



Deadly in Generation STEM Insights 2024

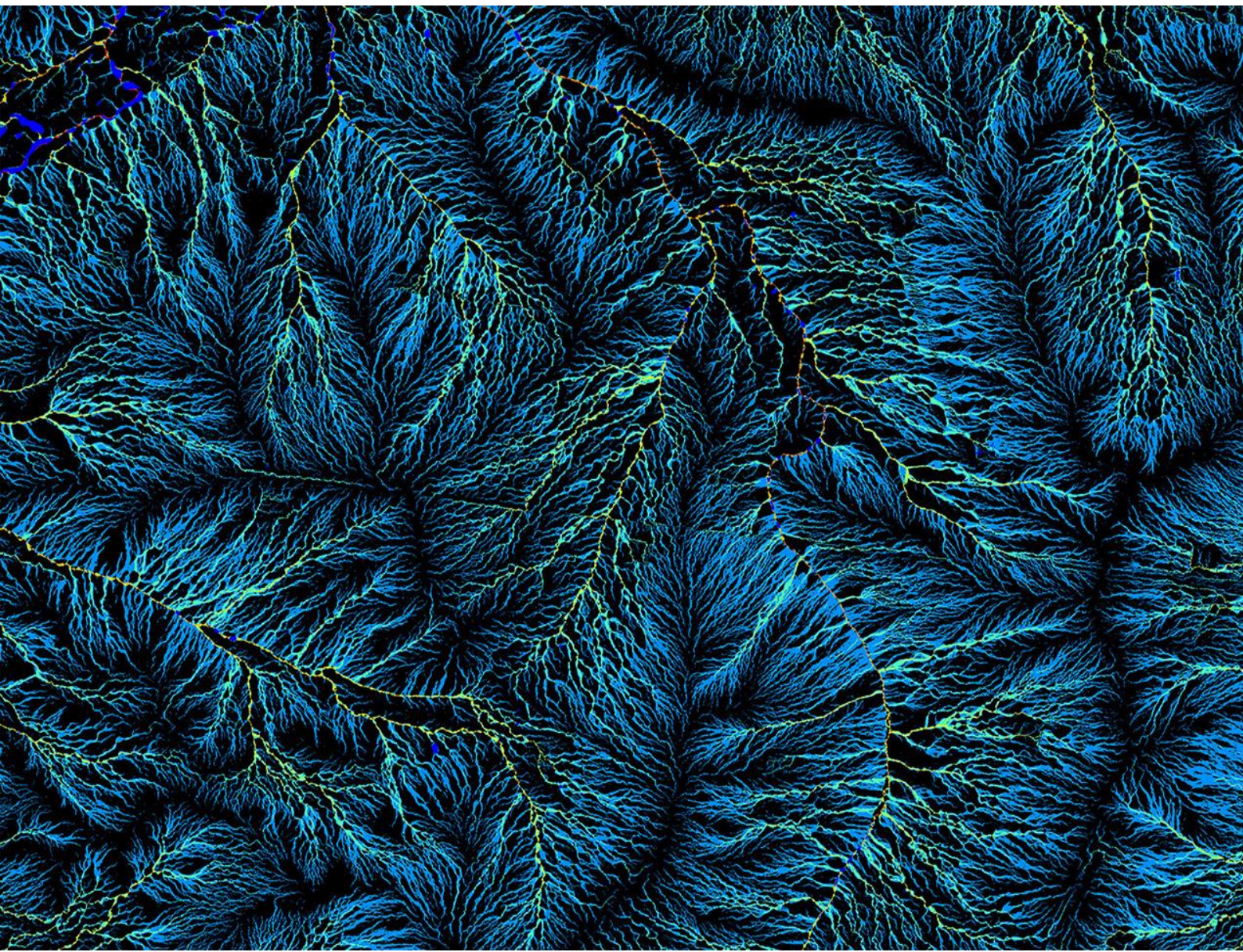
‘There is a bright spirit that burns in all of us’

- Aboriginal Knowledge Holder speaking with young people on a STEM camp

Generation STEM camp findings

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April 2025



Executive Summary

Deadly in Generation STEM is part of the Generation STEM initiative, funded by the NSW Government and delivered by CSIRO, to attract, support and retain NSW students in STEM and school into further education and employment. The Deadly in Generation STEM program is currently delivered in two NSW regions: Kamilaroi Country (Moree - Narrabri) and Dharawal Country (Illawarra).

This report provides a 2024 evidence snapshot of learning outcomes of the Deadly in Generation STEM program's STEM camp activities. This evaluation was led by a non-Indigenous evaluator, working closely with the Deadly in Generation STEM program team and Aboriginal camp leaders to deliver a strength-based and reflexive evaluation methodology. This Insights report looks deeply at feedback from Aboriginal and Torres Strait Islander participants and their perspectives on the program's STEM camp activities. Overall, minimal interpretation of the evidence was undertaken, instead, a significant number of direct quotes are included in this report to more fully and directly represent the views of participants.

This report highlights the following learnings:

The program's multi-generational model of sharing knowledge is something that all participants identify as one of the most valuable aspects of the STEM camps. Students on camp valued engaging directly with Elders, Knowledge Holders and camp leaders, describing an enhanced understanding when on Country. There was a consensus from Elders, Knowledge Holders and camp leaders that young people thrive on a foundation of cultural knowledge and connection, and that they need support from older generations to do this.

Participants expressed the importance of spaces for genuine engagement with culture outside of schools, and the significance of involving Elders and other Knowledge Holders. Connecting with Elders and Knowledge Holders in the camp setting provides young people access to culturally grounded wellbeing practices that they don't often experience elsewhere.

When young people stepped out of their comfort zone, into a safe, culturally grounded camp environment influenced by Knowledge Holders and Elders, they reported positive benefits including identity formation, personal growth, and the development of social connections.

The STEM camps provided students with a different way of thinking about their future and their careers, based on curiosity, personal interests, strengths, and broader possibilities than they previously imagined. This was enabled by contributions from camp leaders, STEM professionals, and Elders.

The significance of learning on Country with local Knowledge Holders was also highlighted by participants as important for its role in building local connections and contributing local knowledge to students' learning experience.

Several Knowledge Holders reflected on the importance of connecting with students not just during camp, but at other times throughout the year. This reflected their acknowledgement of the gradual learning that occurs over time as well as the importance of continuing to build on the relationships established during camp

Program staff and camp leaders identified several challenges to delivering the STEM camps including facilitating groups of students through a busy camp itinerary as well as securing return camp leaders each year. Camp leader commitment was not guaranteed each year partly due to the short-term and changing nature of the program's camp activities and competing with camp leaders' other education and employment commitments.

Engaging young Aboriginal STEM professionals as camp leaders is a key component of this program and the camp leaders interviewed described an experience that positively influenced their own connections with Country, culture and/or broadened their STEM career pathways. The final part of this report describes their experiences and critical factors for a successful model of inclusion in the program.

