pathways while strengthening cultural identity and community connection. Students reported the greatest changes in their **awareness of Indigenous STEM knowledges and different STEM subjects**, with additional increases in interest in cultural activities and future STEM careers.

#### **Landscape**

Local community contexts strongly shaped camp design and delivery. While some challenges existed, recruiting students through schools, partnerships with Aboriginal Education Officers, local networks and families helped increase participation. Contributors—including Elders, Knowledge Holders and local organisations—shared cultural knowledge that students deeply valued, often helping them reconnect with family history or strengthen cultural pride. Continuous improvement processes ensured camp structure and ways of working were responsive to community priorities and participant feedback.

#### **Resources**

The program drew on human, cultural and community resources. Strong networks enabled effective coordination of Elders, Knowledge Holders, educators, STEM professionals and community organisations. These contributors offered diverse expertise and culturally grounded support. Staff highlighted the intensive preparation required to deliver the camps, training and mentoring for new camp leaders were ongoing needs, with behavioural management and cultural leadership identified as priority skill areas. Structured monitoring and evaluation processes included building on the

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strengths of Indigenous camp leaders to lead the collection of student evaluation data while on camp and contributed to overall improvements in the model design.

### **Ways of working**

Camps were grounded in culturally safe, intergenerational, and trauma-informed practices. Camp leaders modelled respect, teamwork and positive behaviours while building trust through co-learning and culturally responsive communication. Students benefited from a wellbeing focus, including grounding activities on Country, flexible pacing and structured support as they stepped outside their comfort zones. High-expectations relationships encouraged students to rise to challenges while maintaining a safe, relational learning environment.

### **Learnings**

The program fostered strong relationships, cultural knowledge sharing and leadership capability across students, camp leaders, contributors and staff. Returning camp leaders played a key role in building stability and modelling leadership for new leaders. Students strengthened their cultural identity, language knowledge and sense of belonging, while forming new friendships and networks. Many students described stepping outside their comfort zones, feeling more confident to try new activities, and recognising how STEM connects to culture, Country and future career aspirations. These insights, supported by the Ngaa-bi-nya evaluation framework, contributed to continuous improvement and strengthened the evidence base for culturally grounded STEM education.

# Glossary

**Comp contributor.** Any adult external to CSIRO that contributed to (led or co-facilitated) camp activities, including Elders, Knowledge Holders, community leaders, STEM professionals.

**Camp leaders.** Aboriginal STEM tertiary students or early career professionals who delivered camp activities and mentored students.

**CSIRO program staff/camp supervisors.** A CSIRO Education and Outreach staff member, who was involved in the delivery of a STEM Camp. Includes Aboriginal and/or Torres Strait Islander staff and non-Indigenous staff.

**Elder.** A person who is respected by their community for permissions and advice and is open to sharing their own experiences and stories.

**Inquiry-based learning** (also referred to in this report as investigation-based learning). An education approach focused on investigation and problem-solving, prioritising critical and creative thinking to solve problems and promote foundational STEM skills.

**Knowledge Circle.** An Aboriginal and Torres Strait Islander cultural practice of collaboratively and respectfully sharing knowledge through storytelling and dialogue. Participants are considered equal and contribute to the collective understanding and knowledge system.

**Knowledge Holder.** An Aboriginal community member who holds and teaches cultural knowledge.

**Research yarn.** Applying a yarning circle approach for the explicit purpose of research<sup>5</sup>

**Student/camp participant.** The Aboriginal and/or Torres Strait Islander young people who attended a program camp (high school students in Years 8 to 10).

**Student ambassadors.** Years 10 to 12 students who attended camps in previous years and assisted with camp activities in 2024. This role was not extended into 2025.

**Two-way Science.** An approach that integrates Western science and Indigenous Knowledges and perspectives.

**Yarning Circle.** An Aboriginal and Torres Strait Islander cultural practice of gathering in a circle to share stories, knowledge and experiences in a safe, respectful and inclusive environment.

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<sup>5</sup> Bessarab, D., and Ng'andu, B., 2010 informed this method.

# Introduction

The *Deadly in Generation STEM Insights Report 2025* presents an analysis of the program's progress across its educator professional learning and STEM camp activities delivered on Dharawal (Illawarra) and Kamilaroi Countries (Moree-Narrabri). The report draws on surveys, interviews and research yarns with students, educators, camp leaders, Elders, Knowledge Holders and community organisations to understand how the program supported Aboriginal and/or Torres Strait Islander students to strengthen their cultural identity and explore local STEM pathways. Guided by the Ngaa-bi-nya evaluation framework and delivered through a strengths-based, collaborative methodology, this evaluation highlights the importance of place-based design, community leadership and culturally grounded approaches. The findings contributed to continuous improvement of the program and provided insights into how Deadly in Generation STEM supported meaningful learning, wellbeing and connection for young people, their families and their communities.

CSIRO acknowledges the time, knowledge and expertise contributed by Aboriginal and/or Torres Strait Islander staff and camp leaders to guide the evaluation data collection and implementation as well as qualitative data collection such as facilitation of student research yarning circles.

# Program description

Deadly in Generation STEM (the program) is part of the 10-year Generation STEM initiative (2018 – 2028), funded by the NSW Government and delivered by CSIRO, to attract, support and retain more NSW students in STEM education and employment pathways. The program is delivered in two NSW regions: Kamilaroi Country (Moree - Narrabri) and Dharawal Country (Illawarra) in response to anticipated workforce demands in high-growth industries such as advanced manufacturing, agribusiness, and information and communications technologies.

The program takes a community-driven approach to prioritise and deliver activities, drawing connections between Indigenous STEM knowledges and local STEM industries. This is delivered through two distinct program components:

1. Educator Professional Learning (K–12): supporting culturally responsive STEM learning by linking curriculum to Indigenous Knowledges and local Aboriginal and/or Torres Strait Islander community.
2. High school STEM camps (Years 8–10): strengthening cultural pride, community relationships and knowledge of local STEM opportunities.

In 2025, the program met its planned reach and piloted an additional Professional Learning session in the Tweed Coast:

- 48 educators attended PL in Illawarra and Moree-Narrabri regions
- 11 educators attended a pilot PL session in Tweed Coast
- 24 educators attended an end-of-year reflection and planning session
- 33 students attended two regional STEM camps
- 3 returning and 5 new camp leaders supported delivery
- 32 camp contributors delivered or co-facilitated camp activities.

In response to evaluation findings, the 2025 program included changes such as extending one of the camps to 5-days (from 4 days); a reduction in the number of activities delivered during the camp to allow for deeper student learning and reflection. The camp leader model was strengthened to include more camp leaders per camp, and a capability building/mentoring approach for new camp leaders.

# Methodology

This evaluation used a mixed-methods, strengths-based design to understand the outcomes and experiences of participants. The methodology prioritised culturally safe approaches, place-based engagement and the inclusion of Aboriginal and/or Torres Strait Islander voices. Evidence was collected from students, educators, Elders, Knowledge Holders, camp leaders, STEM professionals, other camp contributors and CSIRO program staff. See appendix 1 for full details of the data collection tools.

## **Application of the Ngaa-bi-nya evaluation framework**

This report provided an opportunity for the CSIRO Education and Outreach Impact and Evaluation team to incorporate the Ngaa-bi-nya evaluation framework into an evaluation project for the first time. Developed by Wiradjuri scholar Dr Megan Williams (2018), Ngaa-bi-nya means to examine, try and evaluate in the language of the Wiradjuri peoples of central New South Wales. (Grant and Rudder, 7:2010, in Williams, M, 2018)

The framework supports culturally grounded evaluation by examining four domains: Landscape, Resources, Ways of Working and Learnings. These domains help evaluate programs in the context of First Nations histories, relationships, cultural strengths and community-driven priorities. These domains are explained below and depicted in Figure 1 (taken from Williams, M., 2018):

1. Landscape: the context and system within with the program operates and signifies the whole-of-life perspective of education
2. Resources: human, material and non-material resources, including in-kind and informal economies and relationships that offer social capital
3. Ways of working: the types of activities, relationships, frameworks, principles and accountability mechanisms that support program delivery. Reflects a culturally safe, holistic educational practice.
4. Learnings: insights gained and participant learnings and changes. Assesses the extent to which the program objectives were met. Learnings relate to movement of ideas, actions, purpose and ways of being and relating.

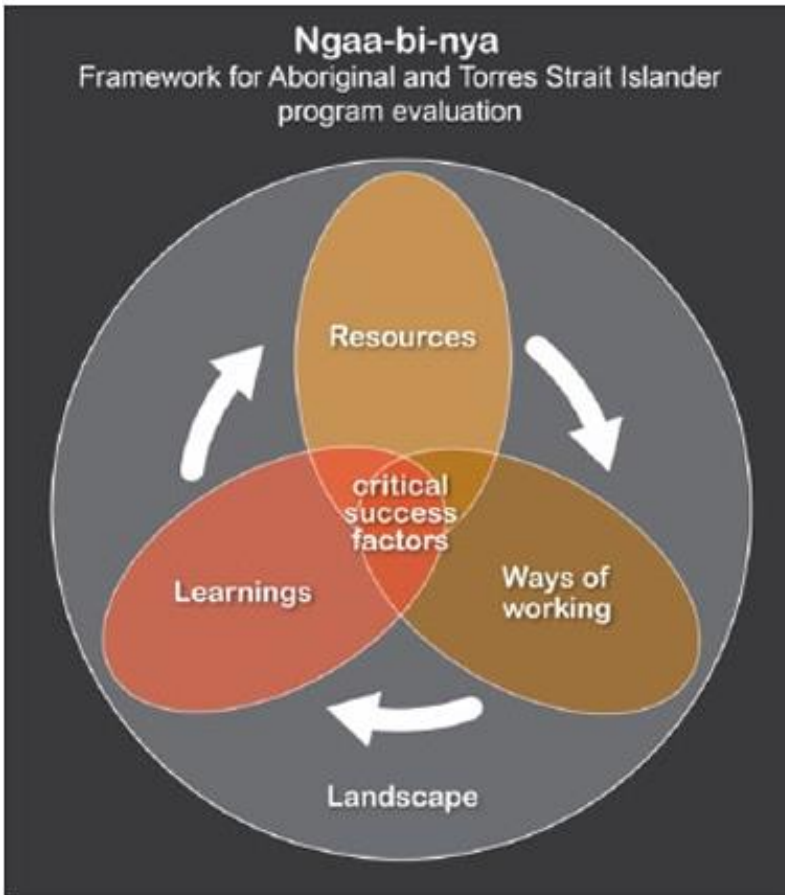


Figure 1 A visual representation of the Ngaa-bi-nya evaluation framework

For this project, the framework was retrospectively applied over the existing methodology and used to analyse and report on evidence related to STEM camp activities only. Qualitative data was analysed within the framework of the Ngaa-bi-nya domains to answer evaluation questions addressing the following:

- whether the program is achieving its stated objectives
- what parts are working effectively and what could be improved
- changes people are experiencing and/or observing because of their engagement with the program.

### Approach to data collection

A combination of quantitative and qualitative methods was used to capture a comprehensive view of participant experiences:

- **Post-program surveys** were administered to students on the last day of camp. Surveys captured self-reported changes in knowledge, confidence, cultural connection and interest in STEM pathways.

