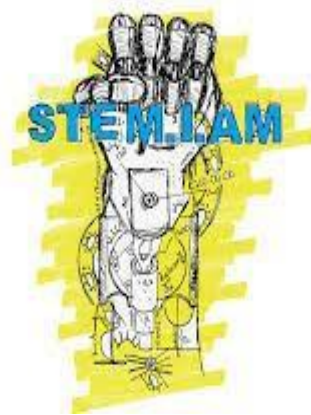


STEM.I.AM Program: Interim Evaluation Report



ADVANCE QUEENSLAND

Jobs now, jobs for the future

Dr Harry Van Issum

Dr Helen Klieve

Mr Troy Meston

15th May, 2018

STEM.I.AM Program: Interim Evaluation Report

List of Figures	4
List of Tables	4
1. INTRODUCTION	5
Overview	5
The STEM I AM Program	7
Program Goal	7
Program Objectives	7
Program Partners	8
Program Logic	9
Location of Project Activities	10
Structure of the Evaluation Report	10
2. THE TENSIONS OF EFFECTIVE STEM PROGRESS IN THE INDIGENOUS SPACE – LITERATURE REVIEW	11
Introduction	11
3. THE EVALUATION PROCESS	18
Type of Evaluation & Link to DSITI Evaluation Questions	19
Phase 1 – Planning and Initial Implementation	22
Phase 2 – Implementation and main data collection	23
Phase 3 Consolidation and reporting	23
STEM I AM Program: Data	24
4. STEM I AM PROGRAM PARTNERS & PROJECT ACTIVITIES	27
Carbon Media	27
Overview	27
State Library of Queensland	28
Aurukun Shire Council: (\$25 000)	29
Cook Shire Council: (\$9 680)	30
Douglas Shire Council: (\$12 830)	30
Gladstone Regional Council: (\$23 750)	30
Logan City Council: (\$24 970)	30
North Burnett Regional Council: (\$21 790)	30
Paroo Shire Council: (\$14 580)	31

Townsville Shire Council: (\$25 00)	31
Department of Housing and Public Works: (\$20 000)	31
EnVision Group Inc.:	32
5. INITIAL RESULTS	33
Network & Partnerships:	33
STEM I AM Program	33
Administrators	33
Facilitators	35
Students	35
6. DISCUSSION OF FINDINGS TO DATE	37
Discussion of the process learnings	38
Preparation for Stage 2	38
7. CONCLUSION & RECOMMENDATIONS	39
APPENDICES	42
A. STEM I AM Program: Griffith University Ethics	42
B. STEM I AM Program: Sample Surveys	45
C. STEM I AM Program: Yarning Circle Questions & Process	56
NOTES	57

List of Figures

Figure 1. Program partners	8
Figure 2. Spread of STEM I AM across QLD	10
Figure 3. Phases of evaluation	20
Figure 4. Hierarchy of funding relative to Carbon Media and the STEM I AM program	28
Figure 5. Image of STEM I AM State Library Queensland launch with Minister Leanne Enoch.	28
Figure 6. Hierarchy of funding and the delivery to the respective levels in the State Library of Queensland process	29
Figure 7. Image of Aurukun students interacting with a robot.	29
Figure 8. Hierarchy of funding and the delivery to the Universities.....	31
Figure 9. Hierarchy of funding to the delivery of activities	32
Figure 10. Image of participants in EnVision Group Inc’s Far North Queensland Road Show.....	32
Figure 11. Results of administrator responses to attitude statements	34
Figure 12. Results of student responses to attitude statements	36

List of Tables

Table 1 DSITI Program Logic Scheme	9
Table 2 Queensland data: Aboriginal and Torres Strait Islanders compared to Non-Indigenous	14
Table 3 Tri-annual cycle of three phases relative to a program logic model	19
Table 4 Service requirements from schedule 1 and year for delivery.....	21
Table 5 Summary of key interactions with the Program Manager (DSITI) cross Phase 1.....	22
Table 6 Data collection process.....	23
Table 7 Administrators Survey	24
Table 8 Questions of Facilitator Survey.....	25
Table 9 Questions of Participant Survey	26

1. Introduction

Overview

The STEM I AM program is a 3-year Advance Queensland, Queensland government funded initiative. The STEM I AM program was officially launched on the 26th of August 2016, to increase Indigenous school aged participation in STEM. Initial planning suggested a three-year program cycle and recognition of timings. As the planning advanced extended approvals were added to the program design. STEM is the acronym used through policy and curriculum to capture the subject domains of Science, Technology, Engineering & Mathematics (STEM). STEM is the focus of this initiative. The Federal and State governments within Australia are responding to foregrounded critical need relative to global information economies of the future. The STEM I AM program aims to increase Indigenous enrolment in STEM related fields at university. STEM I AM has been designed to direct funding to the 'grass roots' level for youth along with scholarship incentives for those entering a STEM aligned degree at university. In framing this first evaluation, the STEM I AM program was outlined by Connolly & Cranny in 2016 to be comprised of;

- Coding and robotics workshops for Aboriginal and Torres Strait Islander youth in grades 5- 12.
- Support for the establishment of coding clubs to provide hands-on learning environments for students, teachers and the broader community.
- Support for students to participate in state and national coding and robotics competitions.
- Storytelling and awareness.
- Capability development for teachers to deliver coding and robotics skills to young Aboriginal and Torres Strait Islander from grades 5 – 12.
- Links with social entrepreneurs who are interested in investing their time and talents to improve the uptake of STEM Aboriginal and Torres Strait Islander youth in grades 5- 12.
- Digital careers advice through school visits to raise awareness and interest in studying.

It was envisioned that these processes were to be underpinned by key stake holders spread across three levels. The first level relative to sponsorship and governance, the second being facilitators and the third, Aboriginal and Torres Strait Islander participants. In greater detail they are listed below;

Sponsorship & Governance:

- Department of Science, Information Technology and Innovation (DSITI),
- Department of Education and Training (DET),
- Department of Housing,
- State Library of Queensland (SLQ),
- Carbon Media Pty Ltd,
- QUT & USQ, &
- Corporate Sponsors.

Facilitators:

- State Library of Queensland (SLQ) Indigenous Knowledge Centres and local librarians,
- First Australia workshop facilitators [EnVision Group Inc.],
- Teachers and community representative delivering workshops/coding clubs, &
- DET Solid Pathways staff (at camps).

Student Participants:

- Coding and robotics workshops,
- Coding and robotics clubs and leagues, &
- Coding and robotics competitors (Connolly & Cranny, 2016).

Griffith University was engaged by the Department of Science, Information Technology and Innovation (DSITI) as consultants to independently evaluate the STEM I AM program. The reporting cycles for the STEM I AM program were fixed to be delivered annually over a triennium. This report is the first in this iterative cycle. This report is an interim report which evaluates program activities, personnel and participants for the period 2016 - 2018. The structure of this iterative evaluation cycle, to be conducted over the triennium, will consist of the following components;

1. **Process evaluation** – to determine what steps/activities were undertaken during the program and its varied projects,
2. **Formative evaluation** – to focus on the operational aspects as the program and its projects are rolled out, with feedback, throughout the 2 to 3 year process, &
3. **Summative evaluation** - to determine the value of the initiative, providing some recommendations for improved process as the program advances into its second and third phases.

This interim report outlines;

- The activities undertaken,
- The actual process (including any reflections and learnings that helped shape the implementation and roll out of activities), &
- Summative achievements to date (with recommendations).

It should be recognised that any long-term outcomes can only be discussed in an indicative sense due to the positioning of this report relative to the iterative nature of the STEM I AM program and the evaluation cycle.

The STEM I AM Program

STEM I AM was conceived by Birri Gubba man Wayne Denning, the managing Director of Indigenous creative agency Carbon Media (an inaugural Advance Queensland Community Digital Champion). Wayne was motivated by the work of Ngarrindjeri man David Unaipon, an Indigenous engineer, inventor, author and activist who appears on Australia's \$50 note. Advance Queensland is a foundation sponsor of STEM I AM supporting Aboriginal and Torres Strait Islander communities to foster engagement in STEM. The Advance Queensland STEM I AM Program is a coordinated program of activities to increase STEM engagement for Indigenous students from grades 5 to 12. It is a collaboration between the Department of Science, Information Technology and Innovation (DSITI), Carbon Media Pty Ltd, Department of Education and Training, State Library of Queensland and foundation sponsors including Google and FIRST Australia. To help close the literacy and numeracy gap, greater participation in STEM from young Aboriginal and Torres Strait Islanders from urban, regional and remote communities across Queensland is needed. Relative to the program logic, STEM I AM imagines engagement in coding and robotics activities will encourage and inspire students to study in a STEM field at university.

The STEM I AM program facilitated activities and initiatives delivered by program partners (this will be outlined in the coming section). The rationale of this program logic was to harness working relationships with government departments, Indigenous communities, libraries, schools, universities and foundation sponsors all as a means to seed STEM participation of Aboriginal and Torres Strait Islander students from grades 5 – 12 and into university. A quick summation of activities to date are listed below;

- **Grants** for coding and robotics activities delivered by Indigenous Knowledge Centres (IKC) and libraries, administered by State Library of Queensland.
- **Scholarships** for Aboriginal and Torres Strait Islander students enrolling in STEM related bachelor programs at QUT and USQ.
- A **Far North Queensland Roadshow** by EnVision Group Inc. to run coding and robotics workshops in the Aboriginal communities of Aurukun and Wujal Wujal.

Program Goal

The long-term intention of the STEM I AM program is to increase the number of Aboriginal and Torres Strait Islander enrolments in STEM related university courses in Queensland.

Program Objectives

To achieve this long-term goal the STEM I AM program is organised around the following objectives;

1. Increase the number of Aboriginal and Torres Strait Islander students choosing to study in a STEM related field at university.
2. Raise engagement in STEM subjects for Aboriginal and Torres Strait Islander school students in Year 5 through to Year 12 through their involvement in coding and robotics activities.
3. Increase community support for and participation in coding and robotics activities.
4. Build capability in teachers of Aboriginal and Torres Strait Islander students to deliver captivating coding and robotics activities in classes
5. Shine a spotlight on the achievements of young Aboriginal and Torres Strait Islanders in STEM to inspire self-belief, foster inclusion and encourage Aboriginal and Torres Strait Islander students to go to school, stay in school, and engage with STEM through the fun of coding and robotics.
6. Develop high quality, long-term corporate partnerships that can provide additional support and pathways for Aboriginal and Torres Strait Islander student participation in STEM. This support will focus on opportunities that create a positive difference to help increase uptake of STEM university courses and careers by Aboriginal and Torres Strait Islanders.

Program Partners

The program partners listed below are building on their existing connections with the Aboriginal and Torres Strait Islander community.

