



## STEM Professionals in Schools 2018-19 program impact evaluation

CSIRO

**Document:** Case study report – Remote school partnership with Indigenous students  
**Version:** Final  
**Date:** February 2020

## **ACKNOWLEDGEMENT:**

Tessellate Communication Pty Ltd would like to acknowledge the Aboriginal and Torres Strait Islander Elders for allowing us to be on country and for the significant role they have played in the education of young people for many generations.

We would like to acknowledge and thank the Principal and teachers at the participating school for their willingness to share their views and experiences, and for the time they have taken to participate in the case study. Thank you to the students for sharing their enthusiasm and enjoyment of the activities with us during our site visit. We greatly appreciated the hospitality and support extended to us during our visit.

Thank you to all the STEM professionals for the time you have taken to participate in the case study and similarly, for sharing your views and experiences with us.

We also acknowledge and thank the Northern Territory government and CSIRO's Human Research Ethics Committee for providing the ethics approval necessary to undertake this study as a component of the STEM Professionals in Schools program – 2018-19 impact evaluation. This has enabled us to gain valuable insights into the unique challenges facing the program in remote communities and to see first-hand the value of such programs in remote schools and communities.

The findings from the case study will inform and enhance the final evaluation report.

## **Note**

This is the final case study report for a partnership within the STEM Professionals in School Program. This case study was one of four purposefully chosen case studies within the 2018-19 impact evaluation which collectively provide insights into important aspects of the program. This case was selected as it includes:

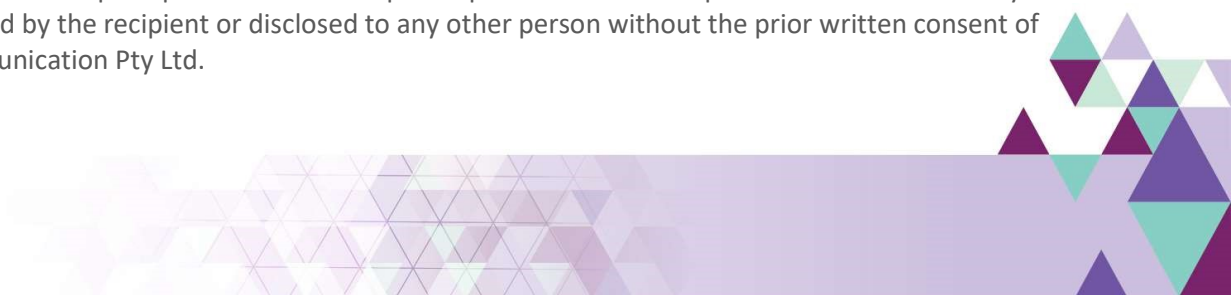
- High proportion of Indigenous students
- Government school
- Very remote location
- Multiple STEM professionals working as a team.

## **Disclaimer**

The case study findings presented in this report have been determined by Tessellate Communication Pty Ltd, drawing on the data collected from case study participants based on their views and experiences in the selected program partnership. Participants have reviewed a draft version of this report and any feedback provided has been incorporated in this final version of the report.

## **© Tessellate Communication Pty Ltd (2020)**

All rights reserved; these materials are copyright. No part may be reproduced or copied in any way or form, or by any means without prior permission. This report is provided to the recipient in confidence. It may not be used or applied by the recipient or disclosed to any other person without the prior written consent of Tessellate Communication Pty Ltd.



## Table of Contents

<b>1</b>	<b>Remote Indigenous school partnership .....</b>	<b>1</b>
1.1	The challenge .....	1
1.2	The process .....	2
1.3	The outcomes.....	4
1.4	The learnings.....	7



# 1 Remote Indigenous school partnership

This case study explores the impact of the CSIRO STEM Professionals in Schools program through the experiences of a teacher, Principal and STEM professionals, partnering at a very remote Indigenous school in the Northern Territory, more than an hour's drive from Alice Springs. The STEM professionals are from metropolitan areas of New South Wales and Victoria.

The partnership has been running since 2017 and includes an annual site visit, timed to coincide with National Science Week, as well as ongoing teacher mentoring and coaching, conducted throughout the year on an as-needed basis. The partnership includes one teacher from the school and five STEM professionals from the same organisation.