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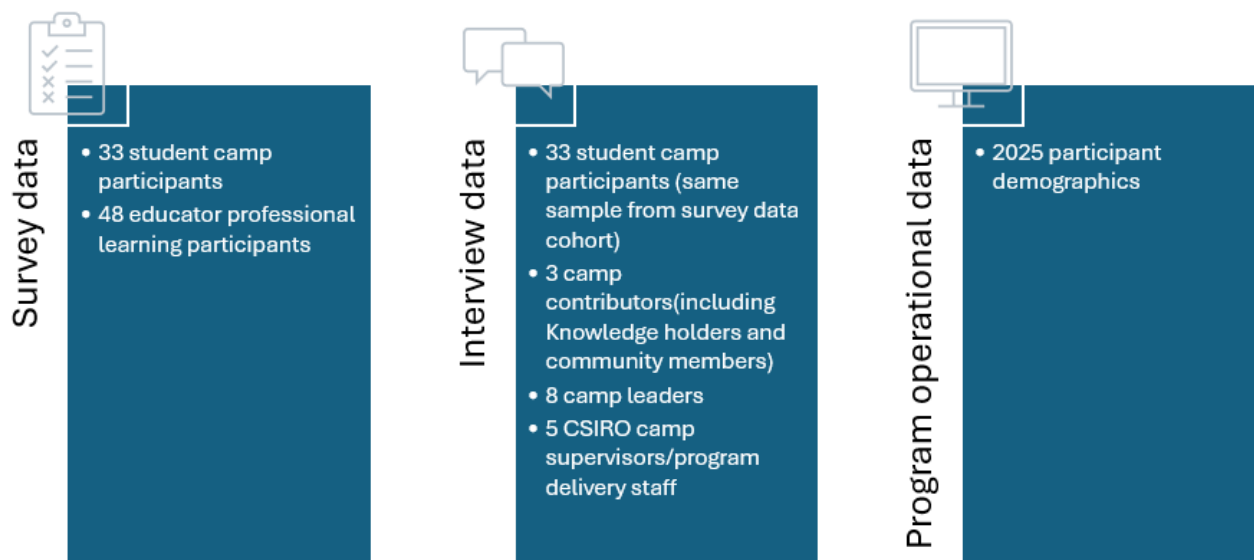
- **Research yarns with students** were facilitated by Aboriginal camp leaders, supported by the embedded evaluator. Yarning was used as a culturally safe method to gather stories, reflections and insights.
- **Informal interviews** with Elders, Knowledge Holders, camp contributors, camp leaders and CSIRO staff occurred throughout the camps and in the days immediately following. These discussions explored perspectives on program quality, cultural safety, student outcomes and ways of working.
- **Observation and reflective field notes** were collected during the camp to support the interpretation of evidence but not incorporated into the analysis.
- **Professional learning (PL) surveys** captured educator satisfaction, capability changes and planned implementation actions.

All data collection activities were voluntary, and participants were reminded they could skip questions or withdraw from the process at any time.

### Sampling and participation

All program participants were invited to participate in the evaluation during or immediately after their involvement. High participation rates were achieved because evaluation activities were embedded into the camp schedule and PL sessions.

In 2025, the evaluation sample included<sup>6</sup>:



<sup>6</sup> Due to a survey implementation error, demographic data was not recorded for most educator professional learning survey respondents; however, across the sample of camp participants, 88 per cent identified as being of Aboriginal and/or Torres Strait Islander descent.

## Data analysis

Survey data was analysed using descriptive and exploratory techniques to identify patterns and changes before and after participation. Qualitative data—including interviews, and yarns was analysed through a combined deductive and inductive approach:

1. **Deductive coding** aligned evidence to the four Ngaa-bi-nya domains.
2. **Inductive coding** was used to identify emerging themes, repeating ideas and participant-led insights.
3. **Minimal interpretation and extensive direct quotation** were used to amplify participant voices and honour their perspectives.
4. **Review of findings** occurred with camp leaders and program staff to ensure interpretations and reporting were appropriate and accurately represented participant experiences.

## Ethics

The evaluation was delivered by a non-Indigenous evaluator working closely with Indigenous and non-Indigenous program staff and camp leaders. Cultural protocols, relational accountability and reflexive practice underpinned evaluation activities. Culturally safe methods - including yarning circles, relationship-centred interviewing - were used where possible. Privacy and confidentiality requirements were followed in line with CSIRO ethics processes.

## Limitations

Several limitations influenced the evaluation findings:

- The methodology was not designed to attribute outcomes solely to the program, but to identify short term participant-reported changes and areas for improvement.
- Survey design limitations, including missing demographic data for some educator respondents, reduced the ability to analyse sub-group differences.
- The retrospective application of the Ngaa-bi-nya framework meant it was incorporated during analysis rather than planning. Future evaluations aim to embed the framework earlier.

## Strengths of the Methodology

Despite these limitations, the methodology provided a rich evidence base. Embedded evaluation activities enabled high participation rates, and the use of research yarning facilitated deep insights that may not have emerged through conventional methods. The process also strengthened the capability of camp leaders and staff to participate in culturally responsive MEL practices, contributing to the sustainability of the evaluation model.

## Summary of findings

The findings in this report (similar to the Generation STEM 2019-22 Evaluation Report<sup>7</sup> and Deadly in Generation STEM Insights Report 2023<sup>8</sup>; 2024<sup>9</sup>) are formative in nature and correspond to the program's evolution (specifically the STEM camps) in 2025, including emerging outcomes, and continuous improvement learnings.

### **Educator professional learning sessions**

In 2025, the program made significant progress towards its educator professional learning outcomes, improving the capability and capacity of educators to deliver STEM with Traditional Indigenous Knowledges contexts. In 2025, 96 per cent of survey respondents (n=48) were very (42 per cent) or extremely (54 per cent) satisfied with the session. Two educators were moderately satisfied.

Educators' top three most valued elements of the session were:

1. linking Indigenous Knowledges to the curriculum
2. learning about cultural considerations in the classroom
3. planning the investigation project for the classroom.

Educators self-reported their capability improvements in the following areas (from most to least significant amount of improvement):

1. teaching with traditional context
2. implementing an investigation lesson with my class
3. investigation based learning methods.

Overall, the learning was described as supportive, thought provoking, and clear, prompting reflection on what Two-way Science<sup>10</sup> education meant for their students and school while providing practical tools to take immediate action. Educators reported strong intentions to apply their learnings by embedding Indigenous perspectives more confidently and respectfully within their teaching programs and using the cultural context models introduced during the session. Many planned to incorporate the hands-on-on STEM activities and practical demonstrations directly into their classrooms, utilising the resources provided, which were seen as reducing time demands for teachers.

Educators identified several opportunities to strengthen future professional learning sessions. A common theme was more hands-on, practical experiences, including additional experiments, and

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<sup>7</sup> Banks, Chris; Miller, Kate; O'Brien, Mearon. Generation STEM: evaluation report 2019-22. CSIRO website: CSIRO, 2025, csiro: EP2023-5111.

<sup>8</sup> Cherry, Kate, Deadly in Generation STEM Insights Report 2023; CSIRO website; September 2024

<sup>9</sup> Cherry, Kate, Deadly in Generation STEM Insights Report 2024; CSIRO website; August 2025

<sup>10</sup> Two-way Science is a science pedagogy for students that links Indigenous knowledges with western science.

culturally relevant activities such as grinding and cooking with grains. Participants also suggested resources that were tailored to lower primary and the new science curriculum and requested greater support in navigating and applying the resources, noting that some materials felt complex and would benefit from simplification.

At the end of each year, a facilitated group discussion with educators is led by the evaluation officer, to elicit educator implementation learnings and outcomes over the year. In 2025, this session was replaced by a facilitated discussion with educators, seeking their input to build on program model strengths and prioritise strategies to enhance the longer-term impacts of the program. This feedback contributed to continuous improvement processes.

### **STEM Camps for Aboriginal and/or Torres Strait Islander students**

In 2025, the program delivered two successful STEM camps, connecting student participants into STEM education and career pathways they valued. Progress was also achieved in strengthening student connections with their community.

Aboriginal and/or Torres Strait Islander student participants (years eight to ten) that engaged in a STEM camp in their local area were asked about their perspectives at the end of camp compared to before camp. The areas with the highest amount of self-reported change for all students (across both camps) was increased awareness of:

- Indigenous STEM knowledges and
- different STEM subjects to study.

The next most highly rated areas of change for students differed across the two camps and included:

- interest in taking part in traditional and cultural activities in the future
- interest in working in a STEM career in the future.

Students self-reported new STEM interests in the areas (from most to least frequent responses) of environmental conservation or engineering, cultural activities, biology, chemistry and astronomy.

An analysis of camp activity evidence, using the Ngaa-bi-nya evaluation framework highlighted the following insights across the four framework domains:

#### **Landscape**

In each region, the local context influenced the design and delivery of the camp. Program staff faced barriers to student recruitment in some schools, but partnerships with Aboriginal Education Officers and local networks helped increase participation. In addition to the STEM camp, parents and camp contributors highlighted the importance of culturally grounded school-based supports, though unstable funding for non-government organisations was thought to limit consistent service delivery. Ongoing design and improvement of the program were guided by local Indigenous community

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priorities, with participant feedback directly shaping camp structure, preparation and ways of working each year. Local Indigenous contributors, including Elders and local organisations, provided cultural knowledge that students strongly valued, with some students using the camp to reconnect with family history and culture.

### **Resources**

Local CSIRO staff effectively accessed and coordinated financial, human, cultural and in-kind resources for the camps by drawing on strong community networks and local expertise. Elders, Knowledge Holders, educators, STEM professionals and community organisations contributed a wide range of skills and opportunities, which students and camp leaders valued for both cultural learning and personal support. Staff and leaders noted that camp preparation required significant time and resources, while mentoring and training new camp leaders—especially around cultural leadership and behaviour management—were important ongoing needs. Monitoring and evaluation resources supported continuous improvement, with Indigenous-led data collection and structured processes ensuring Aboriginal and/or Torres Strait Islander staff and participants could influence program design and delivery.

### **Ways of working**

The program's ways of working were grounded in intergenerational learning, cultural safety and holistic, trauma-informed practices that helped students build confidence, connections and wellbeing. Camp leaders modelled positive behaviours and high expectations relationships, balancing firm guidance with trust, respect and culturally responsive communication. Staff and leaders emphasised the importance of reflective practice, resulting in a strengthened, structured daily debrief process in 2025 that improved learning around camp delivery. Strong community relationships, place-based leadership and ongoing monitoring and evaluation supported program sustainability and ensured that Elders, Knowledge Holders and local priorities continued to shape the camp experience.

### **Learnings**

The program strengthened relationships, Cultural Knowledge sharing and leadership capability across students, camp leaders, contributors and staff, supported by a stable group of returning camp leaders and growing trust with the local Aboriginal and/or Torres Strait Islander community. Camp leaders described significant benefits from connecting with Elders, sharing Knowledges and building confidence, while staff identified clearer insights into the resources and practices needed for a successful, culturally grounded STEM camp. These learnings collectively contributed to a more effective, sustainable model that supported Aboriginal and/or Torres Strait Islander young people to engage with culture, community and STEM pathways.

The camp strengthened students' connections to culture, language, Country and community, while also helping them build new friendships and confidence by stepping outside their comfort zones. The combination of Cultural Knowledge, STEM learning and strong support from Elders, camp leaders and peers created a safe, strengths-based environment where students embraced new opportunities and imagined future pathways. The program also contributed to the broader evidence base by applying the Ngaa-bi-nyaa evaluation framework and embedding continuous improvement through monitoring, evaluation and learning (MEL) practices.

The following section details the perspectives of non-Indigenous and Indigenous program deliverers and stakeholders representing a diverse group of Aboriginal and/or Torres Strait Islander participants currently living on Kamilaroi/Gomeroi and Dharawal Countries in New South Wales and with identified connections to Yuwaalaraay, and Yuwaalayaay and Wiradjuri and Bundjalung Peoples. Participants have connections to a range of Country and language groups and acknowledged that their views were not representative of others, but a reflection of their own experiences.

# Detailed findings and discussion

## Findings related to educator professional learning

Overall, 48 educators completed post session surveys. Of these,

- 11 educators were based in the Narrabri region
- 37 educators were based in the Illawarra region.

### Satisfaction

Satisfaction levels across both regions were high:

- 54 per cent of respondents were extremely satisfied
- 42 per cent of respondents were very satisfied
- 4 per cent of respondents were moderately satisfied

### Value of professional learning modules

The following tables (1 and 2) highlight which PL modules were most valued by educators, showing that across both regions, the two most valued components were: ‘linking Indigenous knowledge to the curriculum’ and ‘learning about cultural considerations in the classroom’. Investigation planning’ was rated the least valued component, as many educators reported already possessing strong capabilities in this area.