Introduction

As part of the ongoing monitoring and evaluation of the Generation STEM initiative, this 2024 summary report was developed by the CSIRO Education and Outreach Impact and Evaluation Team and aims to provide a 2024 evidence snapshot of learnings outcomes of the Deadly in Generation STEM program's STEM camp activities. This evaluation was led by a non-Indigenous evaluator, working in close collaboration with the Deadly in Generation STEM program team and Aboriginal camp leaders to deliver a strength-based and reflexive evaluation methodology. CSIRO acknowledges the time, knowledge and expertise contributed by Aboriginal staff and camp leaders to guide the evaluation data collection tool design and implementation as well as qualitative data collection such as facilitation of student yarning circles. Aboriginal and non-Indigenous staff and leaders contributed to the interpretation of findings in this report, however, are not listed as co-authors, in line with ethical and privacy approvals received on this evaluation project¹.

Due to the place-based nature of the Deadly in Generation STEM program (in two locations: Kamilaroi Country (Moree - Narrabri) and Dharawal Country (Illawarra)), its design and delivery continues to evolve in response to local community needs and strengths and therefore, the purpose of this evaluation evidence is to support the further development and continuous improvement of the program. In 2024, the program held its first student camp on Kamilaroi Country, and third camp/immersion day event on Dharawal Country. The student ambassador program was continued to include ambassadors in camp and other activities. The Generation STEM evaluation report 2019-2022² and Insights report 2023³ includes learning from the program's previous establishment years, while this Insights report looks more deeply at feedback from Aboriginal and Torres Strait Islander participants and their perspectives on the program's STEM camp activities. While consideration to community context was made when generalising report findings from the student camp activities, findings included in this report represent common emerging themes across both locations. Findings from the Teacher Professional Learning component in 2024 are not included in this report and were reported and utilised internally to support CSIRO Education and Outreach's continuous learning processes.

¹ Ethics approval for this evaluation project was granted by CSIRO's Social and Interdisciplinary Science Human Research Ethics Committee (CSSHREC)

² Banks, Chris; Miller, Kate; O'Brien, Mearon. Generation STEM: evaluation report 2019-22. CSIRO website: CSIRO; 2023. [csiro:EP2023-5111. https://doi.org/10.25919/tybc-wq69](https://doi.org/10.25919/tybc-wq69)

³ Cherry, Kate, Deadly in Generation STEM Insights Report 2023, CSIRO website: CSIRO; September 2023.

Methodology

This report is based on the data available for Deadly in Generation STEM camps during the 2024 calendar year. A high rate of evaluation participation occurred due to the participants' high levels of engagement in the program overall and because there was time and space provided to participants to reflect and provide feedback and perceptions through embedded evaluation activities. Although participation in the evaluation activities was voluntary, a high number of camp attendees decided to opt in, in part because the time was embedded in the camp itinerary, with student surveys and yarns occurring on the last day of camp, and interviews with Knowledge Holders occurring throughout camp. These were facilitated by camp leaders and the embedded evaluator respectively and students were able to opt out of any questions as they were asked. Staff and camp leader interviews occurred after the camp. This report draws on:

Perspectives from Aboriginal and/or Torres Strait Islander⁴ participants:

- survey data representing the views and experiences of 24 students that participated in a camp
- qualitative data from 24 students that participated in camp yarning circles
- qualitative data from 5 student ambassadors that participated in a yarning circle
- qualitative data from 1 CSIRO program staff member
- qualitative data from 5 camp leaders
- qualitative data from 2 Knowledge Holder⁵ participants

Perspectives from two non-Indigenous program staff

Program description

Deadly in Generation STEM is part of the Generation STEM initiative, funded by the NSW Government and delivered by CSIRO, to attract, support and retain NSW students in STEM and school into further education and employment. The Deadly in Generation STEM program is currently delivered in two NSW regions: Kamilaroi Country (Moree - Narrabri) and Dharawal Country

⁴ 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 peoples, programs and/or initiatives.

⁵ These participants identified as Knowledge Holders rather than Elders, explaining that they had not been formally initiated to the role of Elders.

(Illawarra), in response to anticipated workforce demands in high-growth industries such as advanced manufacturing, agribusiness, and Information and Communications Technologies.

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

1. Teacher Professional Learning (TPL) for local primary and secondary educators
2. Two-way Science⁶ camps for local Aboriginal and/or Torres Strait Islander students with an interest in STEM.

In 2022 and 2023, the program included four-day immersion events delivered on Country, consisting of two-way science activities such as ecological walks, traditional medicines, boomerangs to drones, traditional painting and dance with Local Knowledge Holders and visits to two cultural sites of significance; sustainable buildings tour with local Indigenous engineering, traditional weaving, and a university campus tour with local Aboriginal STEM professionals. CSIRO science was also incorporated through Sky Stories with Indigenous CSIRO scientist and ex Wollongong Alumnus Stacy Mader, and Chemistry of Traditional dyes with a CSIRO Phd Candidate and local Indigenous Academic.

In 2024, the four-day program activities were extended to include a Grandfather Sun Ceremony⁷ with local Knowledge Holders, and bush regeneration with Illawarra Local Aboriginal Land Council. In 2024, the program design was expanded to include of a small number of previous camp participants in the role of student ambassadors. In this role, the returning students engaged with camp participants to deliver a series of Indigenous STEM activities. New camp leaders were also engaged in 2024, including a CSIRO Indigenous Scholar from the University of Wollongong, who facilitated a marine biology activity on Country, making connections to the CSIRO Atlas of Living Australia Project.

In response to evaluation findings, the 2025 program will be enhanced to incorporate changes such as longer camp activities, extended to a five-day period; and a reduction in the number of activities delivered during the camp to allow for deeper learning and reflection of key two-way science

⁶ Two-way Science is a science pedagogy for students that links Indigenous knowledge with Western science.

⁷ The Grandfather Sun ceremony is drawn from Uncle Max Dulumunmun, Elder of the Yuin Nation, *My People's Dreaming*, 2009. Dharawal Country is part of the Yuin Nation, and Uncle Max reestablished a men's initiation process, and Uncle Dean Kelly has continued this legacy. A series of Yuin knowledge holders, including a 2025 camp leader have been through or are currently going through Initiation. As part of this learning, they were granted permission to perform a Grandfather Sun ceremony at the 2024 Illawarra camp.

concepts. The focus will include exploration of the role the Land Council play in the local Greater Glider conservation project, and a trip to Symbio wildlife park.

Input from Knowledge Holders has prompted the incorporation of a cultural canoeing tour through Country, exploring the local waterways and ecosystem of a significant site.

The program continues to prioritise the engagement of established camp leaders, with one camp leader returning for a fourth year and another for a second year. A returning student ambassador now graduated from high school and enrolled into Social Sciences at the University of Wollongong will take on the camp leader role in 2025, as the program continues to support and retain Aboriginal students in STEM.