The partnership was viewed by all participants as extremely positive, with a strong desire to continue and expand. To improve outcomes, recommendations were made addressing challenges in knowledge sharing, sustainability, resource availability and engagement.

Further details are provided in the following sections highlighting the:

- challenge
- process
- outcomes
- learnings.

## 1.1 The challenge

Program participation originated from a STEM professional meeting with the previous Principal, who brought onboard a middle school teacher with a science and maths background as the partner.

The school has a high turn-over of teachers who tend to only have short term stays (around two years). The environment for teachers is challenging. They live in a compound beside the school, the township has limited activities, the community is dry, and Alice Springs is more than an hour drive away. The partner teacher has however stayed at the school for more than the usual one to two years.

The students are challenged by a lack of English literacy and numeracy skills as the school is 100 percent Indigenous, with English as a second language (ESL). This results in students being several grades behind the mainstream student cohort, especially in science and maths. Additionally, many of the students are special needs students, requiring further specialised care and attention. Due to external circumstances, they often rely on the school and the teachers to provide their basic needs. This leads to an environment that challenges focus on higher level learning. Attendance rates at the school are low, and increasing attendance is a recognised goal and outcome from the partnership.

Short and long -term student learning outcomes have been identified by the school. In the short-term these include understanding basic elements, for example:

*They should be able to use vernier scales and callipers, little things like that. Measuring with micro-meters the parameters and area related to maths and science. (2019, Teacher, NT)*

This feeds into longer term goals guiding career paths through infrastructure expansion, as the teacher's ultimate aim is to facilitate student transition to science and related subjects at university.

Inspired by overseas experience, the teacher plans to develop a science hub with surrounding schools, including a science lab supported by a lab attendant. The proposal incorporates a curriculum targeting middle and senior levels consisting of theoretical and practical activities in chemistry and biology. Non-related partnership initiatives in the school include a Science Club, run by the teacher as part of a weekly elective program inviting students to participate in an extra-curricular in-school activity. Local excursions are conducted as part of the ranger program (junior rangers) which involves camping to learn about flora and fauna.

## 1.2 The process

The school is very supportive of the partnership run by the teacher, who has been involved with the STEM program for almost four years. The teacher initially introduced Science Week to the school to coincide with the national science week event, which occurs annually during the third science focused term. Each year the industry team of STEM professionals, which can vary, conducts class activities within the school over the course of the week.

### Selecting the STEM professional team

All the industry STEM professionals originate from a single business unit within one organisation. The lead industry STEM professional, whose partnership with the school began in 2017, acts as the central liaison with the teacher, the STEM professionals in the team and the STEM Professionals in Schools program staff.

The lead STEM professional works with another contact within the organisation to recruit additional STEM professionals to the team by distributing an expression of interest across the organisation. Approximately 20 applications are received each year from a wide range of employees, including managers, PhD students and post-doctoral employees. Initially three STEM professionals, who had previous experience with the program, were selected for the partnership in 2019. Two new STEM professionals also joined the partnership in 2019, expanding the STEM team to a total of five participants. One of the STEM professionals with prior experience with the partnership did not visit the school in August 2019 but worked with the remaining team members to assist in planning and coordination of the visit. The STEM professionals have a variety of science backgrounds with one also holding a Diploma of Education.

### Planning for the annual visit

Each year the teacher and STEM professional team meet to plan a week-long activity, aligned with the theme of the National Science Week, for the school's annual Science Week activities. The partnership primarily targets science and maths while also including elements of technology.

The STEM professionals are allocated 20 capability days by their employer which can be applied to the school visit, session development, preparation, post visit debriefs, follow-up with teachers and employer presentations. As the partnership is conducted with a school in a very remote area, the STEM professional team receives \$1000 from the STEM Professionals in Schools program and a further \$500 from their business unit to assist with costs incurred within the partnership. These funds are used to cover costs including resources and materials for the activities that total approximately \$200 for each STEM professional.

The STEM professionals adopt a team approach enabling brainstorming, knowledge sharing and support in developing sessions plans, which are sent to the partner teacher for feedback. By working independently and then combining their efforts, the STEM professionals developed two streams of content to be delivered concurrently throughout Science Week. The teachers schedule the various classes to rotate through the sessions.

