Creative STEM Pathways – Supporting Pacific Learners through 3D Printing

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ABSTRACT

The low participation of Pacific students in tertiary STEM studies has implications for schools as they consider how best to engage these learners in STEM subjects (Science, Technology, Engineering and Mathematics). This article reports on an innovative project that supports Pacific learners with STEM learning through 3D printing technology. Creative STEM Pathways is a university-led initiative which has successfully brought 3D technology to the classroom, providing culturally-sustaining, hands-on and relevant learning opportunities. We used an Appreciative Inquiry lens to help us explore how the programme could create positive learning experiences. In this article, we share experiences of its development and delivery. We highlight successes and challenges, offering practical insight to those considering similar innovation in the classroom.

INTRODUCTION

This article reports on an innovative project designed to engage secondary school students in STEM subjects. Based in the Wellington region of Aotearoa New Zealand, a team from the School of Architecture and Design at Victoria University has partnered with local schools to support students' learning through 3D printing technology. One particular focus has been to work with Pacific learners in low-decile schools (schools in low-socioeconomic areas). These school-based programmes have received positive feedback from students. With Pacific learners in mind, we (the authors) draw on a recent conversation with the team members to discuss here the successes of the programme. To help evaluate perceptions of success, we applied an Appreciative Inquiry lens, which supports a solution-focussed, strength-based approach. The aim of our article is to highlight how this kind of innovation can provide invaluable support for learners and, in particular, Pacific students. We offer ideas to other educators interested in encouraging STEM learning, and who may wish to consider similar innovation in their classroom.

It needs to be acknowledged that Pacific students reflect a diverse population of Pacific peoples who have migrated to Aotearoa New Zealand from Pacific Island countries such as Samoa, Cook Islands, Tonga, Niue, Tokelau, Fiji, Solomon Islands, and Tuvalu (Ferguson, 2008, p. 5). Diversity is further reflected through individuals' intercultural identities and whether they are first, second or third generation (Rimoni & Averill, 2019). Whilst recognising diversity, the New Zealand Ministry of Education has grouped these learners into one cohort within the education system as deserving special attention. Despite the successful academic progress of many Pacific students, concern is expressed over those not attaining expected levels of achievement (Ministry of Education, 2019). The Action Plan 2020 – 2030 recognises that shifts are to be made to better support these learners and their families. In particular, the Plan recognises the need to respond to the strengths of Pacific communities who demonstrate a collective commitment to promote positive educational outcomes for their young people (Ministry of Education, 2020). The Plan advocates strongly for family and community engagement to strengthen success at school (Ministry of Education, 2020).

We begin this article with a brief review of literature on engaging learners in STEM subjects with reference to minoritised groups such as Pacific learners. We then provide background details on the innovative project, known as Creative STEM Pathways - Moana Innovative Learning, where we introduce the team and their work. After a brief discussion of Appreciative Inquiry, we discuss key themes which have emerged from our conversation. The conversation was shaped by key questions to elicit responses from the team about what motivated them, what they felt went well, and what challenges they have overcome.

ENGAGING MINORITISED LEARNERS IN STEM SUBJECTS

The term 'minoritised' has arisen in research over recent years (for example, Tolbert, 2015) to describe learners from minority cultures. Aware of the increase in cultural diversity within New Zealand schools (Hipkins et al., 2022), we draw attention to this term to show how Pacific students form a significant group of diverse learners within this category. International literature highlights the low participation of minoritised groups in STEM subjects at tertiary study and in STEM-related careers (Shin et al., 2016). In New Zealand, Richards et al. (2017) note the low numbers in uptake and completion rates for Pacific and Māori learners at undergraduate and postgraduate level in comparison to the rates for New Zealand European or Asian students, expressing concern over STEM subjects. The need to be more culturally responsive in New Zealand schools is noted by Hipkins et al. (2022) who call for a revitalisation of the science curriculum. Both New Zealand and international literature argue for culturally-sustaining practices and specific interventions to help create maximum opportunities for minoritised learners to succeed in STEM subjects (Fonua, 2018; Richards et al., 2017; Tolbert, 2015). Not only can these measures help address the underrepresentation of minority groups in STEM-related careers, but also help address issues of inequity (Tolbert, 2015). Since Pacific peoples are negatively represented in low socio-economic statistics, such as in housing, health and unemployment (Duncanson et al., 2018), supporting Pacific learners' success in STEM subjects is one way to assist these learners into higher-paid

employment and enable them to contribute positively to their own communities (Fonua, 2018; Richardson et al., 2017).