Table 1 Narrabri: educator professional learning

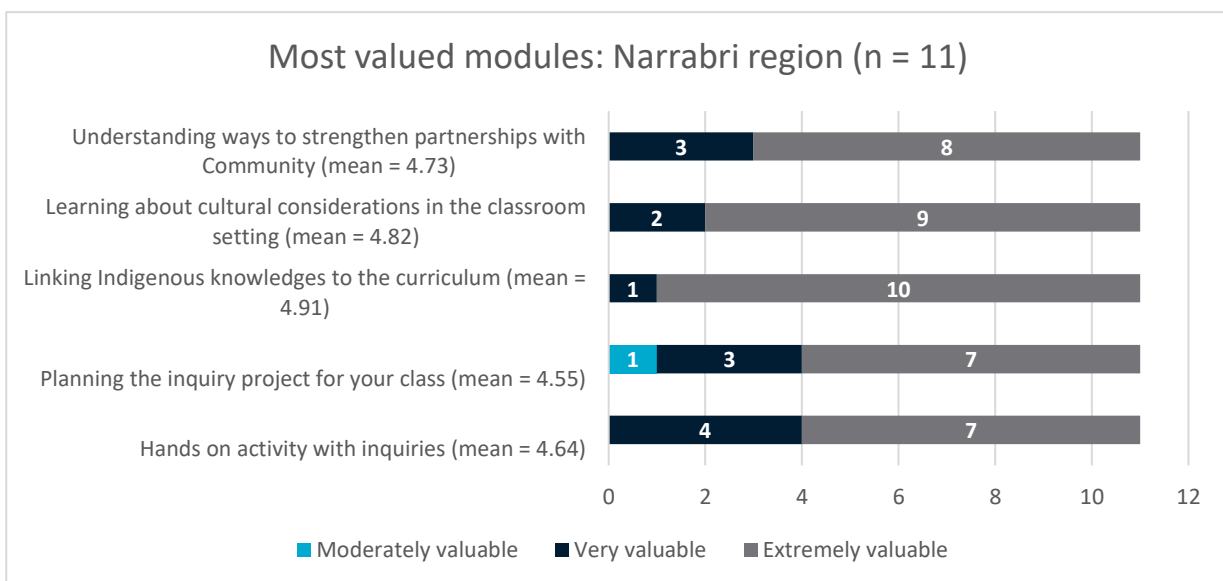
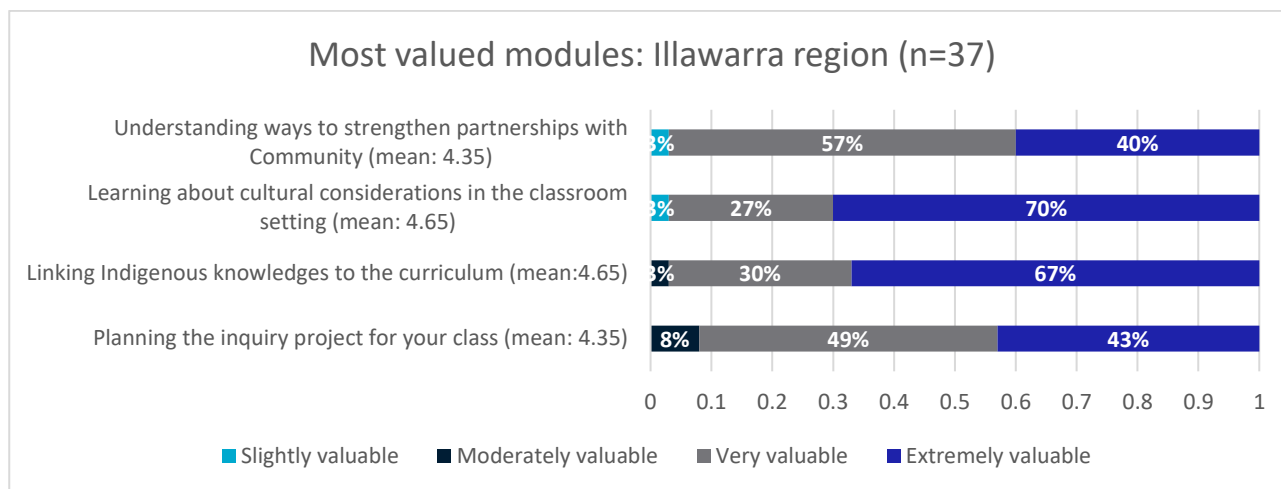


Table 2 Illawarra: educator professional learning



### Educator capability

All educators self-reported capability improvements across all measures, following the PL sessions (See Tables 3 and 4). For educators from the Narrabri region, the highest improvement was reported in relation to ‘implementing an investigation lesson’ suggesting that educators were generally confident planning their classroom investigation project, but lacked the additional skill and ability, required to implement this. Overall, educators from the Illawarra region reported the highest improvement to be in ‘teaching with Traditional context’ which reflected their capability gap in the practical application of Two-way Science to the curriculum.

Table 3 Narrabri: educator professional learning

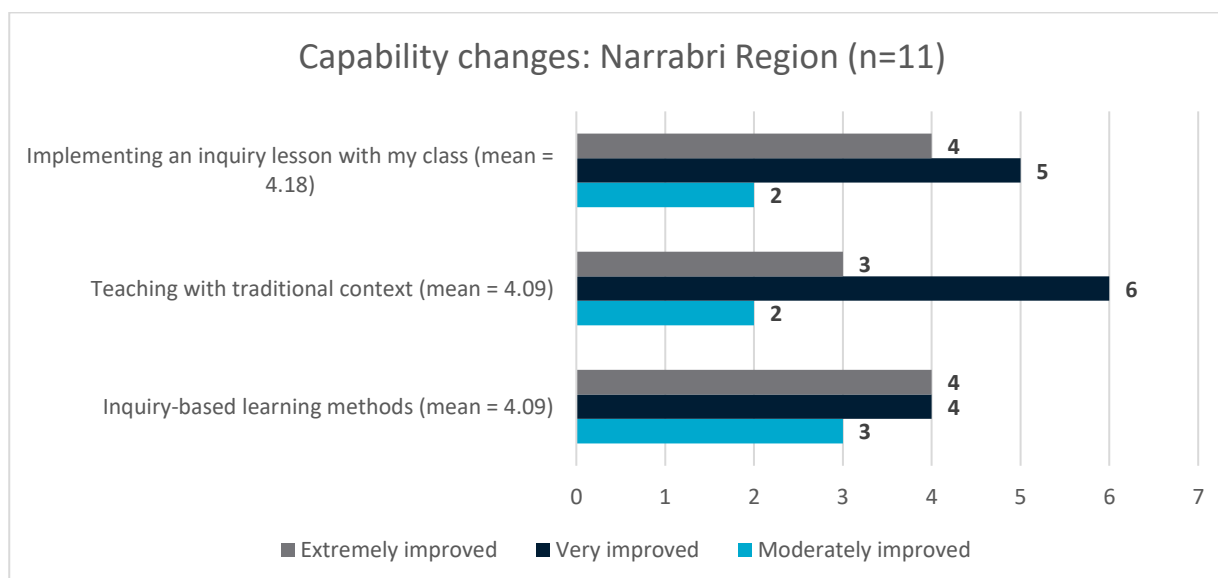
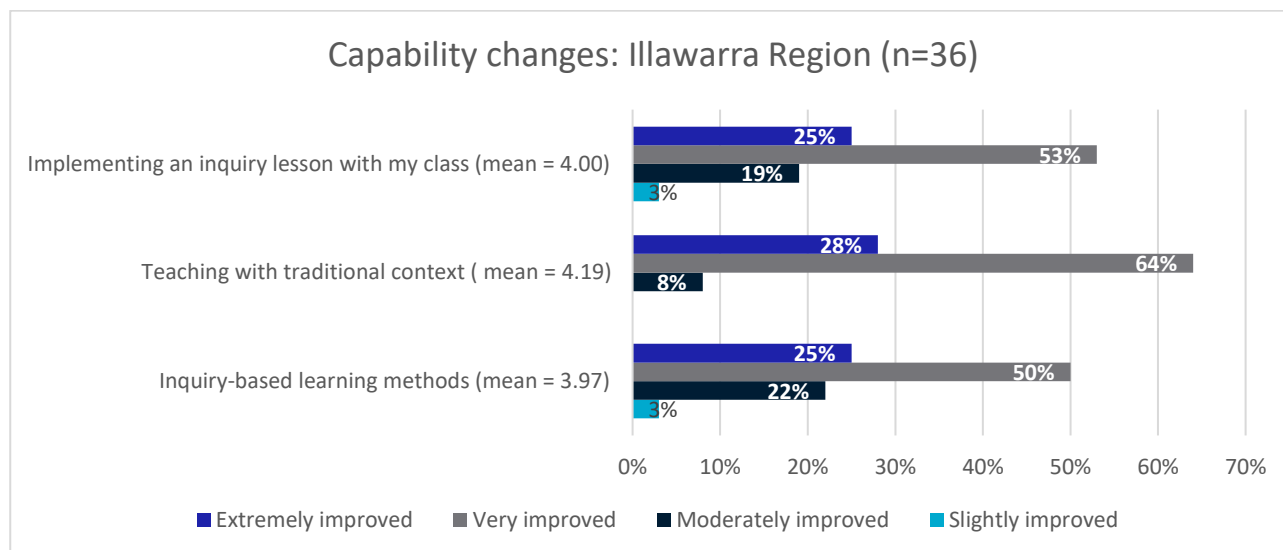


Table 4 Illawarra: educator professional learning



Educators contributed free text to their survey responses, covering areas of session value and individual improvement and how they planned to utilise learnings from the session. The following is a summary of their responses across both Narrabri-Moree and Illawarra regions:

Most valued components of the session:

**Cultural guidance and confidence building and its application to the curriculum building-building**

- The “5 Rights” and the cultural practices vs cultural context model were highly valued.
- Educators appreciated learning how to add cultural context respectfully and what to do/not do.
- The program helped reduce fear for non-Indigenous teachers and built confidence to embed culture meaningfully.
- Participants valued seeing how STEM can be integrated across key learning areas and woven with Indigenous knowledge in meaningful, engaging ways.
- The holistic view of STEM and cultural contexts broadened their understanding of curriculum possibilities.

**Practical and authentic learning components**

- Activities such as weaving, experiments, and classroom-ready demonstrations made the learning tangible.
- Hands-on tasks showed how lessons should be delivered and were low-cost, easy to organise, and directly transferable to classrooms.
- Meeting Knowledge Holders, touring the site, visiting the Research Centre, and learning about local opportunities (e.g., ancient grains farm) enriched the experience.
- Exposure to additional programs and real-world contexts deepened relevance.

### **Ready-to-use resources**

- Resource packs, units, and examples were clear, practical, and easy to implement.
- Educators valued not having to start from scratch and appreciated that materials were adaptable for different learners.
- The resources reduced planning burden and supported whole-school implementation.

### **Networking, and shared learning**

- Connecting with other teachers, CSIRO staff, Illawarra Aboriginal Corporation members, and community agencies was a major highlight.
- Group discussions, idea-sharing, and troubleshooting together strengthened professional relationships and broadened perspectives.

### **Reflective environment and knowledgeable facilitators**

- The atmosphere was described as supportive, thought-provoking, and energising.
- Educators valued time to reflect on their own context and consider what Aboriginal science education means for their students and school.
- Presenters were described as passionate, engaging, and deeply knowledgeable

A small amount of feedback was provided by educators to improve the professional learning sessions, including the following:

**Resources related:** further engagement with the resources; time to go through the resources and better understand them (high volume of documents); simplified versions of the resources; more ready to go units, units targeted to lower primary; A list of classroom resources; where to buy supplies and contact details in one place.

**Educator practice related:** more opportunities for teachers to share their successes and challenges when implementing the inquiries; increased focus on a range of community connections and initiatives.

**Educator PL delivery related:** more planning time during the session; more hands-on activities including outdoor activities.

Educators described the following implementation intentions following the session:

### **Culturally specific implementation goals**

- Embed Indigenous perspectives more confidently and respectfully using the cultural context models explored in the session.
- Integrate STEM and cultural contexts into whole-school activities and investigation-based learning.
- Strengthen connections with community members, Knowledge Holders, and local organisations.
- Apply contextualised examples relevant to local Country, culture, and environment.

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- Begin reflecting on what Aboriginal science education means for their school context and students.

### **General implementation goals**

- Incorporate hands-on STEM activities, experiments, and practical demonstrations into classroom programs-on STEM activities, experiments, and practical demonstrations into classroom programs.
- Use the provided units, resource packs, and ready-to-go lessons to support planning and reduce workload.
- Adapt and differentiate resources to suit different year levels, including lower-primary students.
- Share learning with colleagues and collaborate on programming and implementation.
- Source additional materials and hands-on resources to support classroom delivery.
- Continue networking with presenters and participants to support ongoing implementation.

## Findings related to STEM camps

The following section is analysed according to the four domains of the Ngaa-bi-nya Evaluation Framework, highlighting evidence that emerged against prompts within the four domains. An assessment of progress towards program outcomes is explored in the final domain: Learnings.

### **Landscape**

Landscape factors shape the foundations and capacity of the program to deliver as planned. This includes the history and environment of each region, the presence of other programs and services and the role and influence of Aboriginal and/or Torres Strait Islander peoples in setting priorities, governing and delivering the program.

Across both regions, Indigenous and non-Indigenous camp contributors—such as Elders, Knowledge Holders and local organisations and industry—brought rich knowledge about local history and community issues. Their contributions covered topics such as massacre memorials, healthy Country management, traditional ownership and custodianship, the voices of Native Title Owners, Land Councils, ceremonies and dance. Students consistently reported that they valued learning from these contributors, particularly local community members.