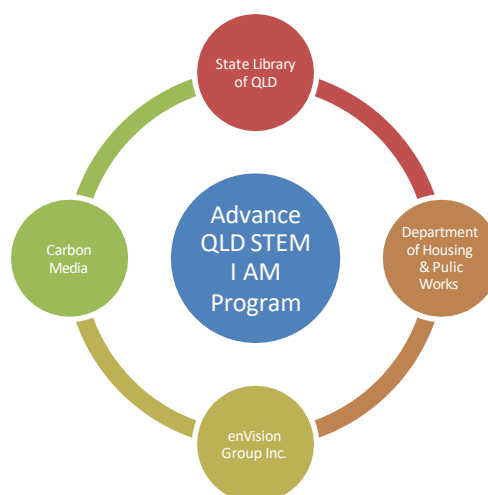


Figure 1. Program partners

Program Logic

An underlying assumption behind this program planning is the following DSITI Program Logic Scheme:

Table 1 DSITI Program Logic Scheme

Policy or program logic model and rationale						
Motivation	Inputs	Activities	Outputs	Short term outcomes (things we <i>directly</i> influence)	Longer term outcomes and impacts (things we <i>indirectly</i> influence)	Beneficiaries
<ul style="list-style-type: none"> • Low levels of Aboriginal and Torres Strait Islander students enrolling in STEM related courses at Queensland universities. • Promote STEM careers as an achievable employment pathway for Aboriginal and Torres Strait Islanders 	<p><u>Real inputs</u></p> <ul style="list-style-type: none"> • Schools with significant cohorts of Aboriginal and Torres Strait Islander students in Years 5 to 12 • Teacher participation in professional development • Public libraries and Indigenous Knowledge Centres (IKCs) • Department of Education and Training's Solid Pathways Program • External corporate partners including Google, FIRST Australia and Carbon Media • Financial inputs \$930,000, 2016-2019 • Administration inputs 1 x A06 and 1 x A04 to oversee program deliverables, aggregate survey outcomes, program reporting. • Department of Science, Information Technology and Innovation (DSITI) • Department of Education and Training (DET) • State Library of Queensland (SLQ) 	<ul style="list-style-type: none"> • Consultation with government and corporate partners • Address legal requirements • Write program documentation and promote • Execute Agreements and distribute funds to project partners • Manage program and coordinate stakeholder relationships • Organisation of coding and robotics events/roadshows • Program evaluation 	<ul style="list-style-type: none"> • Delivery of coding and robotics workshops • Establish coding clubs to provide hands-on learning environments for students, teachers and the broader community to learn code. • Student participation in state and national coding and robotics competitions • Storytelling and awareness building that highlights the achievements of young Aboriginal And Torres Strait Islanders in STEM • Professional development for teachers, librarians and volunteers • 2 annual university ICT scholarships • Annual coding and robotics roadshow 	<ul style="list-style-type: none"> • Increased registrations for STEM activities including workshops, coding /robotics clubs and leagues coding/robotics competitions. • Increased teacher/librarian/volunteer professional development training opportunities • Increased number of collaborative connections from funded activities (school, library or community group etc) • Improved STEM literacy/capability of (students/teachers/ library staff) • Increased number of Aboriginal and Torres Strait Islanders participating in STEM subjects in Queensland schools. • Increased number of STEM.I.AM program participants intending to enrol in STEM related courses at Queensland universities and/or secure employment in a STEM related field.. 	<ul style="list-style-type: none"> • Percentage of Aboriginal and Torres Strait Islander students enrolling in STEM related courses at Queensland universities as a percentage of total STEM enrolments at Queensland universities. • Increased number of Aboriginal and Torres Strait Islanders graduating from STEM related university courses in Queensland and transitioning into STEM careers. 	<ul style="list-style-type: none"> • Aboriginal and Torres Strait Islander youth through greater participation in school and developing the skills needed for future jobs • Aboriginal and Torres Strait Islander communities through increased collaboration and skills development leading to improved job prospects • Queensland through greater participation of Aboriginal and Torres Strait Islanders in the Queensland knowledge-based economy and the jobs of the future

Location of Project Activities

The STEM I AM program involved a roll out of initiatives across the state. In Figure 2 a visual representation of these initiatives is shown.

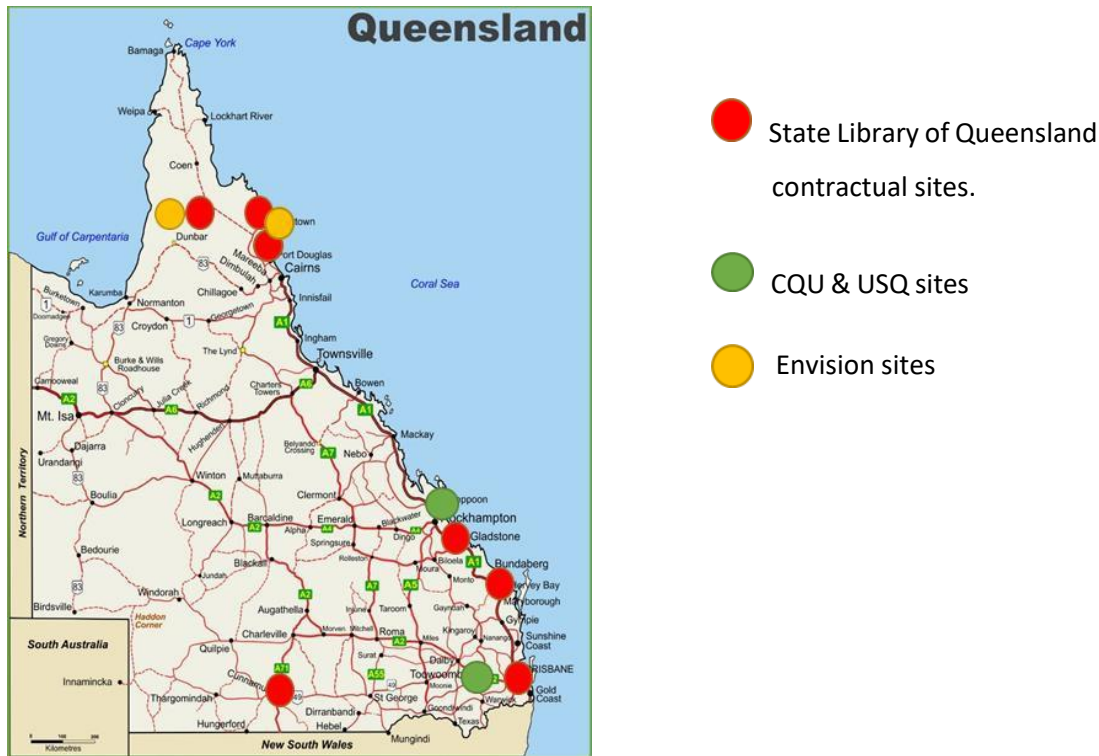


Figure 2. Spread of STEM I AM across QLD

Structure of the Evaluation Report

Section	Focus
Introduction & Overview	The project brief and an overview of the STEM I AM program including history and location of the operations.
Review of Literature	Summary of the tensions of seeding STEM inside the Indigenous context
The Evaluation Process	Summary of the evaluation approach including the evaluation objectives and the consultation process.
Project Activities	The process of implementation, documenting the activities that were undertaken as a part of the implementation.
STEM I AM Program Initial Implementation	The outcomes of the implementation. It also includes some discussion of the interactive nature of the implementation process with a more iterative development of final objectives.
Discussion	Discussion of the findings from the activities and initial evaluation findings.
Conclusion & Recommendations	An overview of the evaluation against the initial objectives including discussion of the objective of the sustainability of the initiative. It also provides learnings from the project activities so far.

2. The Tensions of Effective STEM Progress in the Indigenous Space – Literature Review

Introduction

Strategies to increase the number of future workers in the Science, Technology, Engineering and Science (STEM¹) sectors is a priority for the Federal and State governments. This collective government action has grown from an economically driven necessity, internal to the needs of Australia's knowledge based economy and the role of STEM in fulfilling sector determined need. The STEM I AM program logic model developed by DSITI acknowledges this need and affirms that,

... young people need the STEM skills to support a knowledge-based economy to actively contribute to and benefit from positive social and economic opportunities. By gaining a practical application of STEM, students can understand its importance and value in a real-world context, which is imperative given the demand for new skills.

The DSITI program evaluation plan acknowledges that:

- 60 per cent of new jobs require skills held by 20 per cent of the workforce,
- 75 per cent of the fastest growing occupations require STEM skills, and
- 40 per cent of Australian jobs are at risk of being automated in the next 10-15 years².

Federally the *Powering ideas an innovation agenda for the 21st century*³ as well as *The Health of Australian Science*⁴ have been influential in responding to this STEM aligned sectorial need. This momentum at the Federal level is reflected at the state level in Queensland's, *Roadmap to STEM Education in Queensland*⁵, which offers insight into the role of primary and high schools in progressing STEM initiatives. Key to both the Federal and State STEM policy direction is the agency of Australia's youth and particularly the role of schools to direct these efforts. From foundation through to year 10, the Australian curriculum lists the principle learning areas of Maths and Science, with the general areas of numeracy and ICT, as well as cross curriculum priorities of Aboriginal and Torres Strait Islander histories and cultures, Asia and Australia's engagement with Asia & Sustainability⁶. In years 11 and 12, the secondary curriculum offers a specialised focus upon the learning areas of Maths and Science. In the learning area of maths, specialisation of the subject focus includes Essential Mathematics,

¹ STEM is the acronym used throughout policy and curriculum to capture the subject domains of Science, Technology, Engineering & Mathematics (STEM).

² State of Queensland (Department of Education and Training), #coding counts - A discussion paper on coding and robotics in Queensland schools, 12 October 2015.

³ https://sydney.edu.au/documents/about/higher_education/2012/20120308%20PoweringIdeas.pdf

⁴ http://www.chiefscientist.gov.au/wp-content/uploads/OCS_Health_of_Australian_Science_LOWRES1.pdf

⁵ <http://www.chiefscientist.qld.gov.au/images/documents/chiefscientist/pubs/reports-other/roadmap-stem-edu-in-qld.pdf>

⁶ The Australian Curriculum - <https://www.acara.edu.au/curriculum/cross-curriculum-priorities>

General Mathematics, Mathematical Methods and Specialist Mathematics⁷. While in the learning area of Science, subject specialisations include Biology, Chemistry, Earth and Environmental Science, as well as Physics⁸.

Notwithstanding the overt (and fast approaching) needs of Australia's STEM related labour requirements, of principle concern across all of government is the well documented declining standards of Australian learners in the foundational areas of literacy, numeracy and scientific inquiry (Thomson et al., 2010)⁹. Since 2003 the Programme for International Student Assessment (PISA), alongside the Trends in International Mathematics and Science Study (TIMSS), as well as the more recent NAPLAN testing since 2008¹⁰, have collectively shown the regression of capability in Australian learners (Thomson et al., 2010). The 'granular' insights offered by this data, indicate that males have, on average, scored higher than females (Maths and Science) and that non-Indigenous students have consistently scored higher than Indigenous students (Thomson et al., 2010). Notwithstanding the concern for Australia's declining national standards across these key foundational areas, of critical consequence to this discussion is the significant, ongoing gap between non-Indigenous and Indigenous learner capability. Recent data demonstrates a 'gap' equivalent to two years schooling in 2010, while in 2012 the gap had moved out to two and half years (Dreise & Thomson, 2014¹¹). Some of the finer points relative to the spacing are listed by Dreise and Thomson (2014) below,

- For Maths literacy Indigenous learners were under-represented in the upper bands of the proficiency scales while being over-represented in the lower,
- Only 2% of the top performing students in Maths, Science & Reading were Indigenous, while comparably for non-Indigenous students collective achievement levels ranged from 14 to 18%, and
- Indigenous learners represented 37% (Science) and 39% (Reading) of low performers while non-Indigenous learners accounted for 13% (Science) and 14% (Reading) of low performers.

A further point of clarity with respect to Indigenous students, is that females are outperforming males across all areas, sometimes by as much as 1 and 1/3 years of schooling (Dreise & Thomson, 2014). This statistic is critical to understanding the nuanced need of the Indigenous space, as female

⁷ The Secondary Maths Curriculum - <https://www.australiancurriculum.edu.au/senior-secondary-curriculum/mathematics/senior-secondary-mathematics-subjects/>

⁸ The Secondary Maths Curriculum - <https://www.australiancurriculum.edu.au/senior-secondary-curriculum/science/senior-secondary-science-subjects/>

⁹ Thomson, S., De Bortoli, L., Nicholas, M., Hillman, K., & Buckley, S. (2010). PISA in brief: highlights from the full Australian report: challenges for Australian education: results from PISA 2009: the PISA 2009 assessment of students' reading, mathematical and scientific literacy.

¹⁰ Ford, Margot. "Achievement gaps in Australia: What NAPLAN reveals about education inequality in Australia." *Race Ethnicity and Education* 16.1 (2013): 80-102.

¹¹ Dreise, T., & Thomson, S. (2014). Unfinished business: PISA shows Indigenous youth are being left behind.

performance exceeding that of males is the inverse to that observed from non-Indigenous performance data¹².

Social context is given to these numbers as they parallel the prevailing socio-economic conditions which have become inherently synonymous with the Indigenous experience in Australia. Such views inside policy and research documents summarise Indigenous collective experience via a deficit discourse most headed by 'Indigenous problems and gaps'. Dreise (2016)¹³ substantively links this discursive language to a "quadruple bottom line" of factorial association which links "economic progress, social wellbeing, environmental stability and cultural affirmation". A set or prevailing relations, which up until this point have consistently been repeated, ad nauseam, as being deterministic of the 'complex', 'murky' and often 'untenable' collective advance of the Indigenous position.