The highly motivated team holds bi-weekly meetings:

*We believe it does make a difference for the students, for the teachers and for the community in general. (2019, STEM professional 2, VIC)*

Their dedication is complemented by the teacher's commitment:

*He always has a new project or a science club or something just to help the students and show them their possibilities. (2019, STEM professional 2, VIC)*

## Logistics for the week

The STEM professional team travels to the school and conducts pre-prepared classes for the duration of Science Week. They stay in the community throughout Science Week, billeting with teachers and in school accommodation. House sharing with the teachers was a positive experience contributing to understanding the culture, nuances and personal impacts that the students may be facing:

*... helps you understand what is going on, why some people react. (2019, STEM professional 1, VIC)*

Another STEM professional indicated that billeting with the teacher fostered regular debriefing and offered time to garner in-depth understanding of the teacher's goals, which created a solid partnership foundation.

Due to the remoteness of the location, the STEM professionals transport the resources for activities and their own food, which is recognised and appreciated by the school:

*I arrived with 35 kilograms of luggage and returned with 18.1 kilograms. (2019 STEM professional 1, VIC)*

The STEM professionals would be unable to participate without the financial support they receive from their business unit:

*Some people don't mind covering the cost themselves because they love it, but others may not be able to afford to do that, so you could miss out on good people. (2019, STEM professional 1, VIC)*

## Conducting activities for the week

Activities are designed to align with the school's Science Week theme, the Australian Curriculum for Science, class subjects and the National Science Week theme. Throughout the week, the STEM professionals work in pairs within designated classrooms to deliver the content to different classes across year levels. The teachers are often supported by an Indigenous teacher assistant who helps manage the students, conversing with the children in their native language. Some students transition in and out of the room dependent on their arrival at school or due to their behaviour.

The STEM professionals agreed that the sessions should focus on highly participatory activities and be sufficiently flexible to overcome the variability of daily attendance rates, lack of structure in student arrivals and the impacts of personal trauma:

*I could tell some of them have been traumatised by certain things because they are so withdrawn, but by the end of the class they are starting to join in and become part of that group, which is extremely rewarding. (2019, STEM professional 1, VIC)*

In earlier years the STEM professionals only targeted their applied sessions to the preschool to transition levels, until 2019 when an increase in older students expanded the classes. The younger age group activities are highly visual and tactile helping students to predict outcomes, such as:

*... throwing the cars on the ramp and if the ramp is a bit higher, determining which one will come first and why. They are very interactive with very easy questions so they can predict things. (2019, STEM professional 2, VIC)*

While the second session, targeting the higher grades, is a lot more advanced, incorporating science and maths with complex questions. Retaining the younger years is beneficial by instilling skills and interest at an early age. The communal aspect of the culture was noted with students helping each other, leaving project models at school for other children to see:

*This was really refreshing because that doesn't often happen in mainstream schools. (2019, STEM professional 1, VIC)*

Conscious about encouraging teachers, the STEM professionals provided experiment instruction sheets and corresponding scientific questions to facilitate revisiting the activities and creating a continuation of student enquiry post-visit. Teachers are given the opportunity to email the STEM professionals regarding ideas and requests for information or questions, extending the relationship beyond the week's visit. Furthermore, copies of CSIRO's Double Helix magazine are donated to the teacher by one of the STEM professionals:

*We try to help the school with [supplementary] resources wherever we can. (2019, STEM professional 1, VIC)*

### **Extra engagement during the week**

Working together with the National Aboriginal Sporting Chance Academy (NASCA), a 100 percent Aboriginal governed volunteer program, the STEM professional team hosts a community BBQ event during the week. Building on the success of the first community astronomy night held during 2018 National Science Week, the team held another astronomy night in 2019.

This event was attended by approximately 150 students and families from local communities. To facilitate this event, the school bus was used to collect and return students to their homes. The NASCA team provided the BBQ and the STEM professionals arranged telescopes encouraging students and their families to view the full moon and other planets. This resulted in a stream of inquisitive and excited children and adults eager to participate throughout the evening.

Using a National Science Week grant, the STEM professionals purchased one of the telescopes which they presented to the school following the community astronomy night.

According to one STEM professional:

*... these nights have enabled the wider community and parents of the children to participate with their children in a learning activity. Both times we have run these nights many parents and their children have commented on how much they enjoyed looking through the telescopes ... when we arrived a couple of the students commented that they remembered us showing them the sky on our previous visit. (2019, STEM professional 4, NSW)*

### **Wrapping up the week**

The week ended on the Friday with a morning debriefing session with the STEM professionals, the Principal and all teachers at the school. The school hosted a breakfast to thank the STEM professionals for their visit and the team discussed the week's events with teachers and identified possibilities for next steps with the partnership.