“If they’re local, then we could know more about the symbols for our country. Like if there's anything special, anything that’s made it our Country.” - Student

Several students shared that they felt disconnected from their family history or culture, possibly reflecting the experience of other young Aboriginal and/or Torres Strait Islander people in each region.

Many of these students said the camp helped them reconnect in a positive way. One student also acknowledged the personal effort Elders made to share their stories.

“It kind of makes me feel sad because I don't know a lot about my culture. But it's also inspiring, seeing and knowing how it was back in the day when they [Elders] weren't allowed to speak their language. And for them to come out and tell us the stories, it's really special because knowing the past is horrible, and for them to come out and tell us. It's something.”

- Student

Program delivery staff reported some barriers to recruiting students for camps. These challenges differed across the two regions. In some schools, educators had limited relationships with parents, making it difficult to follow up on applications. In these cases, the place-based worker used personal and professional networks—including Aboriginal Education Officers and the Education Pathways Project Officer—to bridge the gap. Staff also perceived that some educators did not value cultural activities or tended to nominate only high-performing students instead of those who might benefit most from programs like the STEM camp.

In contrast, many students identified educators who supported their participation and encouraged them to sign up for camp.

“She always pushes us to do stuff like this and we wouldn't be here without her.” - Students

At one pre-camp parent session, parents and carers highlighted the value of programs that mixed cultural activities and education, like the STEM camp, and other such as the Clontarf Foundation but noted the latter was only available to their sons. A camp contributor also commented on the importance of school-based supports—such as Aboriginal Education Officers—to help students stay connected to school. However, they noted that short-term and insecure funding for many NGOs, made consistent service delivery difficult.

In the Moree-Narrabri region, long travel distances between towns and subsequently for contributors resulted in them staying overnight at camp, allowing for more engagement with students and a deeper understanding of the program. This extended time together also strengthened collaboration between program staff and contributors. It created space to share their interests for the community and identify opportunities to influence future camp activities, including educator professional learning delivered through the program.

“I think that really highlights the community's passion and motivation to support these children in their learning journey and they take their role very importantly and don't just want to deliver a workshop and have that as the transaction and be done, they really express that that desire to be a part of the actual camp”. CSIRO staff

At a whole of program level, the design and continuous improvement of the Deadly in Generation STEM program was guided by the priorities of local Indigenous communities. This occurred through regular

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engagement led by the local, place-based CSIRO staff member, including involvement with branches and local committees of the NSW Aboriginal Education Consultative Group (AECG).

“And one consistent message—We're here to support your community, and all these programs are here to serve that and feed into each other.” — CSIRO staff

At a camp activity level, design and delivery were led by both Indigenous and non-Indigenous staff and camp leaders. Participant feedback was used to refine the camp model, with learnings from the first camp of 2025, improving delivery of the second camp. Student feedback informed changes to camp length and structure, while camp leaders provided feedback on ways of working before and during camp. In 2025, based on this feedback, a pre-camp day focused on culture, family and local history was introduced as part of camp leader and staff preparation for one of the camps. This was highly valued by participants.

“We're all big on culture and on coming together and building community. And I think [the pre-camp day] is us practising that together.” — Camp leader

## **Resources**

Resources in this program included financial, material, human, cultural and in-kind contributions. They also included the informal relationships and networks that supported the design and delivery of the camps. In both the Illawarra and Moree-Narrabri regions, local place-based CSIRO staff played a key role in accessing and developing these resources by working within existing networks, aligning with local education priorities and drawing on community strengths.

### **A broad range of resources and expertise**

The program's networks provided students with access to a wide range of skills, opportunities and knowledge. Elders, Knowledge Holders, local organisations, camp leaders and CSIRO staff contributed diverse social and cultural capital. Their expertise included Aboriginal Land Councils, Aboriginal Rangers, Aboriginal languages, local businesses, arts, dance, science, ecology, astronomy, bush medicine, engineering and Indigenous games. Students were also encouraged to take up community-based opportunities outside the camp, including volunteering, education pathways and invitations to engage further with Elders.

“It felt really inspiring since all these Elders are here to talk to us about our culture and teach us about stuff that we didn't know before.” — Student

### **Family and school-based support networks**

Students yarned with camp leaders about the people who support them in their education and cultural engagement. Most identified immediate and extended family, Aboriginal Education Officers and educators as key supporters in helping them stay engaged. By the end of the camp, many students also

saw camp leaders as part of their support network. Friends were also important, particularly when stepping out of their comfort zone.

One student described the combined influence of family, school and camp supporters:

“The Aboriginal Education Officer at my school, Aunty, she helps me and the camp leaders here... and my Dad. He tells me a lot about Aboriginal stories too. He tells me what his life was like when he was a kid, which has encouraged me to carry on what he was like and what Aboriginal people do.”

### **Resource challenges**

Staff and camp leaders described the significant preparation required to deliver a five-day camp.

“It's five days of camp, but I feel like for each of those days, there is a month of work behind it.” — CSIRO staff

Barriers during preparation included confirming student numbers early enough to secure accommodation and staffing; and relying on schools and families to complete application processes. Unconfirmed availability of camp leaders and CSIRO staff before the camp also made it challenging to plan and meet prior to camp.

“Scheduling is the biggest challenge when planning for camp and preparing camp leaders. Pretty much every year we run into the same issues, having people confirm they are definitely coming and being able to run through the programme, it is difficult at times.” - CSIRO staff

### **Staff resources – capacity strengths and challenges**

In 2025, staffing levels during camp were reported as ideal, influenced by learnings from previous years. Camp leaders valued having enough leaders and support from CSIRO staff. Highlighted by the following comments from camp leaders:

“The combination of the three CSIRO program staff is so supportive to the camp leaders and the students as well. It can go unnoticed but it's part of the supporting structure and camp leaders rely on that, and the students see the collaboration and working together as a team. To execute the camp in the level that you can get the maximum change and inspiration and knowledge to the kids, it's quite complex to execute.” - Camp leader

“The more camp leaders we have involved, the varying levels of understanding around behaviour and the more cohesive camp leaders can be, the stronger and more effective we will be, and we can spend more time on connection and culture.” - Camp leader

Some camp leaders and CSIRO staff reflected that new leaders often lacked experience engaging with young people or taking on cultural leadership roles. Camp leaders identified training needs, such as managing group behaviour and deepening cultural knowledge.

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“I think knowing more about culture and be able to jump in and say I know this about, this story's happened out where I am and then the kids from that area could probably even relate to that or already know that story” — Camp leader

While it was challenging to bring everyone together before camp, staff felt more structured support for new leaders would have been beneficial. Others noted that learning through experience was also valuable for leadership growth.

In 2025, strategies to build leader readiness included:

- a pre-camp cultural learning day
- co-designing an activity for new leaders to deliver based on their strengths.

“The pre-camp day made me feel really comfortable to go out to camp and having the camp space to ourselves makes it a community gathering vibe. It helps you connect with the kids a lot more and you do get that sense of community connection.” — Camp leader

Experienced camp leaders in 2025 prioritised mentoring new leaders through modelling and informal guidance. This helped build the capability, confidence and professional pathways of young Indigenous and non-Indigenous leaders and strengthened future resourcing for the program. New leaders reported feeling well supported.

“The experienced leaders did a really good job of supporting us new ones on the camp, ...with continual prompting to share my opinion or knowledge at certain points. It wasn't done in a forceful way, it was encouraging me more to share more, it made me feel a bit more like a leader.” — Camp leader

Managing student behaviour was identified as a key skill gap for new leaders and a skill that experienced camp leaders were still honing. Most agreed that confidence grew over time.

“I struggled because it's just implied that we have that authority. But if [students] turn around and say, no, I don't want to do that, then you're kind of like, oh, OK, I don't really know where I'm supposed to go from here.” — Camp leader

Several leaders said the skills and experiences gained on camp strengthened their confidence outside the camp.

“For me, stepping up and taking charge and being ‘I'm a team leader, so I've got to set an example for these student's that was probably the biggest challenge for me. I think it's made me feel more confident talking in front of people” - Camp leader

A local camp contributor also saw the camp as an opportunity for his junior staff to build skills and confidence:

“I think it's about them realising that they're moving into a more senior role here at work, but also within community as a result, and just looking back reflecting and acknowledging that they've picked up a lot of information along the way.”

## **Monitoring, Evaluation and Learning (MEL) resources**

A dedicated portion of program funding supported monitoring and evaluation activities, enabling consistent assessment and ongoing improvement. Although this project was not led by an Indigenous researcher, the approach ensured Indigenous-led data collection and formal processes for Aboriginal and/or Torres Strait Islander staff and participants to influence camp design and delivery. An internal process of culturally responsive practice also underpinned the work of the CSIRO Impact and Evaluation team and supported the resources utilised for this project.

## **Ways of Working**

The Ways of Working domain explores the quality and integrity of program delivery, including relationships, cultural safety, sustainability and the holistic processes that underpin Indigenous ways of working. For Deadly in Generation STEM, these principles are strong in the program's strategic vision, legacy planning and are clearly reflected in its camp design and delivery.

The camp model emphasised several strengths-based approaches including an embedded wellbeing focus, a trauma-informed lens, high-expectations relationships, and intergenerational learning and role-modelling.

## **Intergenerational learning and role modelling**

Students, camp leaders, Elders, Knowledge Holders and STEM professionals interacted throughout the camp, supported by a parent engagement session on the first day. Students and staff repeatedly highlighted the value of hearing from many voices.

“Watching the kids come together, I think some of the messages that [Elder] had were great and taught the kids a lot about respect as well. That was such an overarching theme of the whole camp.” - Camp leader

Culture, education and respect were strong themes across generations. One camp leader noted that the ‘strong emphasis on culture helps the students connect into STEM because they value their culture and mixing that with STEM works really well.’ Although each camp group had a different appetite for cultural and STEM activities, students generally enjoyed the balance of cultural learning, language, STEM activities and hands-on outdoor experiences.

Camp leaders played a central role in modelling respect, teamwork and positive behaviour. Their attitudes and interactions strongly shaped how students supported each other.

“Everything you do as a camp leader filters out to the kids. Whether it's seen or heard so those actions are words. The way you work with each other is the essence of how the kids are going to work with each other. They watch and see so much, and they learn and everything. They're learning how to act, how to respond, what's good, what's bad”. - Camp leader

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Leaders described engaging with students in a positive way to facilitate a sense of safety within the group environment. This was described in terms of earning respect, positioning themselves as co-learners, and being non-judgemental. This was captured in some quotes below from camp leaders:

“I was learning with them; everyone was jumping in and working as a team”

“You’re someone that students can go to and not be embarrassed or scared to ask questions because we're all of a similar age.”

“I don't think we can demand respect from kids, I think you have to earn it and especially if the kids have walls up and need that trust building and that time to feel safe and feel heard, that's a big learning - how to earn in that respect.”

### Wellbeing and a trauma informed lens

Camp leaders worked holistically, learning about students’ interests, supporting quieter students and helping them connect to local Country. Several activities used Western scientific and cultural knowledges side-by-side, including daily quiet time in the bush and bush regeneration activities with Rangers and Land Councils.

“When they start doing the planting...the Rangers engage because they come from similar backgrounds, similar upbringings, they're best place to have those one-on-one conversations while something's happening. So, when [the group] breaks out, I think that's probably one of the best things, I see the Rangers engaging with students and that's been consistent with the last couple of years we've done it with Deadly in Generation STEM.” - Camp contributor

Although trauma was not assumed, a trauma-informed, strengths-based approach was adopted, recognising the impact of intergenerational trauma on many Aboriginal and Torres Strait Islander students due to the effects of colonisation (CESE, 2020). This was reflected in:

1. Sharing behaviour expectations – A new activity was trialled in 2025 in response to learnings from previous camps. The process on day one of camp included building respect and setting those behavioural boundaries. One staff member described it as ‘articulating ideas around behaviour, around what it means to us, what it means for the kids, whilst also considering relationships and safety and fun and connection.’
2. Slowing the camp pace – In 2025, a five-day camp was trialled, to allow additional time for students to engage in activities without feeling overwhelmed, and to allow time to process the information they were receiving. This also supported deeper connections, with one camp leader commenting

“Having the extra day also allowed for those relationships and those bonds to continue to form.” - Camp leader

3. Supporting students stepping out of their comfort zone – Many students reported anxiety about leaving home or participating in new activities. Staff monitored wellbeing, adapted schedules and created space for positive interactions.

“We were able to be adaptable to the energy... if it was positive and met the intent of the camp.” - Camp leader

4. Camp leaders recommended ensuring students have more information about daily plans and schedule changes to reduce uncertainty.