Further confounding the school pathways to STEM employment, is the added complexity of Indigenous Australia's median age. As Dreise (2016) outlines, approximately 40% of the population is under the age of 17 (ABS, 2011)¹⁴, while one in two of those attending school are unlikely to finish high school and only 1.7% of our population go on to university (Dreise, 2016). Crucial then to the age equation is the implications of school attendance, retention & completion¹⁵. With such a large percentage of the population being of school age and only one in three completing high school, it begs further consideration of how to bridge deficits in foundational literacies in forums other than school. The interrelationship of this specific and concentrated conundrum is, in part, acknowledged by the STEM I AM Program Evaluation Plan. It states that,

this is partly due to a complex set of challenges, including literacy and numeracy gaps, and lower school attendance in regional and remote areas, which contributes to a 20 per cent gap in performance between Indigenous and non-Indigenous 15 year olds.¹⁶

In Queensland the finer details of this conundrum are shown relative to STEM enrolment at the tertiary level. The Queensland Tertiary Admissions Centre (QTAC) reports that in the 2015 – 2016 year, 985 (2015) and 870 (2016) of the enrolments were from Indigenous students and of those enrolments,

¹² Considering the groundswell of investment in female STEM participation, Indigenous males stand to be the forgotten gender in a targeted gendered marketing discussion.

¹³ Dreise, T. (2016), See Change, Be Change. The Indigenous Youth STEM Challenge. Unpublished ACER concept paper.

¹⁴ The median age of the Aboriginal and Torres Strait Islander population is 21 years, 16 less than the national median age of 37. More than one in three (35.9 per cent) Aboriginal and Torres Strait Islanders was aged less than 15 years, while just 3.8 per cent of the population were aged 65 years and over. <http://www.abs.gov.au/websitedbs/censushome.nsf/home/CO-63?opendocument&navpos=620>

¹⁵ Dreise, T., Milgate, G., Perrett, B., & Meston, T. (2016). Indigenous school attendance: Creating expectations that are 'really high' and 'highly real'.

¹⁶ Commonwealth of Australia, *Closing the Gap Prime Minister's Report*, 2015

110 (2015) and 115 (2016) were STEM related (representing an overall 4.5% increase)¹⁷. In greater detail Table 2 offsets these figures comparatively with non-Indigenous enrolments.

Table 2 Queensland data: Aboriginal and Torres Strait Islanders compared to Non-Indigenous ^{1,18}

	Aboriginal and Torres Strait Islanders (ATSI)	Non-Indigenous	Total	ATSI as % of total
Total Enrolments in STEM related courses at Queensland Institutions (2016)	115	7,074	7,189	1.60
Total Enrolments at Queensland Institutions (2016)	870	36,790	37,660	2.31
STEM enrolments (2016) as % of total enrolments	13.21	19.23		
Queensland population (2011)	188,954	4,287,824	4,476,778	4.22

As Table 2 shows, while the proportion of STEM enrolment increased in the Queensland context during the represented period, STEM has been shown not to be the pathway of choice for Indigenous students. In 2013, the Aboriginal and Torres Strait Islander Higher Education Advisory Committee (ATSHEAC)¹⁹ recognised that of all the subject domains²⁰ studied by Indigenous students, STEM related fields only accounted for approximately 1.4% of the total enrolments of Indigenous students making it to the tertiary level²¹. While it was acknowledged in 2013 that the total STEM related enrolment accounted for only 1.4% of the total Indigenous enrolments rate, ATSIHEAC further highlights that Education (2%), Society & Culture (1.7%) Health (1.6%) and the Creative Arts (1.3%)²² account for the largest distributions of tertiary enrolment for Indigenous students.

A logical outlook can quiet readily accept these distributions as remaining relatively fixed due to the relationship shared in parallel to the greatest areas of Indigenous need (see Prime Ministers Report Closing the Gap 2018²³). With students choosing to either form part of an Indigenous led intervention into the areas of education, health or to continue to develop and preserve culture. The

¹⁷ Queensland Tertiary Admissions Centre - *ATSI STEM Enrolments vs non-ATSI*, 4 May 2016

¹⁸ 3238.0.55.001 - Estimates of Aboriginal and Torres Strait Islander Australians, June 2011 (Latest ISSUE Released 30.08.2013), Australian Bureau of Statistics.

¹⁹ ATSIHEAC background paper - https://docs.education.gov.au/system/files/doc/other/atsiheac_background_paper_stem.pdf

²⁰ At least that time, current rates are beyond the scope of this review.

²¹ Critical to accurately positioning these enrolment figures is consideration of the rates of Indigenous retention and completion at the tertiary level, giving a purer representation of STEM related professional matriculation. As the rate of Indigenous drop out in the first year and commencement into the second is of considerable concern (see Bradley Report, 2011) and should be seen as an added dimension for consideration in order to better measure 'outcome' in parallel to the STEM I AM program objectives, measures and program logic model.

²² These categories contain an oversight relative to the streaming of Indigenous students into Law and justice related fields at the tertiary level. Further discussion is beyond the scope of this review, but begs inclusion here in parallel to the interventionist or preservation and extension pathways to be discussed below.

²³ Prime Ministers Report 2018 Closing the Gap Report - <https://closingthegap.pmc.gov.au/sites/default/files/ctg-report-2018.pdf?a=1>

strength of either pathway, toward intervention or preservation, is likely to be relative to the on-going ramifications of the colonisation process felt by all Indigenous nations of Australia and the opportunities offered to youth, their families and communities. Consideration then needs to be directed to creatively seeding STEM as a viable option for Indigenous students relative to the larger landscape of ongoing policy failure and Indigenous agency to either address inequity in Indigenous communities or to preserve culture. Indigenous young on the whole are unlikely to be motivated by looming concerns of job availability or economic concerns beyond those of their immediate families, clans and communities.

Paige et al. (2016)²⁴ further highlight the ethnocentric, epistemological foundations of maths and science as a dominant challenge for STEM related uptake which requires thoughtful consideration. They remind us of a history that remade Indigenous people as the objects of, rather than participants in science and maths. We must acknowledge that these discursive legacies have become ingrained inside subject domains which have cast Indigenous learners as incapable and dumb (Paige et al., 2016). This is critical and requires strategic consideration, as the present STEM under-representation is a complex set of relational forces beyond simple content ‘gaps’ relative to subject domains, cultural capital and student matriculation. Thought needs to be broad, linking the role of families and extended families, as ‘owners’ of knowledge. Logically families and communities who are themselves given the capacity to overcome generational, ingrained negative experiences of lived memory toward STEM related content bases, will buy in. So logic follows that parents, grandparents, Aunties and Uncles all within the homes of Indigenous children will share a vested interest in aligning with policy direction of future need. However, poise and accuracy is required here, as historically, evidence of positively aligning Indigenous people and policy is a path seldom seen. Failures live long and have sustained currency.

If STEM is approached with broad consideration, with all levels of the Indigenous community as stakeholders, with shared and co-developed pathways that are not ‘top down’ vertical interventions, then logic dictates that STEM should grow. A notion recognised, in part, by the STEM I AM Evaluation Plan logic,

²⁴ Paige, K., Hattam, R., Rigney, L. I., Osborne, S., & Morrison, A. (2016). Strengthening Indigenous participation and practice in STEM: University initiatives for equity and excellence.

Successful programs to improve the participation of Aboriginal and Torres Strait Islanders in tertiary education have come about through the development of close working partnerships with indigenous communities, schools and universities²⁵.

Therefore, horizontal, grass roots, community capacity building investments are needed to sit alongside current initiatives and infrastructure. In this way Indigenous STEM matriculation will be given an organically determined half-life. Therefore, examination for future practice should be directed toward capacity building models which use parents and care givers as first teachers; constructively building family and community capacity alongside that of students in programs and schools. If left only to curriculum, teachers and librarians, logic follows that families of Indigenous children will be less inclined or 'technically' able to support the complexities of progressing pathways, homework or extension activities that might build toward high school completion and tertiary entrance.

Critically Dreise (2016) points to the ongoing limitations of curriculum which fails to engage, offering that schools are unable to connect due to the complexity of the Indigenous youth experience. He also cautions against narrow curriculum, particularly in high school, that can be reduced to bi-directional pathways (academic or vocational) not linked to the prevailing contexts felt within homes or communities (Dreise, 2016). However, there is an extensive gap in the literature relative to Indigenous participation in STEM. How best to bridge the obvious technical divide in light of the ongoing systemic failure of social policy initiatives, requires further work (Paige et al., 2016). In response, the literature affirms the need for more evidenced based educational measures to overcome disparity and to drive progress forward (ATSIHEAC).

Wider assertions are also made for examinations of practice at the classroom level relative to Australia's STEM need and the need for culturally appropriate ways to engage Indigenous learners in the space (ATSIHEAC). Paige et al. (2016) highlight the logic of culturally relevant practice paired alongside the need to increase literacy and numeracy as a foundational base, as well as the critical task of content related ethnocentrism, the stringent preparation of teachers and ongoing opportunities for quality professional development. Dreise (2016) adds that system and policy thinking should hold the necessity of learner agency central, which inspires by innovation and creativity, and is needs funded and strengths based. In further considering the teaching and student

²⁵ Pechenkina, E & Anderson, I 2011, *Background paper on Indigenous Australian higher education: trends, initiatives and policy implications*, Department of Education, Employment and Workplace Relations, Canberra, <http://www.deewr.gov.au/Indigenous/HigherEducation/ReviewofIndigenousHigherEducation/Submissions/Documents/IndigenousHigherEducationReview-ReseachPaper.pdf>.

level, McKinley (2016)²⁶ declares that Indigenous children have a natural affinity for and a great interest in STEM related areas but yet they are under-represented in achievement and enrolment categories. It seems that curriculum, schools and teachers are failing to grasp the complexity of Indigenous students, the worlds they come from and how to engage, motivate and inspire (Dreise, 2016).

McKinley (2016) highlights international examples of success which build upon existing Indigenous strengths in science which link to cultural positions of caring for and respecting land, rivers, seas and sky. She asserts the necessity of extending instructional practice beyond the four walls of an indoor learning space, with the effectiveness of dynamically engaging with natural, functioning ecosystems as being a logical way of building toward learner capacity which naturally maps back to the curriculum. With that in mind, of critical importance are Federal and State motivations to advance STEM literacy within learners that lead to advanced study and future professions. The STEM I AM program has been designed to fulfil a niche space relative to 'growing' Indigenous learner capability, which looks to align project investment alongside State policy and education frameworks, as the STEM I AM program logic model outlines,

DET's, Advancing Education, #codingcounts initiative, is aiming to ensure that 100 per cent of Queensland state schools will be teaching coding and robotics by 2020. The STEM.I.AM program supports #codingcounts by building upon the work of organisations that have strong experience in delivering or supporting STEM education and coding and robotics initiatives across the state.

In this likeness the STEM I AM program is positioned well within the current dynamics of Indigenous STEM stagnation and regression and critically has offered an initiative which is needs-funded and looks to address under-representation in STEM via creativity and innovation. However, without broad thinking and sustained effort concerning the nuances of the Indigenous experience, the STEM I AM program will become, like many before it, a short-term effort to mobilise non-Indigenous vision and practice to close internal gaps born from externally created circumstances. The STEM I AM program has the potential to be an intrinsic component of the broader suite of initiatives that will stimulate Indigenous students' interests and direct their learnings towards STEM in an educational and professional sense for the future.

²⁶ STEM and Indigenous Students

https://research.acer.edu.au/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1290&context=research_conference

3. The Evaluation Process

This interim report is the first in a three-year reporting cycle and is conducted externally. It is understood that the STEM I AM program will also be evaluated internally, parallel with the Advance Queensland Evaluation Framework. As noted by Connolly and Cranny (2016) “The evaluation process will review program logic, objectives, alignment to Queensland government priorities, inputs and outputs, activities and risks”. Therefore, the composition, implementation and structural parameters of this external review are located and grounded within these boundaries. The parameters for this external review entailed;

1. ***Setting up the quantitative and qualitative constructs for evaluation*** (development of the survey tools and their housing, with review and adjustment over the triennium (if optioned) as well as yarning circle components (processes and questions),
2. ***Composition and submission of ethics outline to Griffith University Ethics committee,***
3. ***Stakeholder meeting to inform of data capture processes and protocols,***
4. ***Managing, accessing and analysis of the generated data.***

The program is determined by short term impact of momentum directly influenced by DSITI and the Advance QLD STEM I AM initiative. Long-term impact are indirect influences that could be commented upon from an indicative position. A program logic model has been adopted by DSITI for the development, implementation and measurement of the STEM I AM program. The adoption of such a model allows measures to be formed and inferences drawn relative to process and function of the STEM I AM program. The program logic’s key areas are listed as,

- Motivation,
- Inputs,
- Activities,
- Outputs,
- Short term,
- Long term, &
- Beneficiaries.

It is noted that DISTI (Connolly and Cranny, 2016) recognises that the evaluation process will entail a review of the following elements;

- Program logic,
- Objectives,

- Alignment to Queensland government priorities,
- Inputs and outputs,
- Activities and risks.

