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'STEM in Community'. Artwork by Tara Rose Gonebale



'Definitions are often very western. This excludes us.' Our research shows how to boost Indigenous participation in STEM

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Australian politicians and major government reports keep emphasising the importance of STEM (or science, technology, engineering and maths) skills for our economy and society.

As the Universities Accord report noted last month, engineering and and science are experiencing “significant skill shortages”. Then there is a federal goal to have 1.2 million tech-related jobs by 2030.

This comes amid a growing discussion about how the current STEM workforce tends to be white and male.

Last month's [Diversity in STEM Review](#) noted how in 2021, only 36% of STEM university students identified as female, while only 5% were living with a disability. In the same year, 0.5% of Indigenous peoples held a university STEM qualification, compared to 4.9% of the Australian population.

We recently conducted [research](#) for the diversity review about Aboriginal and Torres Strait Islander peoples' views on STEM. This included how we can increase the use of Indigenous STEM knowledge, as well as grow the number of Indigenous peoples in STEM.

Indigenous STEM knowledge is vast and includes many things such as astronomy, weather knowledge, medicinal plant knowledge and animal classification systems.

Read more: [First Peoples' knowledge of 'mysterious fairy circles' in Australian deserts has upended a long-standing science debate](#)

Mob have a lot to say about STEM

In 2023, we did an online survey of Aboriginal and Torres Strait Islander adults' views on STEM. This is the largest survey of its kind.

We asked both multiple choice and open-ended questions and received 204 responses from diverse Aboriginal and Torres Strait Islander peoples, representing 98 different mobs across the nation.

We did this as part of a [broader body of work](#) for the Diversity in STEM review. We also did literature reviews, case studies and interviews on Indigenous contributions to STEM and barriers to participating.

Mob perspectives on STEM

Almost one quarter (23%) of our respondents had not heard the term "STEM". This needs to change if we want to increase Indigenous participation in STEM. It is difficult to promote STEM opportunities to our communities if terminology and language aren't relatable or understood well.


Of those surveyed, 83.3% saw a connection between STEM and Indigenous culture. This also came up in the literature reviews and qualitative interviews we did: western ideas of STEM and Indigenous ways of knowing, being and doing should not be seen as separate, but as complimentary.

Almost everyone surveyed (98%) believed it was important to have Indigenous people represented in STEM fields. Having Indigenous role models in STEM is critical if we hope more Aboriginal and Torres Strait Islander peoples will pursue these careers: we must be able to see a place for ourselves in these fields.

As one participant shared:

I think it's important that as an Indigenous person growing up you can see other people in STEM fields so you are aware of the opportunities you have.

Almost all (97.5%) of respondents either strongly agreed or agreed STEM could benefit community. Many mob have strong motivations to give back and this finding can be used in designing policies and programs that incorporate the connections between STEM and community.

 An infographic asking 'have you heard of the term STEM?' with 77% saying 'yes' and 23% 'no'.

How many surveyed Indigenous people have heard of 'STEM'? Big Mob: STEM it up report 2023

Indigenous people are not being supported

Only one in three participants felt Indigenous people are being supported to pursue STEM careers.


They said racism, discrimination and individual and financial challenges are all barriers. Some of the individual barriers identified are a lack of support, opportunities or confidence.

As one participant shared:

We are often told we are not good enough or smart enough to pursue STEM because we don't fit certain moulds of what people think should be STEM people.

One participant observed the way STEM is talked about and defined is also an issue:

Definitions of STEM are often very western. This excludes us.

 An infographic showing 'one in three Indigenous people feel supported to pursue STEM careers'.

How many surveyed Indigenous people feel they are supported to pursue STEM careers? Big Mob: Stem It Up report 2023

There is a lot of positivity

We know there are Indigenous people who are thriving in their STEM careers, despite the challenges. There is also enormous positivity about the possibilities of STEM for individual careers and for Indigenous communities more broadly. As one survey respondent told us:


I believe STEM can provide more opportunities for our future generations in education, cultural equality and industry advancement.

One person elaborated on the possibilities for sustaining Country and communities:

Protecting Country and community both require STEM skills and are necessary in supporting our future generations.

But our respondents noted it was essential to listen to Indigenous peoples. Our voices need to be at the centre of decision making moving forward. As one participant said:

the more involvement and engagement we have, the more it opens the door for future generations.

 An infographic asking 'do you see a connection between STEM and your culture'. Responses are 'Yes' 83% and 'No' 17%.

How many surveyed Indigenous people see a connection between STEM and their culture? Big Mob: Stem It Up report 2023

Read more: [Universities Accord: there's a push to increase Indigenous students and voices in higher education. But we need more detail and funding](#)

How can we increase Indigenous participation in STEM?

Our [final report](#) outlines 22 key findings and 15 recommendations based on our research. This is both evidence-based and [Indigenous-informed](#). This is important, as our research found most published research to date on Indigenous participation in STEM and Indigenous STEM knowledge has been undertaken by non-Indigenous researchers.

Some of our recommendations include:

- **A place to advance Indigenous STEM knowledges:** This should include a platform for schools and universities to access quality sources on Indigenous STEM knowledges and knowledge holders, as well as investment to grow the Indigenous STEM research workforce.
- **A campaign to increase Indigenous peoples' awareness about STEM:** This should include what STEM is, as well as opportunities to be involved. It should also break down language barriers (by being published in multiple languages) and be Indigenous-led.
- **Establish an Office for Indigenous STEM:** This would coordinate and promote policy initiatives from governments to increase Indigenous participation in STEM and would be similar to the existing Office for Women in STEM.
- **Community-based STEM programs:** To date, governments have invested in many programs but few of these are community based or use existing STEM knowledge within communities.

- **Align Indigenous STEM goals with broader Indigenous education policies:** Unless [education outcomes](#) improve for Aboriginal and Torres Strait Islander peoples, increasing Indigenous participation in STEM will be challenging.
- **Include STEM perspectives in early childhood programs:** this will provide opportunities to experience STEM from an early age, including Indigenous perspectives on STEM.

The authors acknowledge the rest of the [Big Mob: STEM It Up](#) research team: Suraiya Abdul Hameed, Pedram Rashidi, Zoe Ockerby, Amanda Hurley, Lisa Harvey-Smith and Lisa Williams.