## **1.3 The outcomes**

The STEM professional team is viewed by the school as scientific experts who can engage with students and support teachers, while also being extremely well organised:

*They bring solid knowledge to their activities, know exactly what they are doing, why they are doing it, and have got the background knowledge to be able to answer more complex questions from the students because our teachers wouldn't be totally confident to do that. (2019, Principal, NT)*

The Principal viewed the STEM professional team as imparting science in an engaging and appropriate way for the students' levels and keeping the school current in best practice regarding application of the STEM curriculum:

*By understanding the school's context, they are able to adapt what's needed to what would work best. (2019, Principal, NT)*

They also provided resources and equipment which the school would not be able to otherwise access due to lack of funds. The STEM professionals recommended application of the partnership model for other Indigenous schools.

As a further outcome of applying a holistic lens to the program, the STEM professionals have been in discussion with the school to introduce a recycling and sustainability component to the next Science Week, addressing the excessive rubbish in the town. It is prevalent as the locals view the waste as belonging to non-Indigenous members of the community, as opposed to townships which have received empowerment through community-based decision making. In these communities, locals take ownership and responsibility for their waste. The project would also incorporate operational elements such as signage and recycling bins.

The team provides a detailed report to the STEM Professional in Schools program staff. Additionally, they share the experience with others in their organisation, and more broadly, through a variety of vehicles. This includes informal exchanges encouraging participation with their colleagues; formal staff presentations; YouTube video; posting images to the STEM Professionals program page; and writing news stories for their (manufacturing) business unit newsletter. In collaboration with their organisation's communications group, they and the Chief Scientist within the organisation, produce news items promoting and encouraging staff participation. These are published in the organisation-wide newsletter and through the organisation's social media.

### Student and teacher impact

The Principal noted that recurring visits by the same STEM professionals builds rapport with teachers, engendered trust and positive anticipation from the students, which contributed to attendance and thereby learning capacity:

*We had one of the greatest attendances [rates] for the entire year for one of our classes - they just couldn't believe it! It's the excitement when they know that these people are coming. (2019, STEM professional 1, VIC)*

Students ask questions leading up to, during, and post the Science Week activities, and their curiosity sparks other learning benefits such as internet usage. Visits from the industry STEM professional team created student interest and focus by the many accessible and engaging activities conducted throughout the school, as well as being someone new in their environment.

The STEM professionals' limited understanding of Indigenous culture, though a barrier, also provided an impetus for inclusiveness and adopting a long-term approach:

*The kids study the world using traditional Indigenous methods while we apply a western scientific method. We hope that even by just instigating reading and learning this will be passed on to the next generation, because research shows that kids who read are more likely to succeed. So, our goals are far more gradual and long-term than at a mainstream school. (2019, STEM professional 3, VIC)*

The STEM professionals' combined teaching and scientific skills provided valuable support to the teachers who lack confidence in delivering STEM knowledge. The STEM professional team also supplied information on how to implement various experiments enabling:

*... every teacher to get new ideas which they can build on. (2019, Teacher, NT)*

During sessions, the teacher was afforded space to observe the lessons, which led to new student insights while also generating more interest in science and ideas to integrate in their regular classes.

The school addresses the ESL challenge by aiming to build the student vocabulary in each subject, specifically in science through using equipment and hands on experiences to explain concepts, for example:



*In an activity about momentum, a teacher might not write the word momentum, but show them. The student then understands the concept - ahh this is momentum. So, if it is a big truck, it has more momentum than if it is just a tennis ball. Their [English] vocabulary is low but in showing them they learn by modelling. (2019, Teacher, NT)*

The Principal agreed that demonstration and hands-on learning provides extra guidance with scientific terms, however, she believed a lot of the students were familiar with English.

### **STEM professional impact**

The STEM professionals all viewed the partnership as extremely rewarding, highlighting the successes of the program, commitment from the teachers, support of the STEM Professionals in Schools program staff, the personal satisfaction of helping students in challenging circumstances, the value of cultural learnings and their contribution to the community.