Type of Evaluation & Link to DSITI Evaluation Questions

This evaluation process reports through a triennium cycle which consists of three phases relative to DSITI’s program logic model set to measure against short term and long term impact. The evaluation recognises these phases to be deterministic of the following;

1. **Planning and initial implementation** - to determine what steps/activities were undertaken during the program and its varied projects,
2. **Implementation and data collection** - to focus on the operational aspects as the program and its projects rolled out, with feedback, throughout the 2 to 3-year process, &
3. **Consolidation and reporting** - to determine the value of the initiative, providing some recommendations for improved process as the program advances into its second and third phases.

Table 3 Tri-annual cycle of three phases relative to a program logic model

Key Evaluation Questions	Process evaluation	Formative evaluation	Summative evaluation
1. Has the STEM.I.AM Program been implemented effectively? Were corporate sponsorships effective? Is the design serving the needs of all of the stakeholders?			X
2. Are the objectives of the STEM.I.AM Program being met? Is it increasing the number of Aboriginal and Torres Strait Islander students choosing to study in a STEM field at University? Is the program beneficial to young Aboriginal and Torres Strait Islander Queenslanders in remote, regional and urban Queensland, and far-north, central and south-east Queensland? Are there environmental factors (social, economic, geographical) impacting on program take-up? Are there better ways of achieving the same objectives?		X	X
3. Is the STEM.I.AM Program being administered and delivered in an efficient manner? Is the burden of compliance costs incurred by stakeholders being kept to a minimum? Is the Program design appropriate in serving the needs of all of the stakeholders?	X		
4. Are the STEM.I.AM Program’s objectives of ongoing relevance to the Queensland Government’s broader strategic policy priorities for innovation, science and research? Within the Advance Queensland funding envelope, is the funding allocation to the STEM.I.AM Program about right?			X
5. Are arrangements for monitoring the performance of the STEM.I.AM Program robust? Has the program produced outcomes that would not have occurred in the absence of the program?	X		X

Therefore, the external evaluation will offer reports that take the three mentioned phases as the topic theme of each reporting phase, allowing this focus to drive the measurement and recommendation. Consequently, the evaluation has been planned over a 3 year period, with review at the end of year 2 to determine whether a 3rd year will occur. This evaluation will adopt the 3 phases.

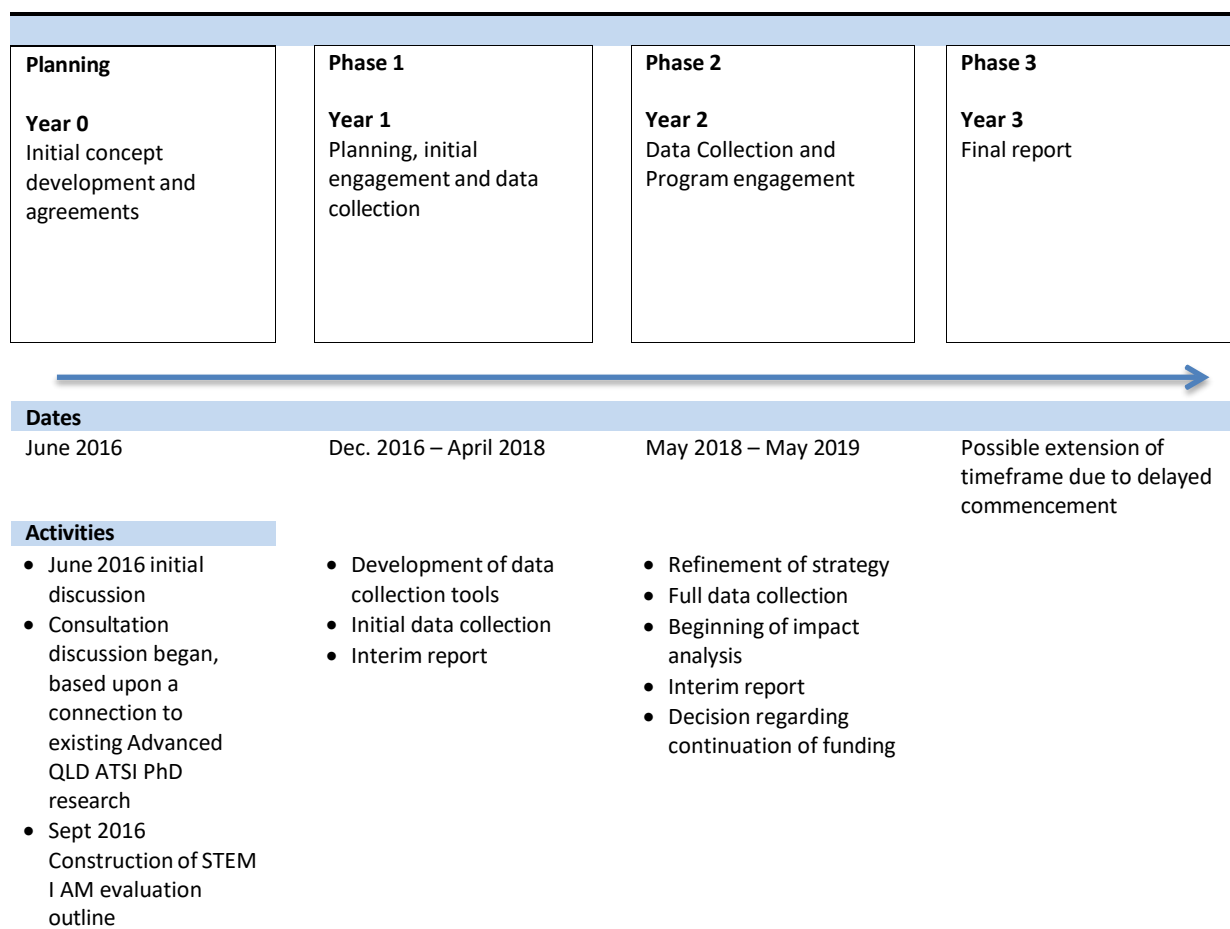


Figure 3. Phases of evaluation

One of the outcomes noted from the initial concept development stage to Phase 1 was a shift in the projected roles and budgets. Initially it was envisaged that the evaluation team would undertake site visitation to collect data and prepare a thorough examination of literature to stand alongside the iterative report cycle. However, in a budget tightening decision it was decided that the evaluation team would not actively be involved in any on-site data collection and an extensive review of the literature would be limited to that provided by DSITI as means to create context and selectively inform recommendations.

The first phase took a Process Evaluation approach – hence it looked at what actually happened, with comments informing aspects of the process that were fed back throughout. The evaluation process was undertaken across the process thus provided feedback within the implementation and operational phases. Finally, at the end of the 3 year evaluation process, ideally a level of summative evaluation will be undertaken. This will use the Program Logic definition to inform how this worked.

Table 4 Service requirements from schedule 1 and year for delivery

Deliverable	Year 1	Year 2	Year 3	Comment
Establishing the quantitative parameters for the evaluation to measure the impact of program activities. Development of the survey tools, their housing, review and adjustment annually.	c			(24.05.2017) Action complete. Three surveys passed through a number of drafts with feedback given by DSITI and its program partners (7/10/2016-10/7/2017).
Establishing the qualitative parameters for the evaluation to measure the impact of program activities. Development of the yarning circle component, including processes and questions.				(07.02.2017) Action complete. Supported by constructed hand out with Yarning Circle structure, format and question set.
Composition and submission of ethics outline to Griffith University Ethics Committee.	c			(21.12.2016) Action complete. Full clearance obtained.
Stakeholder meetings to inform and agree on data to be captured and related processes and protocols.	c			(11. 10. 2016 & throughout) Action complete. Attended planning meeting to discuss evaluation, costing and roles. Attended phone conferencing meetings as well as email correspondence to further clarify the requirements of the data collection process
Collection, management, access and analysis of the generated data in a secure environment.	p	p	p	Action on-going. The project logic has envisioned a three-year cycle, therefore action will continue.
Examination of literature supplied by DSITI that relates to Aboriginal and Torres Strait Islander participation in STEM related subjects at school, university and professions.				10. 05. 2018 Action complete and included as a section in this report.
Draft Interim report: Completion and handover of annual reports that include recommendations for future program delivery and commentary on evaluation components of the STEM I AM Program, which may include but not limited to the following elements.				15. 5. 2018 Action complete. Griffith University evaluation handed over first report of the three-year cycle for comment.
Environmental factors (social, economic, geographical) impacting on program take-up.			p	i
Performance measures over short, medium and long term.			p	Comment is given relative to short term performance measures. Comment on the medium and long-term performance indicators would be the focus of 2 nd and third year reports, if optioned.
Effectiveness of program implementation.			p	i
Appropriateness of program design.			p	i
Are objectives of program being met?			p	i
Effectiveness of program activities relative the program goal.				i
Has the program produced outcomes that would not have occurred in absence of the programs?			p	Final evaluation stage
Are there better ways of achieving the same objectives?			p	Comment included in first report.

Notes: c – complete, p – progressing

i. Comment included in first report, however is only indicative due to the iterative design of the program.

Phase 1 – Planning and Initial Implementation

This initial phase represents the program and evaluation establishment.

Table 5 with key Dates, Action and Comment summarises the key interactions with the Program Manager (DSITI) across this phase

Table 5 Summary of key interactions with the Program Manager (DSITI) across Phase 1

Date	Key Action/ Comment
July 2016	Proposal development & submission
August 2016	STEM.I.AM Program launch
September 2016	Discussions regarding reducing 3-year funding cycle to yearly components and contract progression to be based on receipt of satisfactory reports. Budget reduced due to costs of evaluation team collecting data on site. It was discussed that each stakeholder was to encourage participants to complete surveys and yarning circles with data to be collated and analysed by the Griffith Evaluation team.
October 2016	STEM I AM external program evaluation contract and STEM I AM program evaluation proposal updated for your review, completion and acceptance. DSITI reviewed ethics documents and Griffith accepted suggested changes.
November 2016	Draft survey instrument developed.
December 2016	Full Human Research ethics approval.
February 2017	Sean Cranny confirmed as primary contact.
July 2017	Final survey instrument electronic and .pdf copy accepted.
July 2017 - January 2018	Request and confirmation to extend date of interim report due to delay in program roll out and lack of data received. Variation executed January, 2018.
January – April	DSITI and Griffith requests to stakeholders for survey completion.
May 2018	Data analysis and completion of interim report.

As can be seen from Table 5 the initial stage underpinning the main data collection phase took longer than projected, limiting the major data collection across this phase. However, this means that strong and supported instruments are available for Phase 2 and also limitations in the capacity for data collection are available for a smooth and comprehensive data collection phase in year 2.

Phase 2 – Implementation and main data collection

Table 6 summaries activity start dates, project partner and relative data collection process.

Table 6 *Data collection process*

Date	Project Partner	Activity	Data Collection process
	Carbon Media State Library QLD	Planning and consultation Advertised competitive grant process	Survey Survey & Yarning Circle
	Department of Housing QUT & USQ	Advertised competitive STEM scholarship	Survey
	EnVision Inc. SLQ Indigenous Knowledges Centre: Aurukun		Survey & Yarning Circle

As can be seen from Table 6 the roll out of activities have been progressive and varied. These activities required data capture. Due to the on-going implementation of project activities into the second year the opportunity to consolidate the data capture process is available building upon the foundation established in the first phase.

Phase 3 Consolidation and reporting

It is anticipated that minor adjustment may be required of data collection tools. Closer monitoring of data completion will be undertaken in light of the experiences of the first year of the project. A summative evaluation will be undertaken which will use the DSITI evaluation plan and program logic flow chart to inform how the total project was completed.

STEM I AM Program: Data

To effectively assess the perspectives and experiences of those who facilitate and participate in the STEM I AM program, a mixed methods (quantitative & qualitative) approach to data capture was employed. In the first phase the composition of the data collection tools were developed, consisting of the construction and implementation of surveys comprised of quantitative and qualitative responses (see an example in Appendix B) as well as guidance in the facilitation of yarning circles (qualitative) in key locations.

Three survey tools were designed to collect information housed upon Lime Survey. These surveys were accorded different URL's and respondents had access to the survey via the specified URL link. Categorisation of the different survey tools via URL allowed the data to be sorted via subject and time of completion. This made data categorisation simple via a direct export link to the statistical software program SPSS. In greater detail the focus of the survey tools are presented below.

STEM I AM Program: Administrators

An electronic survey was designed for administrators to complete annually, facilitating reflection by the Project Managers on the implementation and governance processes implicit in the initiative over the course of a 12-month period. Table 7 summarises the key information collected in the survey.