Glossary

Camp leaders. Aboriginal STEM tertiary students or early career professionals who led 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.

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

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.

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.

Summary of findings

The findings in this report (similar to the Generation STEM 2019-22 Evaluation Report and Deadly in Generation STEM Insights Report 2023) are formative in nature and correspond to the program's development (specifically the STEM camps) in 2024, including emerging outcomes, and continuous improvement learnings.

For this Insights report, evidence is primarily drawn from Aboriginal and/or Torres Strait Islander STEM camp participants. Findings have been themed to highlight concepts shared by Indigenous participants and enact CSIRO's Stretch RAP key messages of 'Working together' and 'Amplifying Indigenous voices' (CSIRO, 2024).

Evaluation questions were guided by relevant program theories of change and refined and contextualised in collaboration with program staff. Theory and deductive reasoning were applied to the initial phase of evidence analysis. From this, a second iterative process of inductive coding occurred, generated to reflect recurring and key concepts in the data. Sub-themes were then generated to link concepts within the data. Overall, minimal interpretation of the evidence was undertaken, instead, a significant number of direct quotes are included in this report to more fully and directly represent the views of participants.

Deadly in Generation STEM Key evaluation questions elicit implementation and outcome learnings including:

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

Evaluation discussion guides for camp participants are included in Appendix 1.

The following sections collate the perspectives of a diverse group of Aboriginal and/or Torres Strait Islander participants currently living on Kamilaroi and Dharawal Countries in New South Wales into different themes. Participants, including students, student ambassadors, camp leaders, and Knowledge Holders, have connections to a range of Country and language groups and participants acknowledged that their views were not representative of others, but a reflection of their own experiences.

Why involvement in this program matters to participants

Many of the young people participating in the program describe a school environment where connecting with their culture and sharing traditional knowledge is impacted by a general lack of understanding of Aboriginal culture, token experiences of inclusion, and occasional bias and racism. These same students are often seeking more genuine and Indigenous-led cultural connections.

One student explained: 'In terms of the history - that is very whitewashed. But then in terms of the Indigenous activities in schools, I feel like sometimes it is just a bit pushed and repetitive. You are not learning. It is just all the same activities, like "You guys are Aboriginal, this is kind of what you do".'

Occasional examples of positive change were raised by students and Knowledge Holders, such as the increase in culturally informed or Indigenous-led programs and frequency of discussion throughout the year, not just inclusion limited to events such as NAIDOC week. However, several students, particularly the student ambassadors, highlighted barriers to genuine cultural connection in the school environment, including difficulties for individual educators to incorporate Aboriginal context into a fixed curriculum; the presentation of a consistently colonised view of Australian history instead of from an Aboriginal perspective; and a general lack of knowledge from educators.

One student described a recent experience highlighting this general lack of understanding of the nuances of Aboriginal cultures.

I know lots of non-Indigenous people, they just look at dot paintings and go "Aboriginal", but they don't know where the dot painting comes from. They don't see the story behind it, they don't understand the symbols and they don't know dot paintings. It wasn't our first art works, our first stories. It was lines in the sand. That's how our stories were passed down. It wasn't just through paintings, so it would be cool if they could understand the history and be like "That's actually really cool, can I learn more about it".

Across program evaluation evidence, students consistently reported valuing the input of Elders and Knowledge Holders above most other activities. For young people seeking stronger cultural connections, their school-based experiences typically rate poorly compared to the immersive camp experiences. One student summed this up well, reflecting similar comments from other students:

I feel like at a lot of schools, we're only just now incorporating Aboriginal programs and activities, so I feel like a lot of kids aren't very well-informed, and if they are, I feel like

some of the information can be limited, whereas bringing them out to this camp and having face-to-face talks with Elders and actually get to know them and their story is – no offence to schools, but it's able to do so much more than what schools can teach because no matter what they put up on a whiteboard or no matter how they talk to you about it, the experience and information you'll get from talking straight to an Elder, like multiple Elders like we have on this camp, is going to beat that 100 per cent.

There was a consensus from Elders, Knowledge Holders and camp leaders that young people thrive on a foundation of cultural knowledge and connection, and that they need support from older generations to expand their experiences with new connections and broader mindsets. One Knowledge Holder explained his perspective on this:

Too often we see young people, they rely just on a person, or a person in that same circle, and therefore they're only getting the one perspective. And I don't think it's good for growth because your mind needs to expand, a bit like our universe, which expands all the time. I think our minds are pretty much like that. I say if we're out there and we're meeting other people, and we're sharing stories or knowledge, or even conversation, from that we're learning about other people.

Another Knowledge Holder explained that this participation in positive activities can cultivate a broader perspective, including through culture and learning, and supports a strong personal foundation in life, saying 'unless you're strong, you're not going to continue because you've lost all your foundation. I always think that that's one of those things where people need those foundations to be solid.'

Elders and camp leaders talked about the importance of keeping culture going for future generations and their role in sharing knowledge with young people as part of this. This often included encouraging young people to step out of their comfort zones into new experiences. One Knowledge Holder shared his motivations:

To revitalise language, dances, and culture, to keep it going for the next generations, that's what I like to do, is keep that tradition going, teaching. Even though we've got books and pens now, it's a hands-on experience, face to face. I find kids get more enjoyment out of it, and feel proud of themselves too, or feel happy that they learnt the dance. At first they're a bit shy to jump up, even just language, or learning about stories and local knowledge of the land that's been handed down through generations.

In summary, participants involved in the program (including students, Knowledge Holders, Elders and camp leaders) expressed the importance and need for spaces for genuine engagement with culture outside of schools, and the importance of involving Elders and other Knowledge Holders.

The value of connections

Students on camp valued engaging directly with Elders, Knowledge Holders and camp leaders, describing an enhanced understanding when on Country. This approach was not commonly described by students outside camp, inferring that students don't generally experience cultural learning through a strong focus on local connection and relationship development like that offered during camp.

One student commented, 'spending time with the Elders as well meant a lot to me, because I don't get to do a lot of that. And it was just great to see everyone's backgrounds and where they've come from and what they've been through in their life, and all their stories that they could share.'

Another student shared how important the camp was to connect with Knowledge Holders, 'If you want to connect with your culture, and you don't have much of a chance to do that in school, coming on this camp is a must because I've learnt so much that I never would've learnt, even with [my school] who try their best, but they'll never beat having an Elder talk to me straight up. I feel like it's a must-have for anyone who wants to deepen their information'.

One of the student ambassadors explained that the camp environment created opportunities to develop new friendships and social connections that weren't possible through school, and that this in turn strengthened their connection with culture. Other participants focused on the benefits of connecting on Country, exploring nature alongside new friendships in a way that they didn't do at home. One student shared, 'what I really liked about it was just how connected to Mother Earth I felt. I've never really felt that connected before, and how much the earth and stuff actually gives to us, really stuck to me.'