“Regular check-ins, connecting to country in the morning and afternoons – forest reflections, free time activities. These were beneficial as they were critical for breaking up the attention and slowing down, stepping back from information overload.” - Camp leader

### **High-expectations relationships**

The program adopted ‘high-expectations relationships’, an approach based on the belief that all students can succeed when supported through strong, respectful relationships (Sarra et al, 2018). Camp leaders aimed to challenge negative assumptions about Aboriginal and Torres Strait Islander students and set expectations aligned with “the real world.”

“Camp leaders are challenging the students to raise their behaviour... not how they usually act with their parents or at school.” – CSIRO staff

Camp leaders reflected on balancing behaviour management with building trust and relationships. Setting this tone early was essential.

“Behaviour management versus relationship building... it’s finding that balance.” - Camp leader

A visiting contributor contrasted the camp’s flexible, respectful approach with more rigid schooling environments:

“The model and your workshops and areas are not too rigid, you’ve got kids that are learning at different stages and at different levels and if they want to wander off, they ask permission and that’s fine. And it works.” — Knowledge Holder

### **Experiential learning for camp leaders**

Prior experience and organisational knowledge contributed to the planning and preparation of camps; however, new camp leaders reported a significant amount of their learning came from “learning by doing,” supported by more experienced leaders. Zeivots (2016) explored the role of ‘emotional highs’ in experiential learning, indicating these enhanced participants’ sense of meaning and value in their learning experiences. Camps were described as intense environments that built strong relationships and accelerated personal growth, possibly enhancing the experiential learning experience of camp leaders. One camp leader described this,

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“When you're together and you're on an adventure, the relationship is intensified. Being on a camp with people, you live in each other's pockets... You're getting tested in so many aspects of your inner self. You find your space and navigate that and all these little challenges you're getting through, individually and together, and you come out on the other end, it always builds and binds you stronger.” - Camp leader

New leaders valued the opportunities offered to contribute and be guided:

“They really opened the space for us... they knew when to direct us when we needed it and give us guidance when we needed it.” - Camp leader

Across camps, staff noted the need for more structured reflection and debriefing time to support their individual learning and group cohesion. Informal, rushed or unplanned debriefs sometimes limited effectiveness. Camp leaders wanted to be clearer in their instructions to the students, and ‘make sure they were on the same page’ with each other. One camp leader described the risk of not doing this as an uncomfortable level of frustration that could build up over the course of the camp.

In 2025, this feedback led to the second camp incorporating a structured daily debrief component, facilitated by the Impact and Evaluation Officer using knowledge-circle principles (see Appendix 3). Leaders described strong benefits to this, and suggested some refinements:

“We learn from each other because we get to hear their [other camp leader] challenges too, which then means we get to say, 'this could crop up for me too'.”

“The daily debriefs are so important. I think we need to allocate more time because we tended to either not get through everything or go off track.”

“it's a really nice way to reflect on your own work and how things played out. It helped me to learn from my day.”

At the very least, getting together to debrief and share what's happened throughout the day, so, we run on the same page was super beneficial. It's good to try and talk about strategies that we might try with students, I think it helped us be more of a cohesive team because we all knew what was going on throughout the day”

“It definitely should be used as a platform to give information to the camp leaders. If something may have happened or is about to happen. But it was almost a decompress meeting rather than a debrief.”

### **Sustainability of camp activities**

Program evidence highlighted progress against several sustainability considerations listed in the Ngaa-bi-nya evaluation framework including the extent to which the program is self-determined by each community.

Community and camp contributors were invited to influence program and camp design respectively. Place-based CSIRO staff played a central role in maintaining relationships across communities, with

Elders, teachers, schools and families to facilitate this contribution and alignment with local Indigenous education priorities.

“As the place-based worker, you're the one that holds those relationships, so you're talking to the stakeholders, you're talking to the community, you're talking to the camp leaders, talking to the teachers and the schools. Then we bring parents on board.” — Staff member

Examples included building connections through local AECG meetings, collaborating on other STEM programs and spending extended time with Elders. For example, attending the AECG to ‘just be present and network’ led to strengthening connections with local Aboriginal Officers and the opportunity to collaborate on another CSIRO program, the Young Indigenous Women’s STEM Academy. Another example provided by CSIRO staff was taking the time to have difficult conversations with Elders to better understand their perspectives,

“Just sitting with her for half an hour, having a cup of tea, just building a relationship in that space and also addressing her concerns.” — Staff member

Elders and Knowledge Holders that contributed to the camp confirmed that ‘passing on the cultural knowledge and the stories that go with it, yarning’ was a priority for them. Community priorities included building strong cultural identity for students outside the school environment, therefore inviting students who might not normally access STEM camps but were interested in culture or open to exploring STEM. While this broadened diversity and required more support, staff saw this as essential for sustainability.

Returning staff and experienced camp leaders also strengthened sustainability.

“The camp leadership worked together more effectively – there was a lot of cohesion, being flexible, shared decision making – including organising activities. We worked together as a team. This may be because the core team has worked together for a while now.” — Camp leader

### **The engagement of staff in monitoring, evaluation and learning (MEL)**

The program used a strong, structured continuous improvement model led by team leadership and supported by an embedded Impact and Evaluation Officer. Camp leaders were central to MEL processes, contributing to research yarning circles, post-camp surveys and reflections. Leaders also helped refine methods, such as moving the student research yarn to the last night of camp in 2025 to improve student comfort and engagement. Where suggestions were unable to be incorporated into the MEL project due to resource restrictions, they were considered for inclusion in the camp schedule as a program activity, for example, after moving the research yarn from the last day of camp, additional camp activities were included such as student reflections, ‘warm and fuzzys’ and student presentation of artefacts developed over camp.

The MEL approach continued to evolve through:

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- the use of knowledge-circle methods for debriefing
- the Ngaa-bi-nyaa framework for analysis and reporting.

Full reports were shared individually with Elders and summarised for broader community accessibility.

“The camp leaders set the mood and tone for this camp, and it was a really good group and the camp and [reading the feedback from students], it matched how I felt about camp and that is amazing.” -Camp leader.

### **Learnings**

The Learnings domain focuses on insights gained through program delivery and the changes experienced by participants. It explores how these changes relate to the program’s intended outcomes and Indigenous ways of being, doing and relating. This section explores outcomes for adults and students separately, highlighting progress towards program outcomes, using Ngaa-bi-nya evaluation framework prompts.

### **Adult Outcomes**

For camp activities, ‘adults’ refers to CSIRO delivery staff, camp leaders and camp contributors such as Knowledge Holders, Elders, STEM professionals and local community organisations. The program’s current impact pathway identifies outcomes for community members as: becoming more aware about how to contribute Indigenous STEM knowledges, greater engagement with Indigenous students to develop their Indigenous STEM knowledges; and increased opportunities to deliver and influence STEM education. Outcomes for camp leaders are not explicit within the impact pathway, however emerging evidence from this project provided insights to the program’s ongoing articulation of a camp leader model for future STEM camps

### **Strengthened connections as an enabler of program outcomes**

Program staff described the long-term, relationship-based nature of community work. In 2025, ongoing investment in relationships created tangible benefits, including reduced risks associated with a relationship-driven program, building trust and strengthening team capabilities.

“Building those relationships across the team by working together on camps and educator professional learning workshops has really helped take away some of that risk.” — CSIRO staff

Both camps benefited from a stable group of three returning camp leaders. This core group increased team cohesion, confidence and capability, and strengthened support for new leaders.

This is highlighted by the following camp leader quotes,

“The camp leadership worked together more effectively – there was a lot of cohesion, being flexible, shared decision making – including organising activities. We worked together as a team. This may be because the core team has worked together for a while now.”

“The adaptability of the camp leadership team was like a highlight this year maybe because there were more leaders and more voices, we were able to change when needed – we were able to assess the energy of the students and make informed decisions and be more flexible, including with the reflections.”

Five new camp leaders participated in 2025. While one had prior youth work experience, the others were new to camp leadership. All reported significant growth, including increased confidence to take on expanded roles and apply these skills in their workplaces. The returning group of core camp leaders played a critical role in this learning for new camp leaders.

“I've joined the Aboriginal committee at [work] now. I wasn't on there before camp. My team leader asked me and I ended up joining it. I've been able to feel more comfortable stepping into that space.” — Camp leader

Staff identified deepening trust with local Aboriginal and/or Torres Strait Islander stakeholders as essential to program success. This included creating culturally safe environments, understanding local priorities and acting on feedback. In 2025, this resulted in new school engagement and Elders choosing to attend the final day of camp.

“they were invested to come along to the closing ceremony. That invitation was put out to everyone. They chose to be there and by having them present added value in that situation”  
- CSIRO staff

“Trusted relationships create that repeat engagement so that takes time and you're not going to see that in the first year or the second year.” - CSIRO staff

### **Continuous improvement as an enabler of program outcomes**

Continuous learning is built into the program, with 2025 generating clear insights about essential elements of a successful camp model, including:

- Supporting student recruitment through local AEOs and school-based programs.
- Ensuring local camp leaders are present.
- Addressing a lack of respect from students immediately.
- Having a minimum of four camp leaders.
- Holding a daily debrief.
- Ensuring leaders take breaks to avoid burnout.
- Co-designing the schedule with all leaders, incorporating hard and soft timetable elements.

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- Implementing consistent behaviour management strategies discussed for a range of scenarios, and with a recognition of individual camp supervisor leadership strengths.

### **Knowledge Sharing: increased opportunities and benefits**

Students, camp leaders and Knowledge Holders described strong benefits from sharing knowledge.

Some camp contributors noted young people had gaps in some cultural knowledges such as understanding matriarchal roles in the lives of young people, and cultural fire practices for hazard reduction burning. Participants saw the camp as an opportunity to strengthen this knowledge in younger generations that they didn't experience elsewhere.

Although camp leaders were in the role of mentors and cultural leaders to the students, contributing Elders and local Knowledge Holders, supported and added to their knowledge sharing approach. One camp leader described,

“We did the walk and then [Uncle] sort of shared, you know, it was a bit of a forest bath. But then he jumped in, we did some language, we did some local knowledges. Then we went out to the stars and he was talking about the stars. And then he stepped in and just to have that presence there, it was like community.” — Camp leader

All the participating students valued the contribution of Knowledge Holders, saying they felt cultural knowledge strengthened identity and should be passed on to avoid being lost.

This was illustrated by the quotes below:

“Spending time with Knowledge Holders and Elders. Is very special for me. Yeah, it's like I feel like it's the most valuable knowledge you can get cause like they've been here the longest, they know the most so. Yeah, it's very special.” - Student

“You don't know them, but you can just connect with them straight away and be like, ‘Oh, hi, Aunt, how are you going’, and they'll be sweet to you, just like they know, just like you're their kid or something” - Student

### **Responsibility for future generations**

Knowledge Holders and camp leaders spoke about their responsibility to guide young people and prepare them for the future. Their messages to students reinforced the importance of education, family support, role models and taking opportunities.

Key messages included:

- ‘You have your feet in two worlds’ – finding balance and navigating both responsibly.
- ‘There's value along the journey’ – learning takes time and it's OK to change direction. You don't have to do it all and know it all right away.

Camp leaders emphasised the importance of being a positive influence:

“The kids see you as a leader and then they look up to you and they give you respect and you want them to do well but you want to continue to support them or be involved, even if it's just another adult figure in their life that is somewhat a role model and they take one thing away, that's awesome.” — Camp leader

**Student outcomes**

Evidence from students and other program participants demonstrated progress against program outcomes: to strengthen cultural pride and knowledges; build relationships with the community and to connect students to local STEM pathways.