Table 7 *Administrators Survey*

Survey Section	Content
Background Information	Gender Age Identity Cultural experience
Assessment of Key Program aspects:	Items assessed through Likert scale:
1. The program was well organised.	1 Strongly disagree
2. I was an integral part of the team involved in the program.	2 Disagree
3. The program structure allowed all stakeholders to contribute fairly.	3 Uncertain
4. There was regular communication across all stakeholders.	4 Agree
5. There was fair access and spread of program resources.	5 Strongly agree
6. Financial structures within the program were sound.	6 Not applicable
7. The program vision and implementation considered relevant Indigenous cultural factors.	
8. The Indigenous community involvement was difficult to administer.	
9. I believe the objectives of the program have been met so far.	
Open Response	Key positives and negatives

STEM I AM Program: Facilitators

A short electronic survey was developed to seek responses from facilitators and teachers involved in the implementation process. It consists of closed questions similar to those asked of the administrators, as well as including opportunity for respondents to make brief comments on the operation of the program. The survey was designed to be completed at key points in time, as a continuing series of reflections.

Table 8 *Questions of Facilitator Survey*

1. I am interested in STEM subjects generally.
2. I am interested in coding and robotics.
3. I know how to teach STEM concepts effectively.
4. Student achievement in STEM related subjects is directly related to their teachers' effectiveness.
5. Coding and robotics need to be explicitly taught in schools.
6. Students should be taught STEM related subjects from an early age.
7. Enrolment in STEM related subjects is a good indicator of future university enrolment and careers in STEM.
8. I will typically be able to negotiate areas of cultural competence in the workshop space.
9. A strong personal relationship with Aboriginal and Torres Strait Islander students is needed in STEM related subjects.
10. When an Aboriginal and Torres Strait Islander student progresses in STEM related subjects, it is usually due to a strong personal interest.
11. When an Aboriginal and Torres Strait Islander student progresses in STEM related subjects, it is usually due to support from parents/community.

STEM I AM Program: Participants

Like the other survey tools, the participant survey was administered electronically, after key activities or at the achievement of milestones implicit in a continuing process, combining key closed questions along with a short response section. The closed question portion consists of assessing personal variables (gender, age, favourite subjects and school activities, STEM participation at school, STEM role models), against workshop/activity related questions (Did I enjoy this workshop, which element did I enjoy most?). In the short response portion, attitudes and perceptions are gauged in relation to participation in the STEM I AM program and future STEM related interest and careers (By participating in this workshop has your view on STEM changed? Would you see yourself enjoying a career in STEM in the future?).

Table 9 Questions of Participant Survey

1. The facilitators made the day interesting and fun.
2. I don't like maths and science but the games were fun.
3. I know more about coding and robotics after today's workshop.
4. I came to the workshop today because I like maths and science.
5. Coding and robotics has nothing to do with maths and science.
6. I would like to participate in coding and robotics clubs and competitions.
7. I could see myself doing STEM / Coding and Robotics in university.
8. I would like to work in science and maths as a job.

STEM I AM Program: Qualitative Tool - The Yarning Circle Process

Further to the utilisation of the survey mechanisms, this external evaluation was designed to employ yarning circles to qualitatively measure the impact of STEM I AM initiatives. Yarning circles are a non-hierarchical process whereby power is shared equally amongst participants giving all those involved the avenue and right to share without prejudice. This mechanism is tied to Indigenous knowledge processes and is a culturally relevant way to conduct research. In order to ensure the spread of measurement is balanced, it is recommended that these circles be conducted inside three contexts as part of each annual review, that being, urban, regional and remote locations.

Yarning circles are designed to take 30 minutes to an hour to facilitate. By conducting and filming the yarning circles, face to face data has the opportunity to be collected from a contextual vantage point, allowing a 'living/human element' to be interwoven into the composition and handover of the interim and summative reports. To allow the yarning circle process to run grounded inside the targeted contexts, guiding parameters established by the evaluators were designed to facilitate successful data capture. This included;

- Guiding information on how the process functions, rules and best practice,
- The generation of key questions which will guide the yarning circle discussions,
- The option of Skyping in if necessary in the beginning phases, or
- Filming a yarning circle in an urban centre for dissemination to those in the regional and remote areas as a guiding mechanism to inform implementation.

4. STEM I AM Program Partners & Project Activities

The STEM I AM initiative is designed to provide funding allocation to project activities. In the following section an overview of the program partners and project activities undertaken as part of the STEM I AM program is provided.

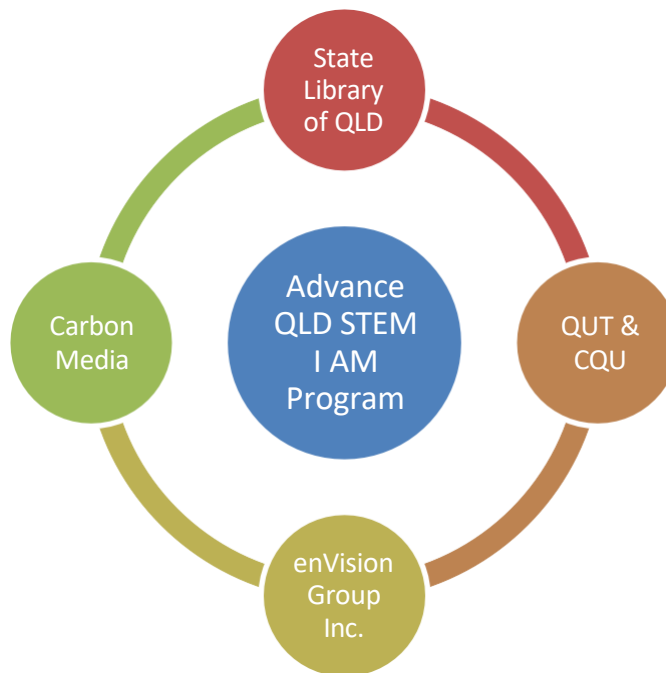


Figure 1. Program partners

Carbon Media

Overview

Carbon Media coordinated a communication and promotion campaign for the Advance Queensland STEM I AM program to create awareness and attract corporate sponsorship. With state-wide coverage the campaign targeted stakeholder networks with the use of;

- Promotional video clips,
- Graphics,
- Documentaries,
- Social media,
- Websites,
- Online print, &
- Broadcast media channels.

Figure 4 highlights the hierarchy of funding relative to Carbon Media and the STEM I AM program.

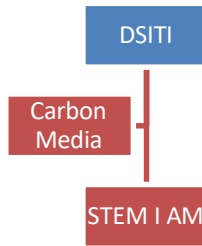


Figure 4. Hierarchy of funding relative to Carbon Media and the STEM I AM program

State Library of Queensland

Overview



The State Library of Queensland auspiced a grant funding program for the STEM I AM program. Criteria determined competitive grants of up to \$25,000 were available to Indigenous Knowledge Centres and local council libraries to deliver coding and robotics education via workshops, community led code clubs, building the capability of local staff to deliver skills to ATSI youth, or supporting youth to compete in competitions. 8 Grant recipients were announced on 17 July 2017 – with activities delivered up to 30th of June 2018.



Figure 5. Image of STEM I AM State Library Queensland launch with Minister Leanne Enoch.

Figure 6 highlights the hierarchy of funding and the delivery to the respective levels in the State Library of Queensland process.

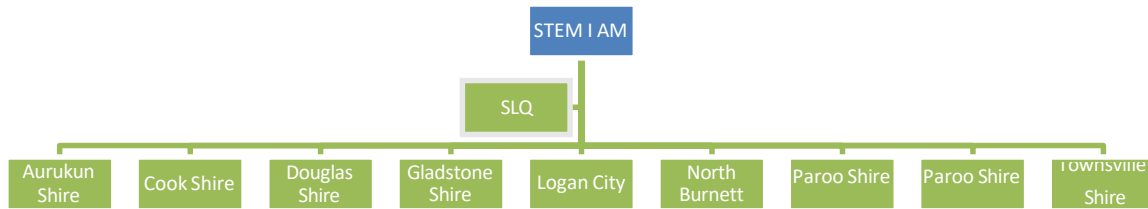


Figure 6. Hierarchy of funding and the delivery to the respective levels in the State Library of Queensland process

Aurukun Shire Council: (\$25 000)

The STEM I AM SLQ grant was used in Aurukun to support Indigenous Knowledge Centre staff to facilitate a program with the local Men’s Shed designed to increase competence in STEM as well as foster team work and public speaking. Working with students, activities included;

- Building a replica of the town as a robot obstacle course, &
- Using robots to work in language, incorporating local geography and culture.



Figure 7. Image of Aurukun students interacting with a robot.

Cook Shire Council: (\$9 680)

The STEM I AM SLQ grant was used in the Cook Shire to allow support for the delivery of two activities:

1. Set up of a new Indigenous robotics club in Cooktown, &
2. Funding to subsidise the travel of 3 Indigenous students already involved in robotics to an international robotics competition.

The club sort to join the Lego League Competition, purchasing 2 First Lego League Competition Kits and fund a trip to Brisbane to participate in a First Lego League Competition.

Douglas Shire Council: (\$12 830)

The STEM I AM SLQ grant was used in the Douglas Shire to support the delivery of STEM related professional development workshops for library staff, teachers & providers of community programs for youth. Professional development led to the facilitation of a STEM related workshop for Aboriginal and Torres Strait Island students as part of school curriculum in partnership with Mossman High School & the Youth Centre.

Gladstone Regional Council: (\$23 750)

The STEM I AM SLQ grant was used in the Gladstone region to purchase a NAO (humanoid) robot to support current library resources as well as to extend programs to include and encourage participation by Indigenous students and families who already access services through partnerships with Communities for Children, Save the Children fund and Department of Education Training (DET) Indigenous Liaison Officers. Activity extension sort to teach a NAO robot tasks that would lead to the formation of a local language program within the region.

Logan City Council: (\$24 970)

The STEM I AM SLQ grant was used in Logan to bolster community skill level in the areas of robotics, coding, communication and leadership. Library staff sort to deliver multiple coding and robotics sessions specifically targeted toward Indigenous students from grades 5 to 12. Success of these objectives were based around intended partnerships with three local state schools, which includes the activities of Coding coaches and Deadly robots.

North Burnett Regional Council: (\$21 790)

The STEM I AM SLQ grant was used to purchase a 3D printer and deliver workshops in the Eidsvold Library by not for profit organisation CoderKidz. The workshops targeted Indigenous students, interested teachers/aides as well as library staff. The proficiency gained would allow librarians to become in-house mentors as young library patrons learn and develop their coding and electronic skills.

Paroo Shire Council: (\$14 580)

The STEM I AM SLQ grant was used to further support the Paroo Shire Council’s current delivery of basic coding programs through the Cunnamulla Library and five schools in the shire. Funding enabled the purchase of advanced operator training for both library and school staff in order to develop advanced NAO coding classes. New technologies such as the Hexapod Ezi Robots were sort to be included in order to further enable the Council to work with more local schools as well as the Cunnamulla Aboriginal Community Health. These programs support the purchase of a NAO robot in 2016 from a previous SLQ grant, ensuring a strong and ongoing link to the school curriculum in the Shire.

Townsville Shire Council: (\$25 00)

The STEM I AM SLQ grant was used by the Townsville Shire library to enable the delivery of the following initiatives;

- Coding & robotics workshops for 10 children in grades 5-7,
- A Living Library program for grades 8 – 12, consisting of a group based – environmental site visit, &
- 3D printing workshops to enable the learning of coding, soldering and design skills relative to real world environmental challenges which further enhance school based learning of the new digital curriculum.

Department of Housing and Public Works: (\$20 000)

As part of the STEM I AM projected activities, the Department of Housing and Public Works invested \$20 000 for STEM related undergraduate university study for Indigenous students. As part of this STEM I AM investment the program sort a partnership with the Queensland University of Technology (QUT) and the Central Queensland University (CQU). Figure 8 highlights the hierarchy of funding and the delivery to the Universities.

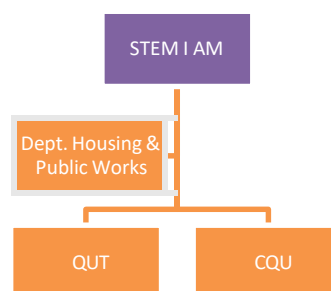


Figure 8. Hierarchy of funding and the delivery to the Universities

QUT & CQU

Scholarship agreements were accorded with QUT and CQU in order to promote digital-related study with Aboriginal and Torres Strait Islander youth in Queensland and to increase the number of Indigenous people studying STEM at university. Each tertiary institution provided \$10,000 for one Indigenous student enrolling in the first year of a single or double degree specific to IT or Engineering undergraduate program. Eva Hopewell was awarded a 1-year scholarship at QUT with CQU to announce an offer after the 27th of March 2018.