Some students described their connection as feeling 'informed' and 'included', resulting in a better understanding of the activities they were doing and their full cultural significance. Similarly, Elders and Knowledge Holders explained that when time is taken to fully immerse in culture, it can provide ways of thinking that support strong mental health and wellbeing for young people. One student explained the value of this using the example of Grandfather Sun and Grandmother Moon.

Introducing us to the Grandfather Sun and the Grandmother Moon helps us connect more to the Earth and feel more encouraged to be connected to our culture, but also for the dance, we did the dances that we were doing, obviously we were talking about Grandfather Sun and Grandmother Moon, and I feel like if we had never done that activity we would've been so confused when we did the dance because we would've been like, 'Grandfather Sun, Grandfather Moon, what's that?' But because we actually took part in that activity and we understood the meaning of it, I feel like it actually let us understand what they were talking about, and we were able to include ourselves in that conversation.

Several other students spoke about this activity, including one student who explained how it influenced their way of thinking more broadly,

A big thing I took out of it was the gratitude about it, and that it made you really think like if you keep on thinking about what you don't have you never realise what you do have. And I reckon that's one thing that I found really, really beautiful about that. And it just helps you stay humble and you understand what you have and you're grateful for it, and you can take so much of that stuff into real life, and I find that super cool.

The young people interviewed agreed that connections around learning were strong areas of focus for those sharing knowledge with them. For example, the ways of connecting were through relationship development, the application of learning over time to different real-life situations, and connections with Country.

One camp leader commented, 'our focus on relationship building with the young people is really strong for all of us camp leaders, and I think that really showed at the end of it that above culture and above STEM was also the relationships that they were building with their community and with us.'

Typically, student camp participants were not accompanied by others in their school-based friendship groups. This is due to program guidelines recommending one male and one female student to be nominated from each eligible school. This nomination criteria were informed by consultation with local Aboriginal community leaders and was designed to support the creation of new peer networks of Aboriginal students in the local area and to prompt educators to identify 'high potential students' that might be disengaged in the school context, but with potential to engage on Country. Not all students felt that they formed sustainable connections across their new peer group at the camps; however, when students did form new connections, they tended to identify them as benefits of the program. One student valued 'the experience with our [new] friends, and sharing

and making memories’ and another commented that the learning experience felt enjoyable because ‘we mainly have each other’s backs and we can count on each other and it’s mainly about doing stuff with them.’

Students also spoke positively about connections formed with camp leaders, not just around culture and STEM, but connecting informally and light-heartedly as well. Several students described the impact this had for them:

I feel like it was really, really fun spending time with the camp leaders. We had a lot of laughs, and I didn’t feel awkward talking to them and we connected heaps. When it was down time and stuff in our dorms, it was really fun to just sit down and talk and laugh a lot.

I feel like the camp leaders were great people to be around, and they really made sure that the morale was up all the time. There was full on good energy, and it was a lot of fun.

I found the connection with the camp leaders and the Elders very important. It felt very different to anything else that I’ve ever gone to, like school camps, any other camps, because it actually felt like the camp leaders were actually friends, instead of some unnecessary social hierarchy where the camp leaders and teachers and educators are higher than the students, and they cannot come and talk to people, the actual staff. It felt really safe, and it just felt like it was more of a little family, to be honest.

Several camp leaders commented that formal and informal connections made around learning resonated with participants and were highlighted well across the camp, relaying that ‘the threads of STEM and culture were pulled together really well and there were a lot of connecting points throughout the days.’ This wasn’t a common way of learning for most participants, and it resonated with the students, providing Two-way Science connections, and connections with identity, community, and to potential career aspirations. Several students talked about these learning moments and the impact it had on their awareness of potential applications in their future careers:

The astronomy activity that we did, that was – I knew I liked looking at stars and astronomy but looking at it from an Aboriginal perspective, that did change because I didn't look at it like that before, that made me a bit more interested to it.

...being able to participate in the dances and being able to actually relive my culture again, and be given an opportunity to further pursue my culture. And knowing that being Aboriginal and learning about certain Aboriginal topics can actually lead to jobs, because with the limited info I've had I always thought being Aboriginal was just celebrating your culture, I didn't realise there was actually really important jobs that involve around the information you have about the Aboriginal culture, and how important it actually is, and how deep it goes.

I feel like it's able to link me to a career path I'm interested in, as well as revive my connections to culture. I feel like I can actually contribute to both society and myself with culture.

A stronger sense of self based in culture

Elders and Knowledge Holders spoke with conviction about the benefits of culture to support young people with their wellbeing and a strong sense of self. One Knowledge Holder explained his own journey and how he reciprocates for young people now.

Culture really helped me, I run into Kamilaroi Elders that teach us the Kamilaroi ways. I think I was just lucky enough to have that bit of guidance too. That's why I try and keep it out there for the young fella these days to help them, whether it's re-engaging at home with the family and good behaviours, or re-engaging at school and learning. I think just that someone showing a young fella a bit of time, they appreciate it.

It's so easy to go down the wrong path. But whenever I see any young fellas getting into a bit of trouble around town, getting into real trouble...I like to be able to get them little fellas and have a yarn with them, and chuck them in a couple of dances. And once they come off the stage, or off the dance ground, after a dance, they feel real proud.

Connecting with Elders and Knowledge Holders in the camp setting provides young people access to culturally grounded wellbeing practices that they don't often experience elsewhere. Another

Knowledge Holder shared how his connection to culture and Country is part of his wellbeing and that he shares this understanding with young people.

This morning when I was up, 10 black cockatoos flew over. So you acknowledge them, and basically when you acknowledge the black cockatoos - or what we call them, 'Balireh', 'Balireh' is the name for black cockatoo. But if you acknowledge them when they fly over and they're squawking and stuff like that, they'll bring you great fortune. Not in money but in spirit with rejuvenation, because what the black cockatoo is all about is bringing the rains, and it rejuvenates the land. When you acknowledge them, you can then choose to rejuvenate yourself, which means you evaluate yourself. You say, "Okay, what can I do to be better?"

When young people stepped out of their comfort zone, into a safe, culturally grounded camp environment influenced by Knowledge Holders and Elders, they reported positive benefits including identity formation, personal growth, and the development of social connections. Student ambassadors described this in a few ways, including 'I feel like for me it has helped me get out of my comfort zone. I feel like last year before I went to the camp, I was terrified, but I didn't talk to anyone and now I just talk.'

Another student ambassador shared, 'I feel like with this camp I have become more proud of being Aboriginal. I have learnt so much of being Aboriginal, whereas at school, NAIDOC week it's just like this is a dance, this is about this, do it, perform it. But here, in the STEM camp you learn what it is about, why we are doing it, how it connects back to our ancestors or history and stuff. More in-depth.'

One of the younger camp participants commented, 'Just connecting with the Earth and bonding with everyone and making good connections. Preparing you for your future self and what's ahead of you in life. Just see it as a really good opportunity for everyone in life.'