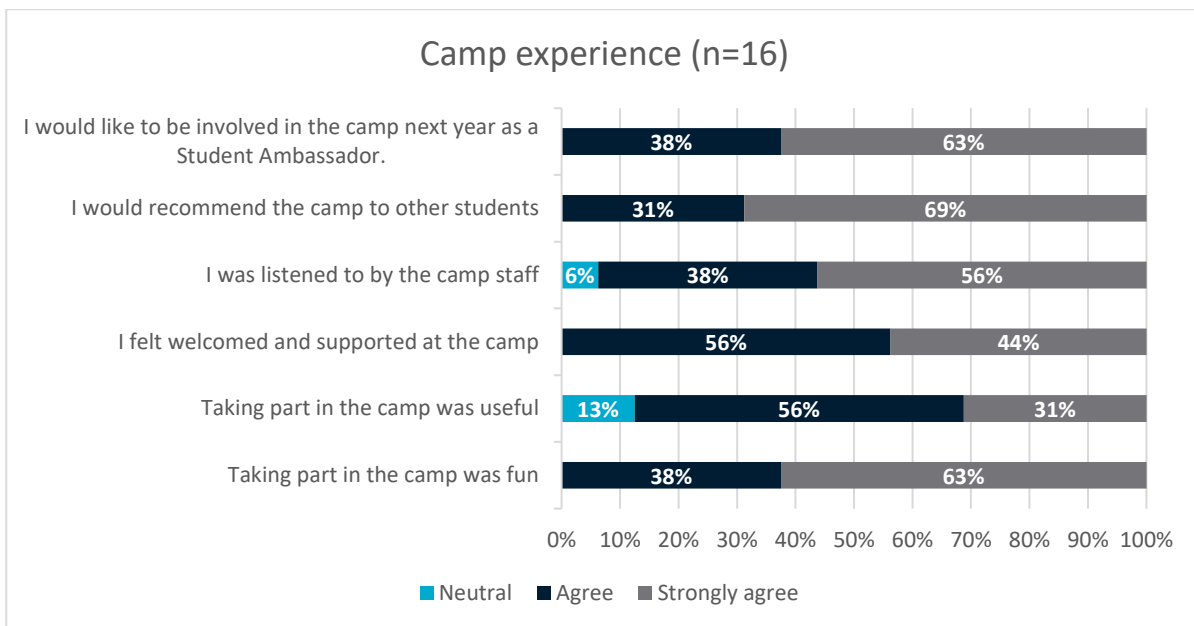
Evidence also identified emerging themes for students related to the Aboriginal and Torres Strait Islander cultural care and healing prompts in the Ngaa-bi-nya evaluation framework. These included: learning to embrace opportunities and being connected to what matters to students.

In 2025, students that participated in a camp completed a post camp survey providing feedback on their experiences and what changed for them because of the camp. The following data highlights these findings.

**Narrabri region**

Overall, the students rated their camp experience highly, with 100 percent of students agreeing that they would recommend the camp; would return as ambassadors, felt welcomed, supported and had a fun time. Two students were neutral about how useful the camp was for them, and one student was neutral about feeling listened to by camp staff.

Table 5 Narrabri region

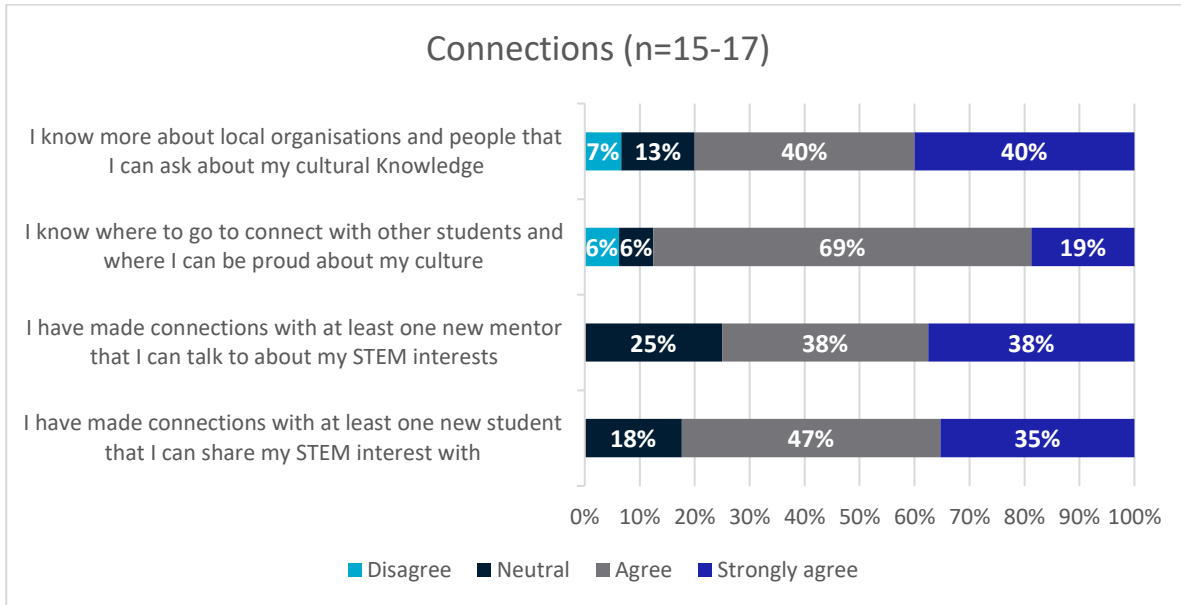


Across all connection measures, students reported positive responses (between 75 per cent and 88 per cent). The highest positive connection response following camp, was 88 per cent of students

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agreeing they knew where to go to connect with other students and be proud of their culture. One student didn't feel as though the camp increased their knowledge in connecting with other students or their local community and eight students reported feeling neutral across one or two of the connection measures.

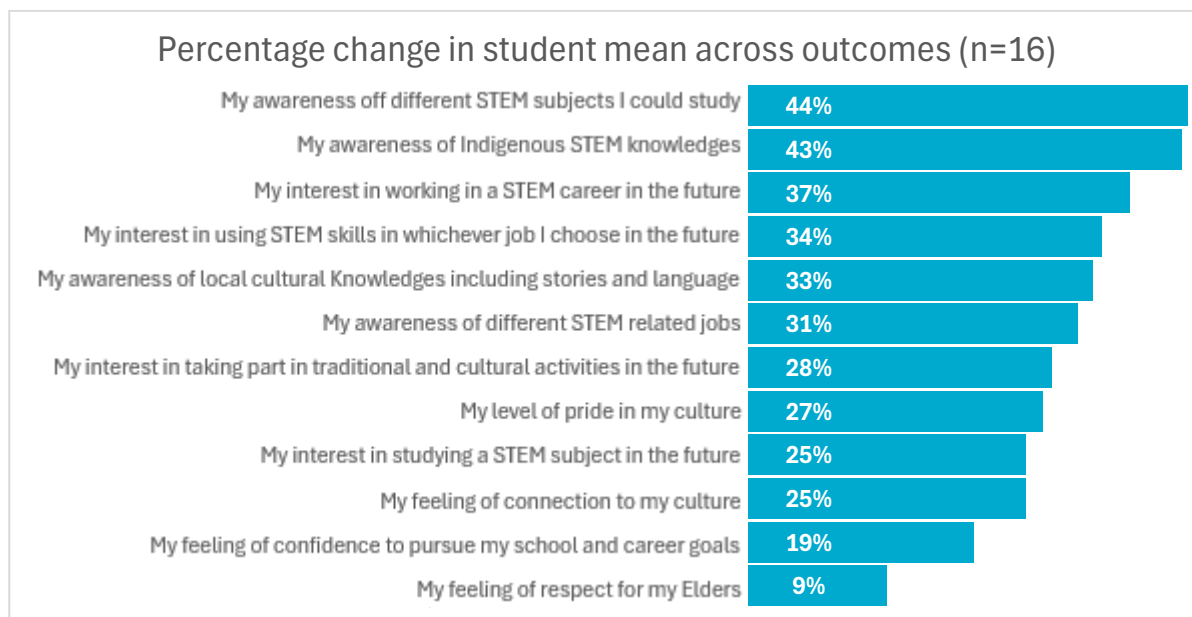
Table 6 Narrabri region



**Changes across the student group for all outcome statements.**

The following graph shows the percentage of change (using means) for students before camp to after camp, listed in order of highest proportion of change to smallest proportion of change. It's relevant to note that students' feeling of respect for their Elders increased the least, however; overall, students rated this highly before camp (highest pre camp score), resulting in a smaller overall increase.

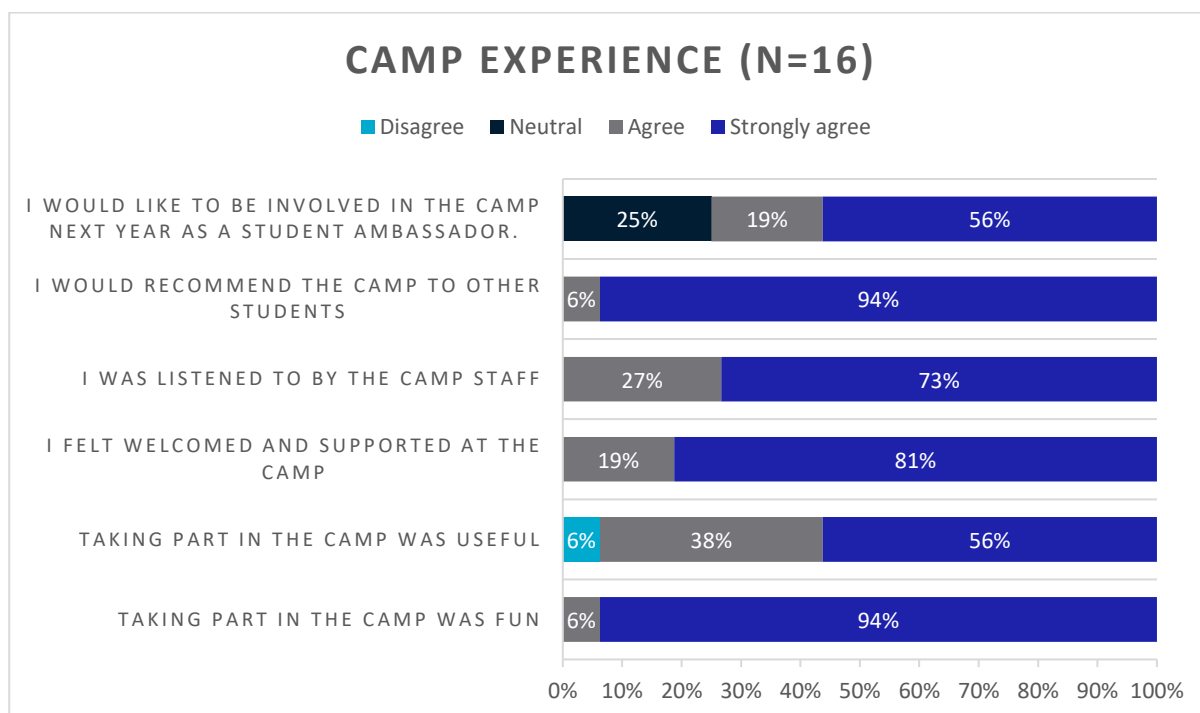
Table 7 Narrabri region



**Illawarra Region**

Overall, the students rated their camp experience highly, with 100 percent of students agreeing that they would recommend the camp; felt listened too, welcomed, supported and had a fun time. One student found the camp wasn’t useful and 25 percent of students preferred not be involved as ambassadors in the future.

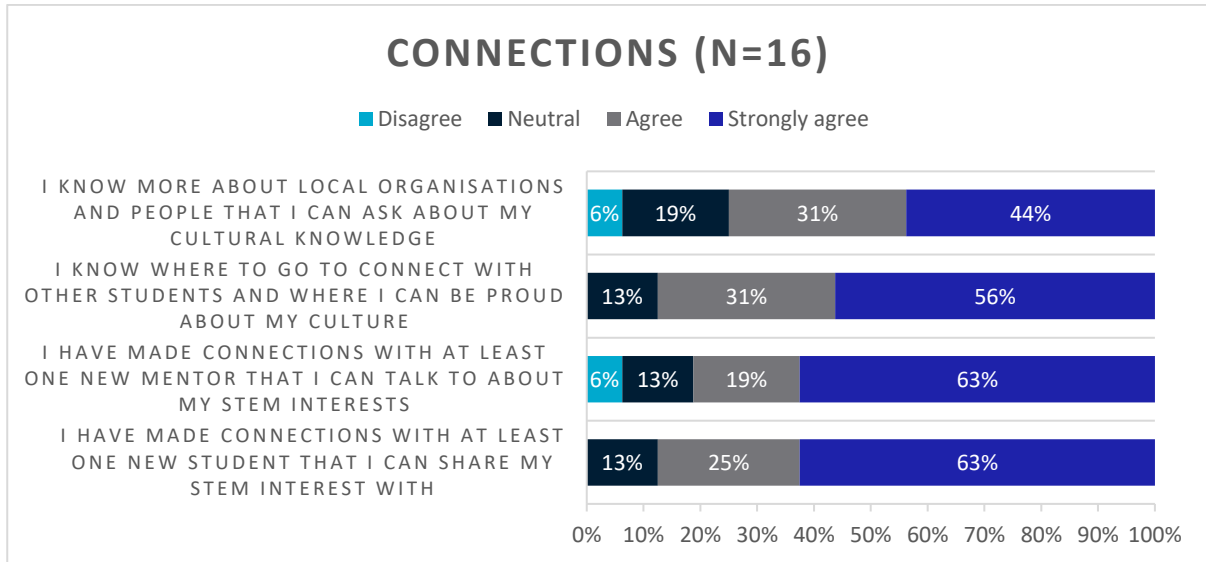
Table 8 Illawarra region



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A small proportion of students were undecided about their connections formed during camp (2 -3 students), while most students agreed (75 per cent – 88 per cent) had made new connections and knew where to access connections if they needed.