EnVision Group Inc.:

As part of the STEM I AM program EnVison Group Inc. delivered a series of workshops which included coding and robotics or STEM related activity. This workshop series was titled the Far North Queensland roadshow and involved delivering workshops in two Queensland regional communities. The roadshow sort to join tech entrepreneurs and Indigenous communities in order to mentor and inspire young Aboriginal and Torres Strait Islanders. The first workshop travelled to Wujal Wujal in 2017 (20 & 21 November) with the second taking place in Aurukun in 2018 (19 to 21 March). Figure 9 highlights the hierarchy of funding to the delivery of activities.

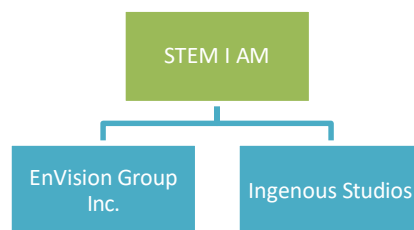


Figure 9. Hierarchy of funding to the delivery of activities



Figure 10. Image of participants in EnVision Group Inc's Far North Queensland Road Show.

5. Initial Results

Network & Partnerships:

DSITI functioned as the middle point in a complex network of internal and external partnership relations. Internally DSITI had to negotiate consultation, design and funding discussions across a number of levels. However it is beyond the scope of the parameters of this external review. It is understood that scrutiny would be directed to these processes as part of an internally conducted Advance Qld review.

Externally DSITI attracted and managed corporate sponsorship which included Google, Carbon Media, First Australian, Department of Housing and Public Works. Clear data upon the vitality of management and function is not available for comment.

Further to the corporate network, DSITI engaged and managed relationships at the program level with the Department of Education and Training, the State Library of Queensland, the University of Queensland and the University of Southern Queensland. Clear data upon the vitality of management and function is not available for comment.

With regard to the evaluation level, DSITI also had to manage internal and external review processes. While the internal evaluation is beyond the scope of this design, externally the management of a functioning network was strained at times. With change of personnel, change of department and delay of program launch all complicating a clear and seamless view of processes and outcome.

STEM I AM Program

Administrators

5 administrators completed the survey (see Figure 11).

Of the respondents 4 indicated age (2 between 30-39 and 2 40-49 years) and gender (3 males and 1 female). Regarding how the respondents identified, of the 3 who responded none identified as Indigenous.

3 questions were asked regarding their cultural experience. 3 indicated that they had engaged in cultural training, only 1 indicated that they had experience in embedding ATSI perspectives, and only 1 indicated that they had experience in engaging with ATSI parents and communities.

Finally, the responses to the 9 statements regarding the program, even from this limited number, are valuable – these are summarised in Figure 11

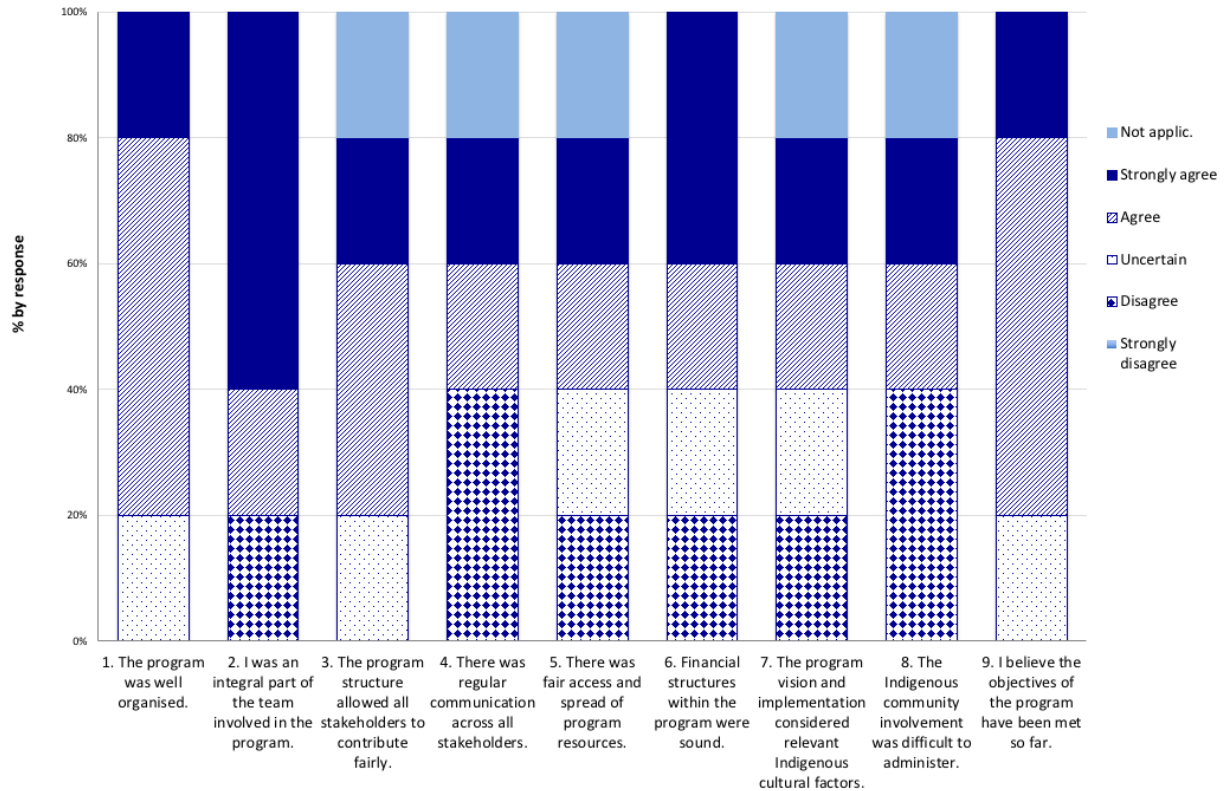


Figure 11. Results of administrator responses to attitude statements

Clearly the Programs were perceived as well organised (S1. 80% agreement and 20% Uncertainty) and with 80% also indicating that they had been integrally involved in the Program (S2) their capacity to comment is appropriate. Less positive was the response regarding regular communication across the program (S4) with only 20% of respondents supporting this view, with a similar response regarding the share of program resources.

While it is noted these responses are from only 3 of the Administrators they suggest a reasonable approach has been adopted but perhaps some planning and input regarding communication and cultural inclusion for the next stage may add value. Given the limited overall responses to surveys for the evaluation, this conclusion seems reasonable.

The following general comments from respondents add to this understanding.

What was done well?:

- *as a whole (program) itself- the rationale of the program itself to allow technology exposure to remote community. The Department has selected a well experienced organiser through the procurement process.*
- *Communication regarding the Scholarship*

- *The State Library of Queensland providing workshops in public libraries and indigenous knowledge centres in partnership with local schools and communities - strong expertise and connections into communities with indigenous school aged children. ENvizion Inc - delivered two roadshows to Aurukun and Wujal Wujal in partnership with Central Queensland University - collaboration with those with cultural connections into community worked well together with using Tech Entrepreneurs who had STEM skills.*
- *The variety of partners engaged in the program allowed for diverse opportunities for participants. The flexibility for public libraries receiving the grant also allowed local programs to be curated well for local community needs.*

What could be improved:

- *I was not involved with any roadshow / robotic events.*
- *Manage all aspects of the program from one team, instead of spreading across multiple teams and expecting them to do the work with little to no support.*
- *media exposure. Allow for more community visit.*
- *The delay in setting up the independent assessment of the program meant that many community participants had already completed the grant programs offered through libraries, and so were not available to provide feedback.*
- *There is a lot of programs in the STEM space, including those with a focus on supporting indigenous students. It is a complex from a policy and program perspective to deliver specific activities to increase STEM participation at university for indigenous people - it needs to be a narrower focus on delivering what is proven to work over the longer term - this program only touches the surface and needs repeating over a significant period in consultation with those in community and STEM specialists in order to measure impact on the intended goal*

Facilitators

No facilitator responses were received.

Students

Only 3 responses regarding student feedback are available.

These are from a session at the Cunnamulla Library (2) and a Shire Hall supper room (1) with all 3 being grade 5-6 students, with 2 identifying as female. Two also identified as Aboriginal. Regarding parents/Carers education level 2 identified this as Grade 12 with 1 indicating a Grade 10 level.

In commenting on their favourite subjects at school the first level response was in the arts, English and Technologies.

All 3 identified physical outside school activities – around PCYC swimming and dance.

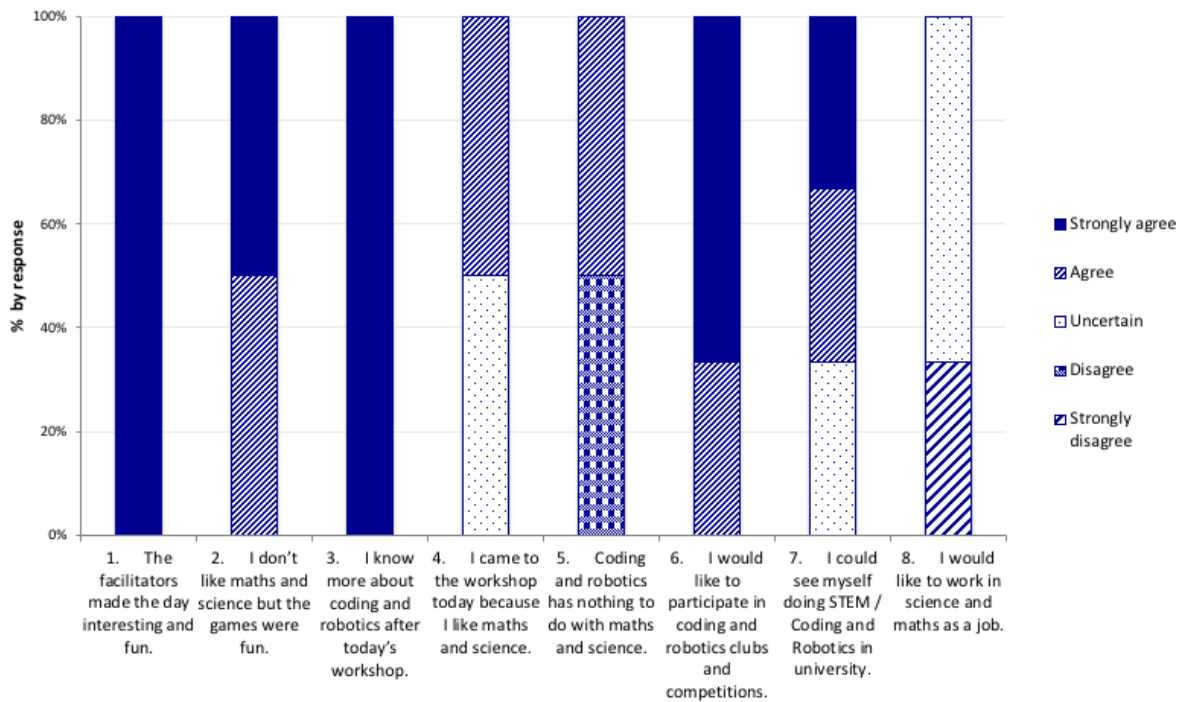


Figure 12. Results of student responses to attitude statements

In commenting on the statements around STEM, all 3 strongly agreed that the facilitators made the day fun (S1) and that they know more about robotics and coding after the session (S3).

While a very small response, the overall comments were extremely positive with the practical nature of the sessions really valued. Particularly as clearly the students that responded were not STEM focussed students their positive responses is particularly pleasing.

Most enjoyable.

- I like the day that it was fun and we got to have a turn at the activities
- I like the part when we made Jd dance
- Home time

What could have been done better?

- I liked everything
- I liked everything

What's the most exciting?

- easement
- The most exciting thing about science is that we done an experiment on plants. The most exciting thing about maths is that we done area and perimeter.
- x tables

6. Discussion of Findings to Date

It is clear from the limited amount of data available from the planning and initial implementation stage that activity has begun, is underway and in some cases completed.