The STEM professionals experienced greater fulfilment working with lower socio-economic schools than more well-resourced mainstream schools:

*I used to support local schools, but every kid has an iPad and the school has actually enough funding to do pretty much everything they need. Regionally, the schools don't have as many kids or as much funding, and due to family circumstances, not all the kids have access to all the technology. (2019, STEM professional 2, VIC)*

Observing immediate impacts was also extremely rewarding:

*With kids who are more of a challenge it's actually a really satisfying feeling to have a child sitting in the background quietly and not participate and then come in and participate and watch them grow throughout a class. You know you've made a little bit of a difference just by sharing your knowledge, being free with it. (2019, STEM professional 1, VIC)*

The relationship with the partner teacher contributed to constant growth and evolution:

*There was nothing there that I couldn't cope with. I would do it again in heartbeat. (2019, STEM professional 1, VIC)*

*We love what we do and have the freedom to create and implement the sessions, which have been extremely well received by the students, teachers and positively impact the whole community. It all runs very smoothly. (2019, STEM professional 2, VIC)*

*I really believe in this program. I think it is just a win-win for everyone. (2019, STEM professional 3, VIC)*

The different perspectives, insights and levels of experience held by the team of STEM professionals, while working towards a joint goal, created an incredibly robust partnership:

*I initially felt dread at the enormity of the task- how to help the students while appreciating their traditional society, and helpless because it seemed that we were just making such small inroads. How am I going to help if every day is such a challenge with kids turning up at any time, sleeping at their desk or lying on the ground? I felt ill equipped. (2019, STEM professional 3, VIC)*

Consequently, a desire to exchange cultures and preserve traditional knowledge through integrating Indigenous science became an important driver. Acknowledging the difference in Indigenous time frames compared to that of western society, revealed a path that offered education without destroying or disrupting traditional knowledge:

*When we discussed this together, we agreed that was exactly what we were doing and I could see the long-term benefits in that, in moving forward calmly, gradually but steadily. (2019, STEM professional 3, VIC)*

The ability to see results only in the long-term, especially with remote schools, was highlighted by the Principal:

*In my strong opinion, in education it will be eight or nine years before you'll see the benefits of good program implementation, especially for communities like ours and situations like ours. It definitely takes that amount of time. (2019, Principal, NT)*

### Community impact

The partnership positively impacted the community on a variety of levels. The students and teachers produce pictures and videos of the STEM activities from Science Week and the Science Club, which are presented and very positively acknowledged at the parent teacher interviews:

*The parents especially ask about Science Week, which indicates the students are talking about the event with their families. (2019, Teacher, NT)*

A further outcome was parents requesting kits from the Science Club to share with their families, which are then returned and exchanged for others.

### Sustainability

The STEM professionals acknowledged the excellent communication with, and support from, the STEM Professionals in Schools program staff who encourage reporting via their portal, follow-up with emails about the partnership progress, send resource web ideas and organise networking events. The broader STEM Professionals in Schools program was rated very highly with school participants in the partnership expressing a strong desire for it to continue:

*I think it is wonderful and it should be ongoing with greater participation frequency. (2019, Teacher, NT)*

This view was supported by the Principal who also expressed a much greater preference in continuing and expanding the relationship with the program partnership, rather than with the private sector due to perceived extra costs and concerns regarding ethics:

*If it's a private company that costs a lot of money or may be a bit dodgy and has a lot of staff change-over then I would not be so supportive, but our current partnership with [organisation name redacted] is invaluable. They give rigour and integrity to what we are attempting to deliver in the science and STEM space. I think that definitely benefits the students and also the teachers. (2019, Principal, NT)*

## 1.4 The learnings

For those STEM professionals that have participated in the partnership since inception, learnings have cumulatively built. New STEM professionals joining the team this year have brought their own experiences to the program and contributed additional insights. The learnings from the partnership and partner experiences are summarised in the following sections:

- student/community engagement
- school engagement
- knowledge sharing
- sustainability and promotion
- leadership and resourcing.