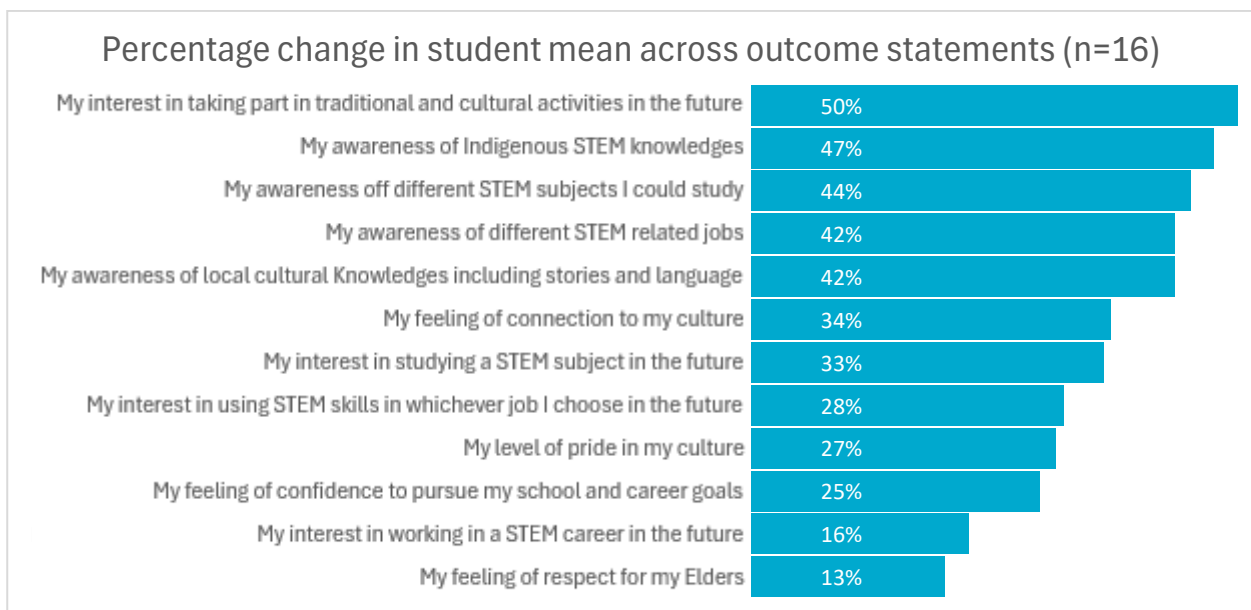
Table 9 Illawarra region



**Changes across the student group for all outcome statements.**

The following graph shows the percentage of change for students before camp to after camp, listed in order of highest proportion of change to smallest proportion of change. Like results in the Moree-Narrabri region, students’ feeling of respect for their Elders increased the least, due to already having a high level of respect for their Elders.

Table 10 Illawarra region



### **Strengthening connections**

Students consistently described increases in cultural pride, language knowledge and personal connection to Country as key outcomes from the camp. During their research yarns, students explained that the camp helped them deepen their sense of identity and understand how culture continued to shape their lives.

“Learning more about my language and getting to know what they all mean and actually saying them because we don't get that chance to learn them anymore and so to come out here and learn my language which was good and actually knowing what my language is now.” - student

The camp model intentionally limits the number of students attending from each school to encourage new friendships and peer networks. Although many students initially felt nervous about meeting new people, by the final day most identified forming friendships as one of the most valuable parts of their camp experience.

“I've met all these awesome people, and I've made some great friends and through the lessons, I've learned more about my culture, more about the people and the history that connects us and through the father sun ceremony. It was special because I haven't done anything like it before.” – student

### **Responding to high expectations and embracing opportunities**

In 2025, evidence from students, Knowledge Holders and camp leaders reinforced the value of high expectations. Camp leaders described their role as mentoring students through encouragement, accountability and opportunities to take safe risks. They emphasised that while they were not ‘parents or teachers,’ they provided space for ‘autonomy and accountability’.

Students responded strongly to this approach. Many described pushing their limits, trying new activities and taking up opportunities they might have avoided before camp. By the end of camp, the students were observed to step up to these expectations, with one camp leader commenting, ‘it was really, nice to see them push their own limits and actually find out, what they are capable of’.

In their research yarns, most students shared examples of stepping out of their comfort zones, and the benefits they felt as a result. The quotes below highlight the range of student experiences on camp:

“The camp has taught me to step out of my comfort zone and take any opportunities that come my way. Because you don't know what they could lead to.”

“I feel like I've achieved a lot of new skills like connecting to culture, learning how to throw a boomerang. And mostly just learning about when you give it your all there's always a good outcome that you get like making new connections.”

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“I'm a bit more confident, like instead of just sitting down and completely ignoring it, I'd actually put my hand up to do [an activity].”

“I achieved having my first cultural dance with everyone and then with J, singing for the first time, which shared the moment for all of us.”

“The first day I arrived, I felt anxious because I didn't know anyone, and it was a much different vibe from now, like as the camps ending, I felt very connected to everyone. Everyone's made a great friendship and just bonded a lot since.”

### **Strengths based learning – connecting students to what matters to them**

Students reported that the combination of STEM and culture supported a strengths-based environment where they felt safe, motivated and genuinely interested in learning. Many described how camp supervisor perspectives and Elders' teachings helped them see STEM as connected to their culture, identity and future goals.

For example, A local Elder, who shared some of her knowledges about bush medicine inspired the students in their connection with STEM:

“Aunty's talk about all the different plants that you could find in the bush for medicine purposes. I'd already been interested in things like that, but it's steering me towards something like biology or chemistry in the future.”

“Aunty's talk about the medicine, the plants in the bush that is really interesting because that's science, that's biology...and reminds me how much there is to learn through STEM.”

Hands-on activities, such as bush regeneration and working with land councils, helped students imagine new ways to contribute to their community and Country. One student shared that the bush regeneration activities allowed them to consider ‘something where you can give back to the Country and do good’ while another student connected that activity with a stronger connection to their community:

“...doing the plants with the land council, I was thinking like that'd be good to have an opportunity to do that [plant more native plants] and connect with [the council], make the community better and have places to go, to have yarns with people.”

A strong contributing factor to positive learning was the cultural grounding of the camp. Smoking ceremonies, Elders' openness and peer-to-peer support helped students feel safe, connected and ready to participate, especially on day one, when many were feeling nervous about attending the camp.

Students shared their experiences:

“It felt pretty special being able to connect with the Elders through medicine, smoking ceremony, it felt like I really shared a bond with them and enjoyed the stuff that they were trying to teach us.”

“Having all the Elders be so open to answer any question, no matter how big or small, is really comforting.”

“Something I learned on this camp is that it's OK to get out of your comfort zone, which most of these girls helped with, they made me feel welcome and safe, so it really helped with that.”

Some students also expressed a desire to take their new confidence back to school, including advocating for more Indigenous content in the classroom.

### **Contributing to the evidence base**

Deadly in Generation STEM continued to contribute to the evidence base for STEM camp education and educator professional learning through its evaluation approach and ongoing refinement of the program. Annual evaluation reports are publicly shared, and continuous improvement processes are driven by Monitoring, Evaluation and Learning (MEL) activities.

In 2025, the program applied the Ngaa-bi-nya evaluation framework for the first time, with findings planned to be published. The team aims to embed this framework in future MEL projects, supported by an Indigenous-based design approach to strengthen culturally grounded research practices for both Indigenous and non-Indigenous evaluators, practitioners and participants. These learnings will be applied to a revised impact pathway to ensure the pathway accurately reflects the progress and outcomes expected through the landscape, resource and ways of working underpinning the program.

Application of the Ngaa-bi-nya evaluation framework, by the CSIRO impact and evaluation team will continue to evolve, through an ongoing process of critical reflection and the allocation of resources to support increased leadership and input from Aboriginal and/or Torres Strait Islander stakeholders.

# Continuous improvement considerations

The following suggestions were distilled from this year's MEL findings, to support continuous improvement of both educator professional learning and STEM Camps for Indigenous students. In addition to these suggestions, learnings from the MEL project include the development of an updated impact pathway to capture the progress and outcomes explored in this report, and ongoing application of the Ngaa-bi-nya evaluation framework.

## Educator professional learning – with a Traditional Knowledge context

### **1. Build confidence first – especially for non-Indigenous educators**

- clear guidance on what is appropriate and respectful.
- Explicit permission to start small and build over time.
- Professional learning should reduce fear before it builds skills. Addressing uncertainty early unlocks educator motivation and action.

### **2. Make learning practical, hands-on and classroom-ready**

- Design PL so educators experience the learning as their students would. If educators can do it in the session, they are far more likely to do it back at school.

### **3. Provide ready-to-use resources that reduce workload**

- Well-designed resources are not “extra” — they are a core enabler of implementation.
- Reducing planning load increases uptake and sustainability.

### **4. Create space for reflection, discussion and shared learning**

- Professional learning is not just content delivery. It works best when it builds a community of practice around shared learning and problem-solving.

### **5. Educators identified opportunities to strengthen future PL by:**

- increasing hands-on activities (including outdoor learning)
- allowing more time to explore and practise using resources
- simplifying materials and reducing volume
- providing more examples for lower primary
- supporting educators to navigate community engagement
- creating structured follow-up opportunities to share what worked (and what didn't).

## STEM camps for Aboriginal and/or Torres Strait Islander students

### Practices to continue

**Place-based, community-led design.** Co-design with local Elders/Knowledge Holders and align camp and content and delivery to local Country and priorities; students strongly valued learning from local contributors and reconnecting to culture and family history.

**Culturally safe, intergenerational spaces.** Elders, Knowledge Holders, camp leaders and staff created environments where students felt safe, respected and supported to try new things, building confidence, wellbeing and cultural pride.

**High-expectations relationships + trauma-informed practice.** Setting clear behavioural expectations from day one, combining firm guidance with trust and respect, and pacing the camp to reduce overload helped students step out of their comfort zones.

**Hands-on, two-way learning.** Connecting Western science with Indigenous knowledges (e.g., bush regeneration with Rangers, language, bush medicine) made STEM real, relevant and strengths-based.

**Daily structured debriefs for staff/leaders.** Knowledge-circle style debriefs improved team coherence, behaviour strategies, and day-to-day adjustments; leaders reported strong benefits.

**Open with culture and connection.** Begin programs with a cultural grounding (e.g., smoking ceremony, local history yarn) for staff and students, to build safety and belonging.

**Model the behaviour you want.** Students mirror staff/leader collaboration and respect—show it, don't just say it.

### Practical considerations for running STEM camp activities

**Programming:** Favour fewer, deeper activities that link STEM to Country and culture; include quiet time on Country and daily knowledge-circle debriefs for staff. Publish a brief plan of the day for students.

**Use “hard & soft” timetables.** Fix the must-do anchors (safety, meals, debriefs), keep the rest flexible to match energy and conditions.

**Make knowledge transfer explicit.** Invite Elders/Knowledge Holders to link stories to concrete STEM practices (e.g., land care, astronomy), then give students a small action they can do back at school/home.

**Student recruitment and readiness.** Work through Aboriginal Education Officers and school-based programs; share clear, youth-friendly daily schedules early to reduce anxiety.

**Leader capacity and wellbeing.** Have a minimum of four camp leaders, pair new leaders with experienced mentors, plan leader breaks, and provide short behaviour-management refreshers.

## Conclusion

The findings from the 2025 evaluation demonstrated that Deadly in Generation STEM continued to create culturally safe, community-driven learning experiences that strengthened students' cultural pride, confidence, relationships and interest in STEM. The program's place-based approach, supported by partnerships with local Elders, Knowledge Holders, community leaders and camp leaders, enabled participants to connect deeply with Country, culture and each other, while embracing new opportunities and developing new skills. Primary and Secondary educators valued the educator professional learning delivered, increasing their confidence and competencies to apply learnings within their classrooms.

Continuous improvement efforts to address challenges—supported by monitoring, evaluation and learning practices and the application of the Ngaa-bi-nya framework—contributed to a clearer understanding of what makes a successful, sustainable and culturally grounded STEM camp model.