Carbon Media:

It is assumed that Carbon Media's role of strategic communication and marketing will continue throughout the remaining phases of the STEM I AM program. It is unclear as to the usefulness of this investment as quantitative or qualitative data was not available from Carbon Media or DSITI relative to their role, experiences or recommendations or insights for the future. In phase two of the evaluation, with strong measurement frameworks in place it is assumed that a clearer picture will be available regarding Carbon Media's role and effectiveness relative to financial investment.

State Library of Queensland:

Clear information was available regarding the role of the State Library of Queensland in the STEM I AM program. They managed to advertise, award and release funding to seed STEM related activities across a vast geographical range involving 8 innovative and engaging initiatives. Critical to the role and indicative success of the role of the State Library of Queensland has been their capacity to reach a dynamic range of Aboriginal communities throughout Queensland and key to their success from their engagement reach has been their ability to cater to need across the various regions of Aboriginal life from urban centres to regional and remote contexts.

However specific numbers relative to participation levels in workshops, coding or robotics clubs and leagues or national and international competitions was unavailable for this phase of reporting. Subsequent lack of quantitative or qualitative data was not available from the State Library of Queensland or DSITI relative to their role in managing the competitive funding process as well as the experiences of those who facilitated workshops, clubs or leagues, alongside recommendations or insights for the future. In phase two of the evaluation, with strong measurement frameworks in place it is assumed that a clearer picture will be available regarding the experiences and insights of those who were involved in the function and process levels of the State Library of Queensland.

The Queensland University of Technology (QUT) & the Central Queensland University (CQU)

The investment from the Department of Housing and Public Works toward the STEM I AM program was designed to support STEM related university study for Indigenous university students

entering their first year with two \$10 000 scholarships available between the two universities. It is clear from the information available that funding for the STEM related scholarships were advertised within both QUT and CQU. At QUT the scholarship was awarded, yet information concerning the CQU was unavailable for this report. Considering Bachelor level of study is four years, definitive pictures of such scholarships would be hard to measure. Again quantitative or qualitative data was not available from either university or from scholarship recipients relative to their role in managing the competitive scholarship process or experiences, recommendations or insights for the future. In phase two of the evaluation, with strong measurement frameworks in place it is assumed that a clearer picture will be available regarding the experiences and insights of those who were involved in the function and process levels of both universities.

EnVision Group Inc.

EnVision Group Inc. undertook STEM related tours of the Aboriginal communities for four days of workshop facilitation, travel, accommodation and meal allowance. However it is unclear as to the usefulness of this investment as quantitative or qualitative data was not available from EnVision Group Inc. or DSITI relative to their role, experiences or recommendations or insights for the future. It is unclear whether a future investment will be made as the program moves into its second phase.

Discussion of the process learnings

Due to the lack of quantitative or qualitative data it is hard to comment across the program or within programs to any degree of certainty, even indicatively. In phase two of the evaluation, with strong measurement frameworks in place it is assumed that a clearer picture will be available regarding the experiences and insights of those who were involved at the process levels in order to make strategic recommendations for phase 3, if optioned.

Preparation for Stage 2

The evaluation team anticipates receiving feedback from DSITI regarding the first interim report and their possible adoption of recommendations. Ideally a stakeholder meeting would be held to determine to what extent recommendations could be applied and the costs, process and scope of the suggested changes. Given the hosts access to an internal evaluation, both evaluations will necessarily be analysed in parallel to determine the best way forward for the second year of the project.

7. Conclusion & Recommendations

Short Term Measures

The focus of this reporting phase is consideration, where possible, of the short term measures listed below;

Total number of Aboriginal and Torres Strait Islander children and youth participating in coding and robotics activities and workshops organised and funded through the Advance Queensland STEM: I AM program delivered through SLQ and DET:

- Registration numbers at workshops.
 - Registration numbers at existing or new code/robotic clubs, leagues.
 - Registration numbers state, national, international coding and robotics competitions.
1. Registration numbers (teachers) at professional development days.
 2. Collaborative connections from funded activities (school, library or community group etc.).
 3. Improved STEM literacy/capability improvements of participants (students/teachers/library staff).

As has been cited above, that the clear lack of data (quantitative or qualitative) available for this reporting period significantly hampers any real assertions that can be made, indicative or otherwise. Exact numbers of attendance and participation (1.) have not been satisfactorily communicated to the Griffith University evaluation team. Exact numbers relative to facilitation concerning teachers, librarians, teacher aides, paid consultants or otherwise (2.), again have not been satisfactorily communicated to the Griffith University evaluation team. There has been tentative information from the State library of Queensland which relate to the announcement of grant recipients, yet there has been no further confirmation as to the success of collaborations between school, library and community (3.). Consequently, it is, at this phase of the reporting cycle, impossible to measure with any degree of certainty the improved literacies and capabilities of students, teachers, library staff and invested community stakeholders united across the STEM I AM program (4.).

What is clear is that the planning and implementation stage was protracted and at various times communication was stymied or delayed as evidenced in **Table 5 Summary of key interactions with the Program Manager (DSITI) cross Phase 1**. Within this reporting period also it must be recognised that there was a State election and the effects of delay and periodic delayed communication might be a factor worth noting for consideration. Protraction resulted in new contracts having to be ratified and new negotiation of milestones and reporting dates. Again these factors might be worth noting for consideration.

From a superficial standpoint, without any degree of certainty, the STEM I AM program, at this point, from the limited insight available to the evaluation team, appears to be adhering to the determined program logic model. Tentatively, it could be assumed that the STEM I AM program has been directed to satisfy a determined need relative to the 'grass roots' capabilities of Indigenous

students and communities. Tentatively, it can be viewed that in order to address this targeted need a broad scope of project activities have been enabled. Investment has seen attention directed to urban, regional and remote settings, looking to not only rely upon external, non-community expertise. But where possible it has sought to build internal community capacity in a relational process which has looked to harness locale centric stakeholders and via capital investment allow skills, knowledge bases and resources to be given the opportunity to grow. Tentatively also the STEM I AM investment has looked to target multiple levels of Indigenous engagement with community, school and tertiary levels receiving stimulus.

Further to the use of community based and community driven initiatives gaining the support of funding the STEM I AM program has looked to support Indigenous capacity with Carbon Media as well as the majority makeup of the Griffith University evaluation team being Aboriginal. This is crucial and is a key component for success of targeted measures which look to bridge Indigenous need. The cited literature is clear with regard to Indigenous led models, where top-down resource models give way to bottom up community driven processes. STEM I AM is a positive step forward that requires a sustained focus beyond that of a second reporting phase if real and meaningful change is to be measured.

Recommendations

- The key recommendation from this interim report is to develop a contractual basis for data collection from project providers. Data collection should be made a compulsory requirement of gaining and administering received funding; like the other essential elements of grant acquittal. By quarantining a portion of the funding allocation, upon 'satisfactory' completion of the data capture protocols, the quarantined amount can be paid in full. In this instance project providers will therefore have to integrate considerations for data capture as they would any other activity they would be set to undertake as a part of their funding allocation. In previous evaluations the Griffith University evaluation team has negated the necessity of travel and face to face data capture with explicit clauses in project providers MOUs. The alternative is to renegotiate the contractual obligations of the Griffith University evaluation process and fund on site, face to face administration of data capture in person.

Further recommendations directed to DSITI for consideration as part of this interim report are generated from the examination of literature which tie to the tensions of seeding STEM as a viable pathway for Indigenous learners. These are listed below;

- Where possible initiatives should be directed to community to allow for community generated input to determine how processes should proceed. In the example of the SLQ funding activities, while the community, in places, where tied to the library sites, effort could be re-directed into community councils, Elders councils and parents, with the intention of pairing project activities with key community personnel, allowing STEM capacity to be grown broadly. The young will follow the old, this is logical grass roots investment. In this way seeding projects in the homes of learners, co-developing the capacities of family members is a more viable option than short term, one off ventures. This will allow for shared knowledge and insights, with parents and care givers more likely to support progress when the long term goal is something that is known, valued and within comprehension.

- The literature suggests that consideration should also be given to Indigenous males whose level of academic achievement is below that of Indigenous females. While the collective position of both genders is of critical consequence in comparison to non-Indigenous figures, programs should target the young as a blanket measure and as they progress ensure that seeding is needs based, with close consideration for Indigenous males and their participation in STEM initiatives. To be considered alongside this recommendation is the retention rates of Indigenous youth in high school, as high school matriculation is the logical pathway to tertiary study. Therefore creativity should be given to measures to stimulate interest, motivation and engagement and be specifically targeted to the transition ages from primary to high school and from year 10 through to senior.
- Finally, even though the sample of student respondents was small, examination of the information they provided aligns with the concerns of the literature, in that the majority of respondents were Indigenous females who said they enjoyed maths and science.
 - Comments were made that they enjoyed arts and physical activity.
 - Comment was offered also of the enjoyment of seeing one of their peers dance, &
 - Enjoyment was had when experimenting on a plant (joining science with nature).

Again while small, from an indicative standpoint, you can assert the need for project providers to link to the strengths and likes of Indigenous learners. By building from cultural foundations, connections formed inside short term stimulus projects are more likely to be pursued. In this sense activity providers need to be attuned to the needs of Indigenous learners and more specifically, where possible, build learning experiences with Indigenous students as co-creators of the experience. Where possible also learning experiences should build from the knowledge learners already have, looking to move beyond the walls of classrooms and libraries and connecting learners with natural ecosystems and their own conceptions of STEM related content, then mapping back to the [pre]determined needs of the session or curriculum.

Appendices

A. STEM I AM Program: Griffith University Ethics



STEM.I.A.M – Evaluation of a Queensland government initiative to facilitate and nurture student participation in Science Engineering Technology and Maths (STEM)

INFORMATION SHEET

Who is this evaluation for?

Griffith University is conducting an evaluation of the Advance Queensland STEM.I.A.M program (STEM.I.A.M) on behalf of the Department of Science, Information Technology and Innovation. STEM.I.A.M is a Queensland Government initiative, which aims to facilitate and nurture Aboriginal and Torres Strait Islander student participation in Science Engineering Technology and Maths (STEM). For more information on STEM.I.A.M please visit <http://advance.qld.gov.au/uni-researchers/stemiam.aspx>

Who are we?

Our names are Harry Van Issum, Troy Meston, Dale Kerwin and Helen Kieve. We collectively work at the School of Education & Professional Studies at Griffith University, University of Queensland and the University of Southern Queensland. Our evaluation team has been engaged by the Department of Science, Information Technology and Innovation. Our contact details are given at the bottom of the sheet.

Harry, Troy and Dale are all Aboriginal teachers and parents who are interested in the progress that STEM.I.A.M is making. We have collectively been involved in Aboriginal education for over 30 years. As an evaluation team, we would like to collect evidence to evaluate the various components of STEM.I.A.M to measure its success.

Helen is a university researcher with several years' experience working with Indigenous people in research projects. Her expertise in data collection and analysis is vital for the analysis of the survey results.

Why is the evaluation being conducted?

We are all very interested in ensuring the most effective education is available for Aboriginal and Torres Strait Islander students across a range of subject areas. Research has indicated that there are fewer Aboriginal and Torres Strait Islander students engaged STEM subjects in school, university and in STEM careers in the workplace. The program you have been engaged in seeks to address this imbalance.

What you will be asked to do?

At the end of the activity, information will be collected via an on-line or paper based surveys and yarning circles. If you are asked to complete a survey or be part of a yarning circle you will answer questions about your experiences of the workshops, competitions, clubs and STEM.I.A.M in general:

- Surveys involve participants answering a range of multiple choice and ratio scale questions and one or two open-ended questions. Each survey takes five minutes to complete.
- Yarning circles involve the facilitator, selecting a small group of participants at the end of the activity to ask questions in a supportive environment on their workshop, competition and club experience. Each Yarning Circle will last approximately 45 minutes and may also include teacher, Aboriginal and Torres Strait Islander community and Griffith University representatives.

What are the expected benefits of the evaluation?

Your responses will help us to better understand the best process to engage Indigenous people in STEM into the future. It will help us to determine what elements of STEM.I.A.M have been most effective and what areas require improvement. Your feedback has the potential to inform program improvements and increased engagement of Aboriginal and Torres Strait Islanders in STEM related courses and careers. This information may be distributed through further publication.

What risks (if any) are there in participating?

Your involvement in this research has minimal risks to you. However, in the unlikely scenario that any adverse incidents arise as a result of your involvement in this research, please contact one of our research team for advice as soon as possible.

Your confidentiality

The information provided by you and others surveyed will be treated confidentially. You will not be named in any evaluation reports. Your views will allow us to better understand the range of experiences of people engaged in the program from the various levels.