Another student shared the following experience,

I felt actually very different between the start of the camp and the end now. It was really hard for me to go out and connect with people. I had extreme anxiety, social anxiety, and a lot of the times, a lot of interactions with new people, or in situations where I felt overwhelmed ended with me having a shutdown or something like that. Now I feel like I've just – it's better now. It feels like I've been able to talk to people

without feeling like that, and I'm hoping that it will continue like that, to be positive, once I go back to school and just throughout other days. But I felt just incredibly safe here with these people.

Future possibilities imagined through STEM and culture

The STEM camps provide students with a different way of thinking about their future and their careers, based on curiosity, personal interests, strengths, and broader possibilities than they previously imagined. This is enabled by contributions from camp leaders, STEM professionals, and Elders. The following quotes from students on their last day of camp highlighted not only the diversity of student starting points, but also the various ways the camp positively influenced some students to imagine the possibilities in their futures.

I originally wanted to do a career in the social sciences to do with like pharmaceuticals, but I do marine biology as a subject in school, and I never thought of it as a career until now. I actually really, really enjoyed it and it would be great to see more about what it could be as a career.

I don't enjoy STEM as much as other people. I'm more of a sporty type of person. But I feel as though there's so many great pathways you can go in with science, and other different programs and stuff you can get in, because I don't really know what I want to do. But I feel like there is always options for me if I want to go down that path. And I feel like a lot of the camp leaders, and what the activities were, were really cool, and I feel as though maybe one day I could do that.

I've always been interested in STEM. I like both the science and engineering sides of it. But for me, the camp has really reaffirmed that I do want to go into a science. And I kind of forgot that there was science other than medical science. And before, I was really focused on that, but now I know that there's a bunch more, and it's reminded me that I don't just have to go for medicine; I can go for anything in the – especially in the realm of science and STEM.

I always wanted to work on aircraft, like aerospace engineering, aeronautical engineering with commercial aircraft. I still do, but this camp has given me a chance to realise that there's also career paths in other stuff that I love, including marine studies,

marine biology and that some stuff like that is actually available, and you can do that as a career..

Learning that song lines in music just in general could help with – and dancing as well could tell stories and instructions, and just help you get around and learn about things [about your future plans/decisions].

I always had a bit of an understanding of my culture, but this has really widened it. I was always thinking of just probably becoming a tradie or something, but this has expanded my work paths. Engineering would be pretty cool too.

I feel like having learnt about everyone's career paths and their journeys to become what they are, I feel like that can prove to us that even all of our passions, it might not lead to jobs but it actually can, and you can do the stuff you love, and I reckon that's really cool, and that made me open my eyes a bit.

I feel like personally it's affected me a lot because in Year 11 and 12 I'm studying both legal side and earth and environmental science, and talking to [camp leader], she said that you can actually go into something called environmental law where you fight for country, and you can also bring your Aboriginality into that, and it can link in with your culture, and it is actually a good career pathway because it goes with my interests and what I want to follow. And it's really opened up – because I didn't decide whether I wanted to go into either a science field or a law field but figuring out that there is a combination of both in a really healthy and productive job pathway has actually changed my mind a lot.

Sharing and receiving knowledge

The program's multigeneration model of sharing and receiving cultural knowledge was spoken about positively by participants. Elders and Knowledge Holders explained that sharing culture with their young ones is at the heart of their participation in the program. For camp leaders, they described that bearing witness to this exchange and playing a role in supporting it and drawing on it for themselves supports their own wellbeing, while for young people, time with Elders and

Knowledge Holders is visibly soaked up with genuine respect and awe and students gave multiple examples about how it can deepen their existing family connections.

One of the Knowledge Holder participants shared the following sentiment, which reflected his own experience; however, a similar perspective of obligation and reward was shared by other Knowledge Holders:

I'm a proud First Nations man, a Kamilaroi man from Narrabri. I find it really rewarding being able to share culture with the kids and just feel obligated as well to be able to teach them what I know. And they still, "Oh, remember the didgeridoo you gave me?" So to keep it going is a big responsibility and obligation to me. So yeah, I love it, love teaching dancing, and I don't think I'll retire till I'm an old fella. I'll still be there playing the clapsticks and singing and teaching them to dance.

I think it's so important to keep teaching because we'd lost so much over the years, and now we have more – we're allowed to be able to share our language and share our culture more now with the next generation. I had to go and travel to meet people from our tribe to learn. I travelled to Moree, Boggabilla, Collarenebri, around a few towns where Elders knew the language and knew dancing, and lucky enough to run into Kamilaroi Elders when I was travelling. I think over the years - when I first started, probably 10 or five years, I really started to see the need for more culture to be shared, and so I found it easy to be able to go and share my time, share some culture.

Another Knowledge Holder described his motivation to share knowledge and the benefits it brings, 'It is [important to pass on knowledge] because if you don't, they're not going to know the magic that is around them. One of the great things about the longevity of life is that participation or the lack of stress that's within oneself. Basically, then it allows you to step outside yourself.'

The sharing of knowledge across generations is something that all participants highlight as one of the most valuable aspects of the STEM camps. One Knowledge Holder highlighted that translation of knowledge across generations is something that he has always valued, 'The kids I taught dancing, or to play didge 10, 15 years ago, they're family men and women now and they're teaching their kids what I taught them'.

The young people attending camp acknowledged the importance they place on receiving knowledge from their Elders, saying, 'It just helped me more deeply understand what my culture means to everyone, and if something happens with culture it affects more people than just you.'

Another student added, 'Everything the Elder said was just really, really amazing to understand because it's stuff that's in my blood and I had no idea about, and I think just discovering that side that no one really told me was amazing, and I reckon that was probably a really good thing.'

Several young people expressed their eagerness to share new knowledge and experiences with their own parents. When students were given the opportunity to work with clay during a STEM camp activity, many chose to mould something that connected with their parents.

I made a goanna. I made that because it's my totem. I made an emu, and I made some eggs for it to sit on. And then I made a little nest for it to sit on the eggs on the nest. And I made that, because my Dad carves on emu eggs, and I wanted to show him when I went home.

Well, earlier when we went on that walk I found emu tracks, so I was like, I might as well make one of them – and I wanted to show my Dad that I made it.

Camp leaders shared their own insights with students, and all remarked on the importance of the interactions between Knowledge Holders and young people, sometimes highlighting that it isn't an experience to take for granted. '...to see like younger kids interacting and engaging with culture. That's something that I didn't have growing up. So being able to see them have that experience. It was rewarding.'

Ways of engaging

While not asked directly, both Knowledge Holders and students expressed how they prefer to engage with others and support a positive space to share knowledge. Below is a summary of learnings taken from interviews and surveys with young people about how they like to be engaged with:

Young participants shared:

- Students wanted to be engaged in activities like the STEM camps, even if they were hesitant at first. They were open to being challenged – in a way that was safe.
- To be better informed to make decisions about attending camp, students preferred to be shown what the camps are like, including demonstrations of camp activities, instead of people just telling them.