### Student/community engagement

Exposing the brighter students, especially females, to the STEM professionals' work sites, universities, museum and galleries in Melbourne, Sydney or Brisbane once or twice a year, could act as a driver to study for tertiary entrance:

*I do believe that will be life changing for them, and they will start thinking differently about options in life. (2019, STEM professional 2, VIC)*

From the teacher's perspective, although the students are often very enthusiastic about Science Week, which in turn results in curiosity - a valuable part of the learning process - poor language and numeracy skills often prevent articulation of their questions. Indigenous assistants help overcome this challenge. Although the older students are bilingual, as they converse mainly in their local language, the teacher expressed that a buddy system generated from mixed classes with Indigenous students from an English-speaking background, would rapidly enhance English skills leading to greatly improved overall learning. Another suggestion was to use alternate teaching styles for teaching maths. According to one of the STEM professionals:

*... one of the things we tried was using Lego Robots as a way of building engagement with the students and introducing some numeracy and measurement concepts in this way. This has been particularly successful when working with a smaller group of students selected by the teacher for their aptitude and willingness to engage. The students excel in following visual instructions and many of the students built the Lego robots very quickly based on visual assembly instructions ... exposure to basic coding methods (2019, STEM professional 4, NSW)*

Student exchange programs with other schools, perhaps ones with an existing robotics program, would have a similar positive impact on engagement and learning, as well as broadening their life experience.

The Principal noted that a supportive tool for teachers would be short YouTube clips on science topics engaging students by seeing scientists, hearing the vocabulary and then replicating the activities themselves.

### **School engagement**

STEM professionals increasing their number of visits to a week per semester would build on learnings, especially for more complex activities such as the Lego robotics. A continual exchange could be achieved by spreading out the attendance of the scientists throughout the year i.e. one STEM professional visiting each semester. Visits would preferably occur mid-week for at least a whole week, as the beginning and end of the week are more likely to be impacted by lower student attendance due to sorry business and cultural activities.

Recurring visits would aid the STEM professionals who lack teaching experience or are new to the program and therefore require practise to adapt their activities to different age groups, as well as improving their ability to gauge the student's participation within the class and respond accordingly. Ultimately, an ongoing partnership refines activities and increases receptivity by building community trust.

*... they get to know you and they respect you. (2019, Teacher, NT)*

This view was reinforced by the STEM professionals, where one indicated:

*... I found that with Lego Robotics activities for example, I was able to build on the work of previous visits because the students were already familiar with me and the activities so we could add some more coding and numeracy concepts. (2019, STEM professional 4, NSW)*

This was also identified as a successful outcome of the NASCA group, who visit each term and work collaboratively with the STEM professional team and the school during Science Week.

As the focus of the partnership has primarily been on science, experts in engineering, technology and maths would be helpful, especially to support coding.

## Knowledge sharing

STEM professional development workshops, training and networking would support all teachers in the school incorporate STEM in their subject areas:

*One teacher was literally crying, saying that the high school kids weren't choosing science as an optional subject. It's an added barrier when the teachers don't have a science background and are mostly doing art, sport and cooking. We can incorporate coding and technology in STEM, but all staff need some foundational knowledge first. (2019, Teacher, NT)*

Although the STEM professionals have a built-in network of knowledge sharing with each other, they expressed the value of having online access to experiments, ideas and resources, including a register of partnerships, corresponding activities and grade levels:

*... who you can contact for certain things and get ideas and hints from. (2019, STEM professional 1, VIC)*

Also recommended were twice yearly or annual networking events.

The STEM professional who has a Diploma of Education background found teaching much easier than her colleagues. In recognition that the students are generally at a lower than mainstream level, she was able to use her skills to modify her teaching approach and experiments accordingly. Providing basic teaching skills to scientists would be of significant value. Additionally, although activity plans were provided for review and feedback, meeting the teachers prior to running the activities would improve the class session for both partners as first-time teachers were found to be very friendly but uncertain how to offer support.

Providing Indigenous STEM professionals with greater preparedness would add an extra positive dimension to the partnership. The environment differs in many ways from the mainstream schools with students arriving throughout the day, language barriers, cultural awareness, addressing and identifying trauma:

*It would help to know some of the language as, although the older ones are bilingual, the little ones didn't have a lot of English. (2019, STEM professional 1, VIC)*

Workshops and training on how to teach, combined with the specialised areas of teaching in lower socio- economic and Indigenous schools to maximise engagement, would be highly valuable:

*We are experts in science, but they are experts in teaching. It would also help with the challenges of dealing with lots of randomness in class, kids acting out, needing to be taken home by a teacher assistant, which I was able to deal with and adapt to, but was very unprepared for. (2019, STEM professional 3, VIC)*