All audio/video recordings of yarning circles except the first (*see below), will be erased after transcription, as required by Griffith University. Other data (interview transcripts and survey analysis), however, will be retained in a locked cabinet and/or a password protected electronic file at Griffith University for a period of five years, before being destroyed. Participants in yarning circles must also respect the privacy and confidentiality of other participants. No information will be identifiable. All data related to the project either electronic or hardcopy will be deleted after five years.

*The recording of the first yarning circle conducted by the evaluators will be used for training purposes only and not distributed beyond the STEM evaluation team. Only members of the State Library facilitating the STEM workshops and DET camp facilitators will have access to this recording. This recording will not be used for any other purposes.

Your participation is voluntary

It is not compulsory for you to be involved in this evaluation. If you do participate in a yarning circle, you may withdraw at any stage, without penalty or repercussions. Only those consenting to the audio-visual recording will be considered for the yarning circle.

Where the discussions in the yarning circles are to be recorded, the facilitators will confirm with all participants that this is acceptable before the sound recorder is turned on. Recording sessions assists us to clearly understand what you are saying. Your views will help us to explain how the program is progressing and recommend changes that would improve the outcomes.

Questions / further information

If you would like to know more about the evaluative process you can contact us.		
Harry Van Issum	E: h.vanissum@griffith.edu.au	Tel: 07 373 55940
Troy Meston	E: t.meston@uq.edu.au	Tel: 07 3238 9000
Dale Kerwin	E: Dale.Kerwin@usq.edu.au	Tel: 0408 894 583
Helen Klieve	E: h.klieve@griffith.edu.au	Tel: 07 373 55925

If you have any further concerns, please contact the Manager, Research Ethics, at Griffith University Human Research Ethics Committee by phone on 07 3733 4373 or email research-ethics@griffith.edu.au.

Feedback to you

This evaluation is being conducted on behalf of the Department of Science Information Technology and Innovation. A summary that outlines the information that we have received will be made available. This will not identify any student, facilitator, community or staff members.

Privacy Statement

The conduct of this research involves the collection, access and/ or use of your identified personal information. The information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. A de-identified copy of this data may be used for other research purposes. However, your anonymity will at all times be safeguarded. Further information about Griffith University's Privacy Plan is available at <http://www.griffith.edu.au/about-griffith/plans-publications/griffith-university-privacy-plan> or by contacting the university on ph. (07) 3733 4373.



CONSENT FORM

This consent form should be read in conjunction with the accompanying Information Sheet.

We are asking for your consent in relation to the evaluation of the Advance Queensland STEMLAM Program, which is a Queensland government initiative to facilitate and nurture Aboriginal and Torres Strait Islander student participation in Science Engineering Technology and Maths (STEM).

Evaluation Team	Harry Van Issum	07 3735 33940	E: h.vanissum@griffith.edu.au
	Troy Meston	07 3238 9000	E: t.meston@uq.edu.au
	Helen Klieve	07 373 53925	E: h.klieve@griffith.edu.au
	Dale Kerwin	0408 894 583	E: dale.kerwin@usq.edu.au

By signing below, I confirm that I have read and understood the Information Sheet and understand that:

- My/my child's involvement may include me/my child talking to a facilitator about experiences of the Advance Queensland STEMLAM Program;
- My/my child's involvement may include me/my child completing an on-line or paper based survey and/or participation in an audio-visual recorded yarning circle ;
- I have had any questions answered to my satisfaction;
- There are minimal risks involved;
- There will be no direct benefit to me/my child from my/my child's participation in this evaluation/research;
- My/my child's participation in this evaluation is voluntary;
- If I have any additional questions, I can read the Information Sheet and/or contact the research team;
- I am/my child is free to withdraw at any time, without comment or penalty;
- I can contact the Manager, Research Ethics, at Griffith University Human Research Ethics Committee by phone on 07 3735 4375 or email research-ethics@griffith.edu.au, if I have any concerns about the ethical conduct of this project; and
- I agree to my/my child's participation in the evaluation.

Participant's Name	
Parent/guardian's name (if participant is under 18 years)	
Relationship to participant	

I consent to participation in survey responses

I consent to participation in yarning circle and audio visual recording

Signature		Date	
-----------	--	------	--

B. STEM I AM Program: Sample Surveys



Admin Survey

This survey seeks to capture the views of administrators associated with the coding and robotics program associated with the Advance Queensland STEM.IAM program.

Please see the following website for further details of the program:

<http://advance.qld.gov.au/uni-researchers/stemiam.aspx>

Please follow the instructions and select the appropriate answers. Your responses are valued and we thank you in advance for agreeing to complete the survey.

This survey should take less than 10 minutes. There are 12 questions in this survey.

1. Date: _____
2. Can you please indicate your role? _____
3. Location/s of the workshop/s: _____
4. What is your job level or title? _____

5. Please indicate you age group

Please choose only one of the following:

- Under 20
- 20-29
- 30-39
- 40-49
- 50 and over

6. What is your gender?

Please choose only one of the following:

- Male
- Female
- Other

7. Identity

Please choose only one of the following:

- Aboriginal and/or Torres Strait Islander
- Other

8. Please respond to the questions about your cultural competence.

(Only answer this question if Answer was 'Other' at question 7)

Please choose the appropriate response for each item:

	Yes	No
Have you engaged in cross –cultural training?	<input type="checkbox"/>	<input type="checkbox"/>
Have you had experience with embedding Aboriginal and Torres Strait Islander perspectives?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have experience engaging with Aboriginal and Torres Strait Islander parents/ community?	<input type="checkbox"/>	<input type="checkbox"/>

9. How many years have you worked in program administration?

Please choose only one of the following:

- 0 - 5 years
- 6 - 10 years
- Over 10 years

10. Attitudes to STEM.LAM Program

Please choose the appropriate response for each item. Select "Not applicable" if the item does not apply to you

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly agree	Not applicable
The program was well organised.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was an integral part of the team involved in the program.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The program structure allowed all stakeholders to contribute fairly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There was regular communication across all stakeholders.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
There was fair access and spread of program resources.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Financial structures within the program were sound.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The program vision and implementation considered relevant Indigenous cultural factors.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Indigenous community involvement was difficult to administer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe the objectives of the program have been met so far.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. As a program partner what parts of the program were done well?

12. If you have any comments on the program including suggestions on how it could be improved, please detail them below:



Facilitators Survey

This survey seeks to capture the views of facilitators associated with the Advance Queensland STEM.IAM Program coding and robotics workshops.

Please see the following website for further details of the Program:

<http://advance.qld.gov.au/uni-researchers/stemiam.asp>

Please follow the instructions and select the appropriate answers. Your responses are valued and we thank you in advance for agreeing to complete the survey.

This survey should take less than 10 minutes. There are 13 questions in this survey.

1. Date: _____

2. Location of the workshop: _____

3. What is your role in the workshop?

4. Age

Please choose only one of the following:

- 20-29
- 30-39
- 40-49
- 50 and over

5. Gender

Please choose only one of the following:

- Male
- Female
- Other

6. Identity

Please choose only one of the following:

- Aboriginal and/or Torres Strait Islander (move to question 8)
- Other

7. Please respond to the questions about your cultural experience.
(Only answer this question if Answer was 'Other' at question '6)

Please choose the appropriate response for each item:

	Yes	No
Have you engaged in cross –cultural training?	<input type="checkbox"/>	<input type="checkbox"/>
Have you had experience with embedding Aboriginal and Torres Strait Islander perspectives?	<input type="checkbox"/>	<input type="checkbox"/>
Do you have experience engaging with Aboriginal and Torres Strait Islander parents/ community?	<input type="checkbox"/>	<input type="checkbox"/>

8. Which is your highest qualification level?

Please choose only one of the following:

- Year 12
- Tafe certificate/diploma
- Other Undergraduate degree
- Postgraduate degree

9. What is your position?

Please choose only one of the following:

- Librarian
- Primary school teacher
- Secondary school teacher Trainer
- Other (please list) _____

10. Please indicate your teaching/training and/or facilitating experience in years.

Please choose only one of the following:

- 0 - 5 years
- 6 - 10 years
- 11 - 15 years
- Over 15 years

11. Attitudes to STEM.IAM Workshop

Please choose the appropriate response for each item. Select "Not applicable" if the item does not apply to you

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly agree	Not applicable
I am interested in STEM subjects generally.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am interested in coding and robotics.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I know how to teach STEM concepts effectively.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Student achievement in STEM related subjects is directly related to their teachers' effectiveness.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coding and robotics need to be explicitly taught in schools.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Students should be taught STEM related subjects from an early age.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enrolment in STEM related subjects is a good indicator of future university enrolment and careers in STEM.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I will typically be able to negotiate areas of cultural competence in the workshop space.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
A strong personal relationship with Aboriginal and Torres Strait Islander students is needed in STEM related subjects.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When an Aboriginal and Torres Strait Islander student progresses in STEM related subjects, it is usually due to a strong personal interest.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When an Aboriginal and Torres Strait Islander student progresses in STEM related subjects, it is usually due to support from parents/community.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I enjoy completing surveys.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. What do you consider worked well in the coding and robotics workshop?

13. Any other comments?



Student Survey

This survey seeks to capture your views associated with the coding and robotics workshop you have completed. This is a part of the Advance Queensland STEM.IAM program.

Please see the following website for further details of the Program:

<http://advance.qld.gov.au/uni-researchers/stemiam.asp>

Please follow the instructions and select the appropriate answers. Your responses are valued and we thank you in advance for agreeing to complete the survey.

This survey should take less than 5 minutes to complete. There are 13 questions in this survey.

1. Date: _____

2. Location of the workshop: _____

3. What grade are you in?

Please choose only one of the following:

- Grade 3-4
- Grade 5-6
- Grade 7-8
- Grade 9-10
- Grade 11-12

4. What is your gender?

Please choose only one of the following:

- Male
- Female
- Other

5. Identity

Please choose only one of the following:

- Aboriginal
- Torres Strait Islander
- Both
- Other

6. What is the level of your parent's or carer's education?

Please choose the appropriate response for each item:

	Year 10	Year 12	Bachelor's degree	Other	Don't know
Parent / Carer 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Parent / Carer 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. What are your favourite subjects at school?

Please number each box in order of preference from 1 to 8:

- The Arts
- English
- Health & Physical education
- Humanities & Social Sciences (history, geography, civics)
- Languages
- Mathematics
- Science
- Technologies

8. Which subjects do you do well in at school?

Please choose the appropriate response for each item:

	Yes
The Arts	<input type="checkbox"/>
English	<input type="checkbox"/>
Health & Physical education	<input type="checkbox"/>
Humanities & Social Sciences (history, geography, civics)	<input type="checkbox"/>
Languages	<input type="checkbox"/>
Mathematics	<input type="checkbox"/>
Science	<input type="checkbox"/>
Technologies	<input type="checkbox"/>

9. What are your favourite activities outside of school?

10. Attitudes to STEM.IAM Workshop

Could you please indicate how you feel about each of the following statements by ticking the appropriate box. Select "Not applicable" if the item does not apply to you

	Strongly Disagree	Disagree	Uncertain	Agree	Strongly agree	Not applicable
The facilitators made the day interesting and fun.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I don't like maths and science but the games were fun.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I know more about coding and robotics after today's workshop.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I came to the workshop today because I like maths and science.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Coding and robotics has nothing to do with maths and science.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to participate in coding and robotics clubs and competitions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I could see myself doing STEM / Coding and Robotics in university.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I would like to work in science and maths as a job.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. What were the most enjoyable parts of the day?

12. What parts could have been done better?

13. What's the most exciting thing you've done in science & maths at school?

C. STEM I AM Program: Yarning Circle Questions & Process

Learnings for Stage 2

The delay in setting up the independent assessment of the program meant that many community participants had already completed the grant programs offered through libraries, and so were not available to provide feedback.

In requesting responses to an online survey, there is a recognised constraint in people's preparedness to complete – linked in part to “survey fatigue”. However, in a situation where an evaluator is collecting data from those that are being evaluated, this always will be more difficult.

Additionally the timing issues in completing the planning phase also will have impacted.

However, the detailed planning processes leave the evaluation team now ready to move to stage 2 of the evaluation, and also will help to create a recognition of the mutual importance of prioritising survey responses by all stakeholders to support good responses for the second year of the project.

As also it is recognised that for many of the providers the first year also will have been one of establishing processes it is planned to stress the importance of year 2 as the key data collection period with Year 3 then focussing on several specific interviews with providers and data analysis and reporting.

Notes