- Students were interested in gaining a deeper understanding of concepts instead of skimming a lot of different concepts – it was suggested that during a camp, concepts are revisited to make meaningful connections, but not by more talking at young people (less talking in general was suggested).
- Students would enjoy an end of camp learning goal that they could build towards every day e.g. dance, art activity.
- More streams of interest within sessions might benefit different students, such as side discussions on specific elements of the topic to cater for different areas of interest.
- Students need time to understand, not just hear about new things.
- Longer time on camp with less intensity would support students' engagement and learning.
- Students wanted to emulate their leaders and Elders.
- Learning on Country with local knowledge holders leading students was important.
- Participants valued being able to lead by example for younger students and valued a focus on relationships and other real-life connections when learning.

STEM camps often host a diverse group of young people, from students already significantly invested in planning their STEM careers, to those less engaged in school but open to cultivating an interest in STEM. Facilitating this varied group of students through a full camp itinerary can present challenges for the CSIRO staff and camp leaders. Camps typically start with a focused discussion on expectations and responsibilities, including demonstrating respect for those speaking, such as through behaviour and body language. For some young people living with mental illness and/or neurodivergences, challenges can arise in demonstrating typical listening behaviours. Students are generally motivated to demonstrate active and respectful listening, however the pace and delivery style of some sessions can be challenging for some students and camp leaders. Some young people, especially the young women raised feelings of anxiety about attending a STEM camp without the support of close friends. A significant number of students gave feedback that long periods of talking and the repetition of messages could be replaced with more practical applications of learning.

One student ambassador reflected on their own new experience of delivering a STEM demonstration within a primary school, by not only highlighting the benefits they felt, but that in some cases, it's not possible to manage the engagement of all students:

When we went to the primary school, and even today, it is nice to feel like a teacher, like we are passing on the knowledge in a way. Even if it doesn't go according to plan or they are unengaged it's like, I don't know, it's still cool to put in our efforts to show

other people what we have learnt. It's like look we've done this. Being that person that's giving them knowledge.

Similarly, one of the Knowledge Holders commented about the process of imparting knowledge without seeking control over what students learn: 'What it's all about with the kids is getting them to look at the difference that we can make in our everyday life. And a few of them talk on about the fire, talking about when you look into the fire. Another comment was about the bright fire, people get drawn into it. So obviously it's just talking, and kids are going to get into it, and they retain stuff that we don't think they will.'

More time and different ways to reinforce learning

Having time to learn a concept and build on it through application in different scenarios was a valuable learning approach described by several students across camps. Many students gave examples of how they would prefer their learning and engagement to be spread over different camp days, to extend their learning and formation of connections. While many students wanted more session time to deepen their learning, some students also indicated that reinforcing concepts over several days would be useful. Some students were able to describe this approach in their own ways,

I think that with that whole thing we did with planting all the trees and the scrubs and the berry trees, I feel like the days prior we had been learning a lot about the earth and everything to do with it, and the sky and stuff, we'd been learning about that in theory, we had been talking about it and how much we need to do to respect it, and what we need to do to help it, but then I feel like actually putting that into practice, and being able to get down and get our hands dirty, and not just talk about the earth but also help it by pushing back that invasive root and being able to maintain it and help it, I feel like that helps so much not just having the talking about it but actually doing something about it, something physical.

It takes time for people to fully connect, like properly connect, and I feel like this is the time period where people finally do connect, and this is cut off way too short I feel like. Another thing is, we were learning heaps of stuff, but we also need time to learn it, and I feel like only learning about things once, I don't reckon it's enough because yeah, we learnt heaps of stuff, but we need time to actually understand things. Because sometimes they just breeze over it, but if we have – if we learn about it another day,

then it would be way better. Because there was heaps of interesting stuff, but we never got to really delve into it.

One student commented, 'I find if I learn things only once it doesn't stick. If I do it twice – if we had three things we did where we did one thing over two days, another thing over two days, and the same on the third thing.' Other students also commented on the length of the camp believing that this would provide them with a slower paced itinerary, more time to delve into topics and activities, and build their understanding of concepts, through application in different ways across several days.

I feel as though the camp should have gone a bit longer, because it actually was really fun, and I learned a lot of stuff, culturally as well. And it was just fun to be around and learning about all different types of science and culture and stuff.

I wish it went longer, because I am getting to know people, and more about my culture, and enjoying it.

I think for me, I feel like it could be longer, but with the same activities, just spread out a little bit more. And maybe focusing on different points and places so we did – rather than having to be on the bus a lot and feel like we were going back and forth.

Building towards a learning goal over the duration of the camp was a suggestion made by one student, who stated: 'I would happily trade 10 minutes each day from our own free time if we wanted to learn pieces of a dance or multiple dances, and at the end of the camp – of the week we could show that and the training that we've done in our own time, and we can show that off.'

Another student spoke about making the yarning sessions more interactive and inclusive, acknowledging that 'some people don't want to talk, but that it's important to make the most of times with Knowledge Holders 'to try and get everyone in' and be more actively involved in the yarning.

Learning on Country and local Knowledge Holders

Some students spoke about the importance of connecting to Country and the input of local people, contributing local knowledge to their learning experience.

One student remarked 'It made me feel connected to all the people that I was surrounded by, and also with the Earth, and just maybe reconnect more, and just acknowledge why our culture's just so important to everyone.'

Another student spoke about how they formed learning connections across Country, their connection to community and their career.

I feel like that whole activity made us understand a lot more about the ground we step on, and how important every single plant is in the ecosystem no matter how small, when I was planting all of the smallest grasses to a massive fig tree, it just made me realise that none of these can succeed without each other. And it made me understand that even the smallest thing can play a major role in something way bigger. And of course it's shown us so many new career paths to do things what we love as well.

Another student commented about the importance of local Knowledge Holders always being present and available during camp.

I feel like there should have been like a couple more local people that would have been like with us. Maybe more local people, like that could be a supporting thing like that. Because it's just better when there's people from around, and you can sort of tell when they're from around here, because they know.

While not all students were asked about their interest in gender specific cultural activities, the young men on camp responded to this question with interest, generally agreeing as a group that including this within camp activities would be 'pretty fun to learn', while also expressing that they wouldn't want to 'affect the girls' or the 'equal relationships' cultivated during camps.

What happens outside camp - connecting and learning over time

Several Knowledge Holders reflected on the importance of connecting with students not just during camp, but at other times throughout the year. This reflected their acknowledgement of the gradual learning that occurs over time as well as the importance of continuing to build on the relationships established during camp. This perspective was raised by the Knowledge Holders as a role they consider for themselves, and at the same time, they challenged the program to include a similar approach. The following quotes illustrate this thinking.

You tend to see grow over a period of time and I think that's a really good thing. I always describe it as 'I always watch you from afar.' Say I know that kid, I don't go over

and, “Oh, I used to do this, I used to do that”, but you just watch their progression over time, and it’s amazing how far they actually get.