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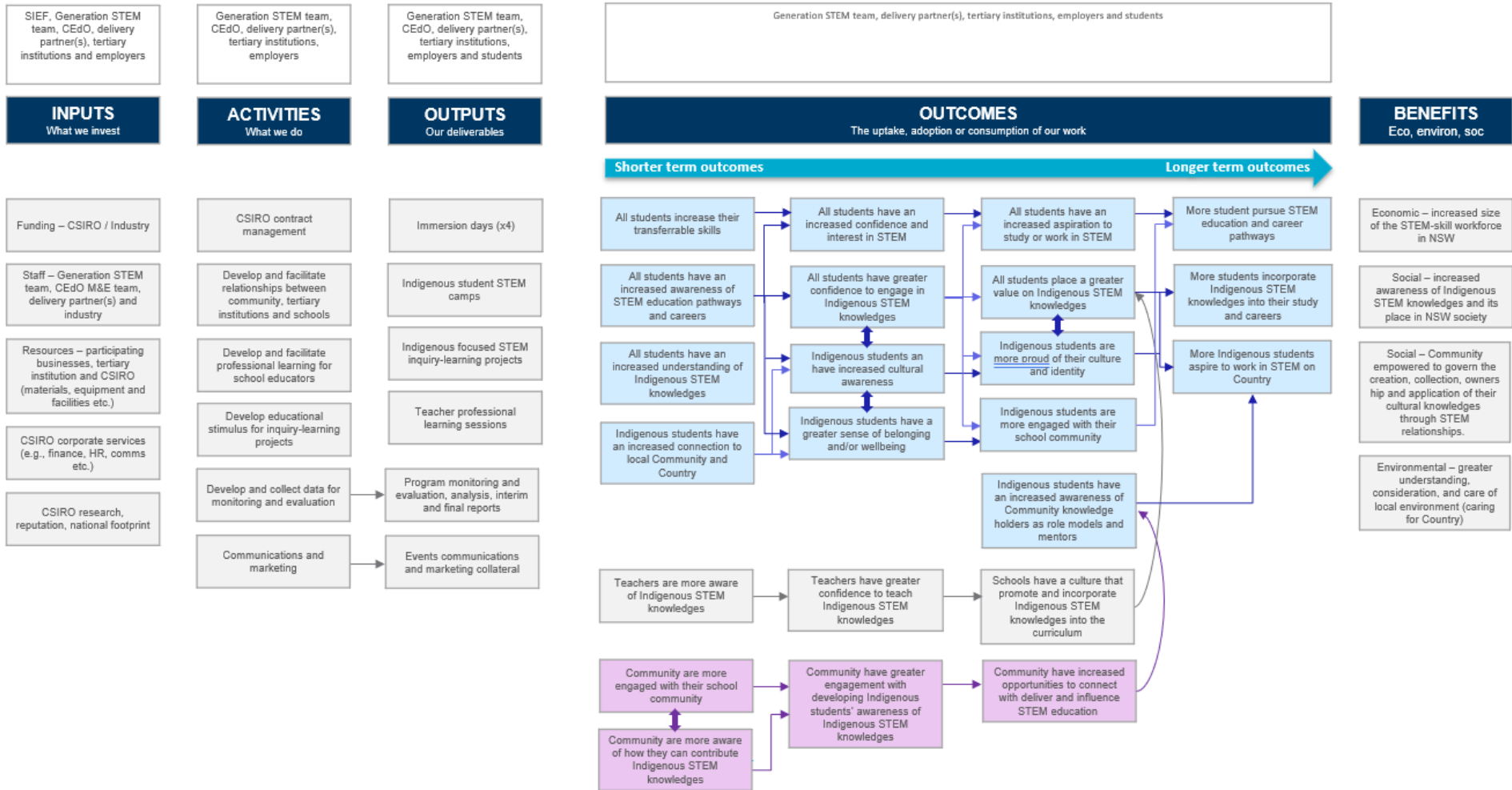
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# Appendix 1

**Impact Statement:** Deadly in Generation STEM (DIGS) aims to increase participation of NSW Aboriginal and/or Torres Strait Islander students in STEM through culture and on Country.

**PARTICIPATION:** Who we need to reach across the various parts of the pathway?





# Appendix 2

## STEM Camp data tools

### Adult participants discussion guide

*This includes community leaders, Elders, Knowledge Holders, and mentors participating in the camp*

1. What's important to you when it comes to the learning experiences of young people?
2. How do you think programs like this camp can make a difference in these areas, if any?
3. What would make you think that this camp has been a success? What would it look like and what would it do for young people?
4. Have you seen any of these changes in the young people while they've been on camp?
5. What was it like to spend time with the young people at this camp? What did that mean for you?
6. What's your role in contributing to the positive experiences your young people have and to them achieving these goals? How would you like to continue to be involved with these young people?
7. Since participating in this camp have you felt any change in your own role in relation to young people, or your role in the community or at school?
8. How well does the camp align with what you're trying to achieve in the community and in education for your young people? If you could make any changes, what would they be?
9. What have you enjoyed most about your time in the camp?

### Camp supervisor discussion guide

Thinking about students and their experiences, outcomes....

1. What's working well?
2. What's not working well?
3. Any stories of learning or success that you've observed?
4. Any other comments about your experience on camp?

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### Camp leader discussion guide

1. What worked?
2. What didn't work? locations, activities, programs, supports etc
3. What learnings were there?
4. What could we do differently next time?
5. What else/Who else would you like to see in the program?
  - a. activities, organisations, knowledge holders might you recommend connecting in with?
6. How could we better promote this program to schools, family, Community and students?

### Student research yarning guide

1. What it's been like to be part of this camp?
  - a. *(Explore: most enjoyable time; most challenging time, feeling engaged, listened to)*
2. Is there anything we could change about camp to make it better?
3. What do you feel like you've achieved while on camp? *(Explore –new knowledge, capabilities, confidence, connections, interests & aspirations, giving back to community)*
4. What helps you to achieve your goals and to participate in activities like this camp?
5. Since participating in the camp:
  - a. Have you felt any difference in how you think or feel about yourself and your ideas for your future?
  - b. Have you felt like you've connected with other people? Do you think you'll keep in contact with anyone? (i.e. other students)
  - c. Have you felt any change in how you see your connection to this community and Country?
  - d. Any other differences in what you might do or how you think?
6. What was it like to spend time with (camp leaders and Elders) what did that mean for you?
7. Has this camp influenced your goals around studying STEM or a STEM career?
8. Have you discovered anything new about STEM that interests you?

**Student survey summary of key questions**

1. What grade are you in at school?
2. Do you identify as Aboriginal and/or Torres Strait Islander? (list of cultural identity options provided)
3. For each statement below, think about how you were BEFORE camp and how you are NOW. Each time, tick a number on the scale that reflects your strengths in each area. (1 = lowest score and 5 = highest score).
4. Awareness: Has your awareness of STEM and culture changed since taking part in the Deadly in Generation STEM camp. *Please rate your awareness **now** and **before camp** for each statement.*
  - a) My awareness of different STEM subjects I could study in the future
  - b) My awareness of different STEM-related jobs I could have
  - c) My awareness of local cultural Knowledges including stories and language
  - d) My awareness of Indigenous STEM Knowledges
  - e) Can you tell us more about what you've learned since being on the Deadly in Generation STEM camp? (free text)
5. Interests: Have your interests in STEM and culture has changed since taking part in the camp?
  - a) My interests in studying a STEM subject in the future
  - b) My interest in working in a STEM career in the future
  - c) My interest in using STEM skills in whichever job I choose in the future
  - d) My interest in taking part in traditional and cultural activities in the future
  - e) Can you tell us more about any new interests you have since being on the Deadly in Generation STEM camp? (free text)
6. Wellbeing: Have any of your following feelings changed since taking part in the camp
  - a) My level of pride in my culture
  - b) My feeling of connection to my culture
  - c) My feeling of respect for my Elders
  - d) My feeling of confidence to pursue my school and career goals
7. My Connections: Have you made any new connections since being on camp? Please rate your level of agreement with the following statements:
  - a) After taking part in the Deadly in Generation STEM camp:

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- b) I have made connections with at least one new student that I can share my STEM interests with
  - c) I have made connections with at least one new mentor that I can talk to about my STEM interests
  - d) I know where to go to connect with other students and where I can be proud about my culture
  - e) I know more about local organisations and people that I can ask about my cultural Knowledge
  - f) Can you tell us more about any connections you've made on camp? (free text)
8. Satisfaction: How satisfied (or happy) are you with your experience at camp? Please rate your level of agreement with the following statements:
- a) Taking part in the camp was fun
  - b) Taking part in the camp was useful
  - c) I felt welcomed and supported at the camp
  - d) I was listened to by the camp staff
  - e) I would recommend the camp to other students
  - f) I would like to be involved in the camp next year as a Student Ambassador
9. Is there anything else you'd like to tell us about these aspects of camp? (free text)
10. What has been the most useful part of the camp for you? (free text)
11. What, if anything, could improve the camp? (free text)
12. Which of the following best describes your gender? (list of options provided)

## Educator Professional Learning data tools

### **Educator survey summary of key questions**

1. Please write the date of your professional learning
2. What is your role(s) at your current school? Please list any current or recent leadership positions if applicable
3. Do you identify as Aboriginal and/or Torres Strait Islander? (list of options provided)
4. How many years have you been an educator (both in and out of the classroom)?
5. Overall, how satisfied were you with the professional learning? (scale provided)
6. How valuable were the following elements of the professional learning? (scale provided):

- a) Hands-on activity with inquiry
  - b) Planning the inquiry project for your class
  - c) Linking Indigenous knowledges to the curriculum
  - d) Learning about cultural considerations in the classroom
  - e) Understanding ways to strengthen partnerships with the Community
7. After participating in the Professional Learning, please rate how much your capability has improved, if any, in the following areas (scaled provided)
    - a) Inquiry based learning methods
    - b) Teaching with Traditional context
    - c) Implementing an inquiry lesson with my class
  8. Is there anything else you found valuable about the PL?
  9. Is there anything that could be improved for future PL?
  10. In what way are you planning on using the resources shared today, in your classroom?
  11. Is there anything else you would like to share about the PL?

## **Educator discussion guide**

### **Welcome and introduction**

1. Can you tell us where you and/or your school is on our journey of implementing the STEM inquiries within an Indigenous context? (i.e. planning, early refining, embedding)
2. What are some of the inquiries you've incorporated into your lessons this year?

### **Process and skills**

3. Is there anything you do differently in your teaching, because of the PL?
4. Has there been a transfer of skills or resources across your school or with other schools, following the Deadly in Generation STEM Teacher Professional Learning?
5. Second year participant question: How would you rate your confidence in implementing Indigenous knowledges into the curriculum now, compared to before you started the program?
6. Second year participant question: Have your skills, knowledge and confidence changed over the time you've been part of this program? If so, how?
7. Would you like to share any Indigenous STEM Inquiry success stories – no matter how small?

### **Implementation learnings**

8. How are your activities going and can you share about your experience? (prompt: challenges, learnings, enablers, successes)
9. Is there anything happening at a whole of school level or with other schools because of your involvement in the program? (prompts: curriculum, school culture, extra-curricular activities, NAIDOC, Science Week)

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10. Primary school participant question: How have you adapted the resources to fit your primary curriculum priorities/activities?
11. Primary school participant question: How could this program support primary school educators better, are there activities or initiatives that we could build on/leverage?
12. Primary school participant question: What are the barriers to implementing this within your primary curriculum? When does it work well for primary school teaching?

### **Student and other Outcomes**

13. How did your students engage with the enquiries?
14. Which students benefit most from this approach? Where do you see the biggest impact?

### **Aboriginal and/or Torres Strait Islander community engagement**

15. Have you engaged with Aboriginal and/or Torres Strait Islander staff members or members of your community around classroom learning? (prompts – what worked, what didn't)

### **Program co-design**

16. Are there ways the program could do more to support you to achieve your goals around STEM inquiries?
17. Are there other programs or strategies outside our program that you find helpful?

### **Program context and system level influences**

18. Are there broader issues that impact your ability to deliver the inquiries? (any common system level barriers could be prompted here). Do you have strategies to work around these or address these? Is there anything the program could do more to address these?

## Appendix 3

### Camp leaders and supervisors: Knowledge Circle for sharing and decision making (program practice -not an evaluation tool)

#### **Circle guidelines**

The discussion is facilitated to support sharing and decision making at the end of each day.

Everyone's perspective is equally important and valued, regardless of role and experience.

Being together in a relaxed environment in a formation that feels comfortable – it doesn't have to be a circle.

Wait until two other people have contributed before speaking again.

Spend a few seconds absorbing what others have said before responding.

When a decision is needed, it needs to be supported by all members of the discussion before the session can be ended.

If more complex relationship-based discussions are needed, these can be taken outside the Knowledge Circle for deeper discussion.

#### **Guiding Questions**

What went well today?

What could we do differently tomorrow?

What more information or support do you need?

Is there anything you want to share with the group?