Greater teaching effort, planning and time is required as students take a long time to immerse themselves in a new activity or task, as the students need time to build trust and participate:

*So, you will have your lesson for an hour, such as in the afternoon when you have got an hour and you spend 20 minutes trying to get them into the task and explain it and then it takes them another 10 to kind of go oh yeah cool and then they will really get into it and then you can't get them to go home. (2019, Principal, NT)*

Understanding the culture helped to identify students with the potential for continued education:

*You've got to have your eye ready to look out as their social circumstances may blur their aptitude. For example, [one] student played up and was regarded by teachers as a troublemaker, but it may have been because he was viewed as an outsider by his peers, as I noticed how polite and bright he was when engaged in the experiments. (2019, STEM professional 3, VIC)*

## Sustainability and promotion

The key teacher in the partnership is dedicated to his students and to progressing the development of a STEM program in the school. Willing to participate in any way possible and to take advantage of available opportunities, he has worked closely with the STEM professionals to facilitate grants and sponsorship to secure equipment for the students. At present, the program at the school is completely key person dependent.

The Principal, who also has a science background, stated her support for the program and indicated that with further information she would ensure the program continued if the current teacher leaves. The Principal recognised the sustainability risk engendered by the partnership being exclusively managed and coordinated by the teacher:

*We probably need to get better at the documentation. I don't know if it happens in a lot of organisations, when the person moves all the knowledge goes with it and staff, which in the child world is really difficult because you have just got the kids or the school used to running in a certain way and then it's not there anymore, and then it sort of falls down. (2019, Principal, NT)*

Also acknowledged was the need to create a succession plan:

*I am not saying that some of our other teachers wouldn't pick it up and run with it and be able to lead it, but I think that would need to be carefully planned and I would hate to see all that great networking and partnership and relationship just fall down if he [the teacher] was to go. (2019, Principal, NT)*

More specific session feedback from the school as opposed to the current very positive but general response would be beneficial to the STEM professionals in terms of:

*... what works, what doesn't, what they like, what they didn't like. (2019, STEM professional 2, VIC)*

Additionally, improved responses from the school through faster email turnaround would facilitate session and logistics planning:

*Sometimes it took two weeks to hear back. (2019, STEM professional 2, VIC)*

Concern was expressed that the STEM professional registration question requesting the highest level of STEM qualification attained, may dissuade those without formal qualifications but possessing valuable experience, from applying.

The STEM professionals thought that a physical identifier such as a brightly branded shirt to promote 'the scientists are in town,' would provide a high return on investment. This tool was successfully implemented by NASCA whose appearance spreads very quickly throughout the community generating enthusiasm and increasing school attendance, once the trademark bright orange t-shirts are seen by the children.

Continued participation in the partnership by the STEM professionals requires leadership level commitment through internal promotions raising the program's profile by highlighting its contribution to staff personal and professional growth. Communicating the program requirements, benefits and opportunities needs to extend to other industries and schools:

*The program is not even widely known in [organisation name redacted]. I don't know if our unit is the only one involved. It would be good to see [organisation name redacted] encouraging more staff to do it, encouraging more partnerships. (2019, STEM professional 2, VIC)*

A STEM professional day, roadshow or national event with guest speakers could highlight the benefits and present examples of successful partnerships.

## Leadership and resources

Human resourcing was identified as central to meeting the needs of this school due to the extra time and effort required to manage language barriers, inconsistent attendance levels and student attention span:

*I've come from my most recent school which had very self-directed learners and my primary class could be investigating three or four different things and they would go along their own merry way. If I was to set up something like that without [organisation name redacted], it would take a lot of groundwork and a lot of resourcing. (2019, Principal, NT)*

The STEM professionals are aligned with the school's desire to extend visits to one per term. Current funding for the week is received from their organisational business unit and the STEM program, however, more funds may be elicited from other areas within the organisation or from other grant opportunities.

As practical interactive demonstrations and tasks are ideal for these students, more funding for experiment materials would also be beneficial. Examples including inexpensive lab supplies, science kits and printed learning resources, such as books or booklets, would be beneficial. This is also relevant to capture the local flora and fauna information which the teacher observed through his involvement with the Women Rangers, has been significantly lost in the Indigenous community.