What I started to do was I started to mesh people together to make them network so that they keep in contact, and that contact builds stronger and stronger people. There’s a thing where it’s not just a once-off thing. I think once-off things, you tend to – it’s a bit like a game of football or something, it’s great while it’s happening, and when it finishes that’s the end of it, no one really cares. But I think keeping people together over long periods of time, that’s really healthy for those kids. It’s a thing where no matter what happens, they’ve got a friend somewhere.

Sometimes an old bloke might have told me a story, I’ll say, “What the hell was that all about?” And I was thinking - but probably about six months, or 12 months later, the penny dropped. And then all of a sudden, ‘Oh, I know where that fits’. There’s been this thing that I’ve known all the way around, but it’s just dropped and it’s a continuing part of the story. Basically that was the last bit of info I got over a 30 year period, but I still think there’s more.

A culturally grounded model for young, professional Aboriginal leaders in STEM camps.

The Deadly in Generation STEM camps embed an intergenerational model of Elders, Knowledge Holders, young camp leaders, and young students learning together on Country to share Traditional Knowledge, learn about themselves, and explore how they might be part of Australia’s future STEM workforce. Engaging young Aboriginal STEM professionals as camp leaders is a key component of this approach and the following section captures learnings from camp leaders to explore in more detail, how a culturally grounded model could emerge from this pilot program. Over the course of the program, a total of 6 different camp leaders have been engaged to co-deliver the STEM camps. At any one camp or immersion day, the number of camp leaders has ranged from one to four, with some camp leaders attending up to four camps, while others have participated in just one. In 2025, camps will have six camp leaders in attendance. Program staff explained that securing return camp leaders each year has been a priority for the program but has been challenging to implement. This is partly due to the short-term and changing nature of the program’s camp activities and having to compete with camp leaders’ education and employment commitments.

To date, CSIRO’s approach to engaging camp leaders has been to utilise community networks and CSIRO relationships to identify potential camp leaders. Individuals are invited to engage through a

sole trade contract or be onboarded as casual CSIRO staff, in coordination with the Indigenous Talent Team. Secondment arrangements are also available for affiliated organisations.

This section summarises initial feedback from the camp leader group and proposes a starting point for a camp leader-led model for future STEM camps.

Camp leader introduction to STEM camps

There can be significant differences across the camp leader group in relation to their expectations, experiences and perspectives, including previous experience engaging with young people. Each camp leader brings their unique perspective and strengths to the role. While the program includes preparation sessions for camp leaders, these tend to have an operational focus and are not always accessed by camp leaders, who have full time study and/or work commitments outside their role as camp leaders.

Some camp leaders were new to the experience and reported feeling like they were still learning about and connecting with their own cultural journey. Even when camp leaders had previous experience working with young people, being in a multi-day and fast paced camp environment provided new challenges, explaining,

I haven't had many cultural opportunities through school and I'm kind of still learning as well, so being on the camp, definitely broadened that and gave me more...especially in this role of guiding them culturally a little bit as well.

It's so easy for us to appreciate it and to understand how good these camps and these sessions are because throughout school we didn't get these opportunities to go away and to connect and through learning to and understand how to connect with country and culture.

I sort of had an idea of what to expect, but obviously with the start, with the few hiccups, it was kind of like, 'I don't know what's happening.

Despite sometimes feeling uncertain about how to lead, new camp leaders were able to draw on their existing strengths, mentioning areas such as skills and knowledge from their areas of STEM study, and their interpersonal skills. Having more experienced camp leaders to work with and look to for guidance in uncertain situations was highly valued.

Having someone else with more experience was critical, there was a lot of support from him to handle behaviour, so next year I would have more of an idea of what to expect. I've got some support now.

For camp leaders, the fully scheduled STEM camps were sometimes fast-paced, overwhelming, and required their rapid response to situations. Camp leaders reported the challenges of filling multiple roles simultaneously, to respond to the needs of young people as they experience a similarly demanding but rewarding camp itinerary.

Camp leaders explained that the need to bring the group together quite quickly on the first day, to get through the full agenda put some pressure on them to fulfil all the roles needed to make that happen. This could translate to camp staff and leaders having high expectations of the students, in marked contrast to the more hesitant student behaviour, as they took time to settle into the camp environment and new rules. One camp leader described their realisation following initial feelings of disconnect with the students, saying they went from 'starting on the back foot' to seeing the students really coming together 'from one end of the polarisation to the other.'

It felt like it went really fast and it felt like you're jumping from one thing to the next and then it's night time. And then when the morning comes and then you're on the next activities. And I think I like to spend more time processing each day and each activity especially after meeting all the young people and just adjusting my expectations as well.

One camp leader described their collective role as like 'co-parenting', explaining that it involves learning as you go, benefiting from having some experience in the role and receiving a sense of reward to see young people on camp successfully 'connect together and then connect to Country.'

Defining the camp leader role

CSIRO STEM camps provide a rich and dynamic learning context for new camp leaders, challenging the young STEM professionals to step into a leadership role. All camp leaders interviewed described the challenges navigating different and sometimes conflicting roles, as well as the importance of their relationship with students and sense of accountability to their families, as Indigenous camp leaders.

One camp leader explained that 'you have that authority role, but you also have that friendly care support role' and that it felt 'like a juggle', or 'two different roles' to be covering off on aspects such as behaviour management, keeping students accountable to pay attention and demonstrate respect

to speakers, but at the same time, making students feel comfortable and to 'make it fun and enjoyable, especially in a cultural way.'

Another camp leader agreed that it was a journey of learning, saying 'I feel like it's a really fine line between that, not just from a teacher perspective versus a friend perspective, but a cultural perspective as well because you are a leader.'

Several camp leaders described the challenges of engaging and relationship building in the first day, where they felt most tested, to gradually feeling much more connected and aligned with the students by the end of camp. One camp leader commented, 'even if we do have kids that are really disconnected and really not wanting to be there, they can come a long way in four days and they can really turn around.'

Traversing these roles is challenging, however adding the element of cultural leadership gives camp leaders another layer of complexity to define for themselves and with young people. One camp leader explained this significance:

You are stepping in for four days to be that cultural leader for them, and I think that comes with a really significant weight in a way, but it's at the same time very rewarding, so it's not a burden on us, but it can be if it's not managed and supported correctly.

Several camp leaders described the camp sessions with Elders as a time when their role was clearer, and their message to students, of demonstrating respect for Elders and Knowledge Holders was understood by students, as it built on their already strong levels of respect for their Elders.⁸

One camp leader explained this dynamic:

How it's run and how it's structured, especially with Elders coming in... a lot of the cultural education, whether it's dance, bush medicine, speaking to Elders about history, speaking to Elders about their story, having a yarn on. I feel like they're really structured well and there's a high-level of respect shown from the [camp] leaders and that's followed by the students.

⁸ Student end of camp survey data showed that overall, students' feelings of respect for Elders rated the highest score prior to camp, compared to all other survey measures. The retrospective pre score given by students against this measure pre 4.56 (mean) on a rating scale of 0 – 5.

This obligation was reflected in the way some camp leaders focused on expectations, student wellbeing and coming together as a community as a strategy that ‘really brought the young people back to focus...to remember that they’re here as a community.’

It was felt by some camp leaders that during sessions with non-Indigenous STEM professionals, the role of camp leaders was more challenging and complex, as additional behaviour management strategies were sometimes required as well as providing a focus on connecting learning to culture.

Being connected in a shared way of working

Camp leaders agreed that establishing shared ways of working and expectations prior to camp and having a full contingent of four leaders to support each other during camp was valued, however barriers can prevent this from occurring. One camp leader shared, ‘my experience at this camp was a lot better because of the support. I feel like having four camp leaders was really good.’

All camp leaders interviewed agreed that a shared understanding and a good working relationship between leaders was a success factor for a positive camp experience.

Our relationship building, our focus on relationship building with the young people is really strong for all of us camp leaders, and I think that really showed at the end of it that above, culture and above STEM was also the relationships that they were building with their community and with us.

Another camp leader expressed the benefits of this established way of working for the next camp, saying ‘I’m really looking forward to another camp where everyone’s kind of got that base level experience from the camp. And then I think it would be incredibly robust,’

Camp leaders agreed that it took the length of the four-day camp for the relationships to be realised in a cohesive way, one camp leader reflected that by the end of the camp, the students ‘started to appreciate our values and our expectations sort of aligned.’

Camp leaders observed the students’ changing perspectives and knowledges, noting that ‘a lot of the boys really changed how they were acting towards the last few days of the camp, to watch that maturity’ was particularly rewarding for the camp leaders. Another camp leader agreed that ‘It did take the full length of the camp, if we were a day shorter, we definitely wouldn’t have got that connection, and the kids wouldn’t have had that appreciation towards the end.’

While meaningful connections were developed throughout camp, between camp leaders and with the young people, challenges were experienced prior to camp that impacted staff and camp leader ability to prepare confidently. Barriers reported by staff and camp leaders included a lack of

returning male camp leaders, turnover of camp leaders prior to camp, including last minute changes, competing priorities for camp leaders, challenges in attending pre camp planning sessions on top of their existing commitments and a lack of time to engage with each other as camp leaders, to form a shared understanding of each other's strengths and approaches prior to camp.

Benefits for camp leaders

As young Aboriginal STEM professionals and tertiary students, the camp leaders interviewed described an experience that positively influenced their own connections with Country, culture and/or broadened their STEM career pathways. For camp leaders, the STEM camp environment was a rare opportunity to experience this culturally grounded development, alongside younger students, enhancing their own appreciation for the benefits.

One camp leader explained the personal benefits they experienced, alongside the students, engaging with them and observing their achievements throughout camp.

It's so easy for us to appreciate it and to understand like how good these camps and these sessions are because throughout school we didn't get these opportunities to go away and to connect and through learning to and understanding how to connect with country and culture...the opportunity to present things and be involved with the younger generation, like to see them change in their learnings is just it's just so motivational and inspirational and rewarding.

Another camp leader shared the pride and connection experienced through their role as camp leader, and the implications it has for their own wellbeing.

Culturally, it is literally all the mobs coming together, Elders, Knowledge Holders, leaders, young people, us, who are in this space where there is a lot of disconnection from culture and having these meeting places these camps means that we're able to come and share culture, share ceremony, share language, share pride. And when you get lost in day-to-day institutions you lose it. And so having these spaces is so important for me, outside of my own family and my own cultural stuff. It's so big and it's connecting mobs from all over and that's what we should be doing is sharing and connecting and growing.

This benefit is often attributed to the contribution of Elders and Knowledge Holders, with one camp leader saying, 'the Elders I meet, the Knowledge Holders I meet... the amount they share, space that they give and the time that they give us culturally is. It's priceless.'

Several camp leaders also described benefits on their STEM career pathway, identifying broader considerations for their career directions. Several camp leaders shared their revised thoughts on this.

I always said that I wanted to go into research and then later education but I never thought about the style of education and facilitating that activity. I was like, wow, that's something I would really love to do...being able to share knowledge in that way, it was like it was fun, it was engaging.

I've just finished my degree, so I've been leaning towards going into academia and research but this camp has shaped the way I view interaction with younger teenagers through an education perspective so I think that's influenced me to take more of an education route into things, especially connecting with culture.

Forming a culturally grounded camp leader model

Camp leaders explained they felt a sense of responsibility as cultural leaders while supporting and mentoring students on camp. To manage this aspect of their role, camp leaders described ways in which this can be supported by the program. This included:

A local, cultural mandate

- Including camp leaders and/or Aboriginal camp staff who are culturally respected, with a wealth of knowledge, culturally they might not be from the area, but they have that true cultural support and respect.
- Time for the camp leader group to spend time with Elders from the Kamilaroi and Dharawal areas, and people in those communities that have cultural experience and knowledge to share.

A culturally informed and shared way of working

- Ensuring camp leaders have an adequate cultural education to work from, including a cultural understanding and cultural knowledge of how to engage with young people and the meaning of cultural connection.

- Culturally grounded strategies to support working with young people, including managing conflict.
- 'Being able to articulate how we learn, how we listen and to be able to show that to the young people on camp.'
- Culturally respectful non-Indigenous camp supervisors.

Cohesiveness

- Experienced camp leaders passing on what works, strategies they've used at previous camps and how camp leaders can operate as a team, supporting each other in the different roles they're navigating.
- Dedicated time for camp leaders to get to know each other, articulate their way of working and develop a shared approach prior to camp as well as post camp feedback and debriefing.

Sustainability

- A learning and development program to invest in camp leaders and provide a mutually beneficial career development approach.

Additional investment to support program contact hours outside camp dates

- A formalised, tiered support system including Elders, Knowledge Holders, camp leaders and Indigenous program staff.

Conclusion

The 2024 summary report for the Deadly in Generation STEM program highlights the outcomes of its STEM camp activities, emphasising the collaborative evaluation methodology involving Aboriginal and non-Indigenous contributors. The program's place-based approach continues to evolve in response to local community needs in Kamilaroi and Dharawal Countries, ensuring its relevance and effectiveness. Key findings reflect common themes across locations, drawn from embedded evaluation processes, such as student surveys and yarning circles facilitated during camps. This report builds on prior insights, focusing on the perspectives of Aboriginal and/or Torres Strait Islander participants to inform continuous program improvement. Ethical considerations and respect for contributors' expertise underpin this evaluation, supporting the ongoing development of the Deadly in Generation STEM program and a beginning phase for the development of a culturally grounded model for young Indigenous STEM professionals as STEM camp leaders.

Appendix 1

Discussion guides

Adult participants

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 supervisors

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?

Camp leaders

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 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?