Culturally-sustaining practices

Pacific learners thrive when classroom relationships foster a caring and respectful environment which encourages engagement and the confidence to take risks in mathematical enquiry and problem solving (Hunter & Hunter, 2018). A caring environment is one in which students are helped to feel secure in their own identity, where the teacher learns about the cultural values of Pacific learners (such as respect, humility and service) and endeavours to embed these values into classroom practices (Rimoni & Averill, 2019; Surtees et al., 2021). Minoritised learners, in general, are more likely to engage in science subjects when teachers relate to their lived experiences, creating space for learners' cultural knowledge and identities to be accepted and valued (Hipkins et al., 2022; Tolbert, 2015). Furthermore, minoritised students benefit from opportunities to participate in collaborative work, where peer support for one another helps them to maintain engagement and persist through challenges (Meador, 2018). Through such mutual encouragement, these students can overcome possible negative assumptions which they may hold about their own lack of aptitude for STEM subjects (Meador, 2018). Hunter and Hunter (2018) recommend collaborative activities in STEM classes for Pacific learners since peer support helps with sense making, problem-solving skills and overcoming reticence to ask direct questions to the teacher.

A hands-on approach

A hands-on approach, as part of active inquiry-based learning, is an effective way to support engagement and understanding in STEM classrooms (Goldsmith, 2018; Taraban et al., 2007). Taraban et al. (2007) maintain that "physical manipulation" helps students explore problems, allowing them to argue their case with peers, make mistakes, and appreciate the complexities of the world around them (p. 976). Goldsmith (2018) acknowledges how hands-on learning improves engagement and retention of information, advocating whole-body movement to support comprehension. Amir and Subramaniam (2012) emphasise how practical projects help less-academic learners to engage in science subjects. Amir and Subramaniam (2012) argue that practical tasks encourage problem-solving and creativity, mimicking the trial-and-error process of a science-based workplace. Exposing students to 'uncertainty' and 'messiness' helps them appreciate how these processes are part of scientific knowledge-building (Hipkins et al., 2022, p. 10).

There is, however, limited research on how a hands-on approach might specifically support Pacific students in STEM subjects (Taito-Taaalii Matamua, 2015). Nevertheless, Leenen-Young (2020) observes a long history in practical-based learning across Pacific cultures which is multi-sensory and focussed on observing and doing. Her exploration of university students' learning styles demonstrates Pacific students' affinity with learning through 'demonstration' and 'imitation' which are common practices at home and church (p. 76). Given students' familiarity with these traditional methods, she recommends their use in classroom contexts and maintains they align well with an active, student-centred approach (Leenen-Young, 2020). Similarly, Taeao and Averill (2020) draw on the

merits of traditional cultural practices to support learning where they note Pacific students' enthusiasm for engaging in cultural performance. They recommend the physical incorporation of performance skills in the mathematics classroom to enhance an understanding of concepts like measurement and geometry. These studies highlight the tactile nature of traditional learning in Pacific cultures, suggesting that Pacific students might relate well to hands-on learning activities in STEM classes.

Effective interventions

Meador (2018) recommends the role of mentors for helping encourage young people to engage in STEM learning. Family members can act as positive role models, helping learners identify with STEM subjects and career paths (Coxon et al., 2018; Jong et al., 2020). However, with minoritised students and those from low socioeconomic backgrounds, there may be an absence of anyone pursuing a STEM career within their community (Coxon et al., 2018; Jong et al., 2020). These learners may struggle to see themselves following a STEM path and perceive themselves to have a lack of aptitude for STEM learning (Coxon et al., 2018; Jong et al., 2020). The role of mentors helps to set high expectations that might direct learners towards further study and counteract stereo-typical assumptions which some learners might hold about their unsuitability for a STEM pathway (Meador, 2018). Mentors support learners in ways that connect Pacific learners to opportunities.

Another effective way to help minority learners (and others) successfully engage in STEM learning is for them to participate in informal programmes which spark interest and remove the pressure of performing for assessment (Blanchard et al., 2020). For example, Coxon et al., (2018) stimulated an interest in Mathematics through engaging students in Lego We Do Robotics. One way to create these informal learning opportunities is for schools to forge partnerships with external organisations such as universities (Harlow et al., 2020; Taraban et al.' 2007). Like the role of mentors, the advantage of this kind of partnership is that it opens learners' minds to potential STEM study and career pathways (Harlow et al., 2020). Such visualisation is another way to positively influence learners whose backgrounds may not provide them with the kind of experiences that prompt the idea of a STEM future (Jong et al., 2020).

Given that learners from low socio-economic backgrounds may belong to families where resources restrict exposure to educational opportunities, it is beneficial for them to experience creative learning opportunities that spark interest and increase awareness of how STEM learning relates to every-day life (Jong et al., 2020). When considering the negative impact of the Covid pandemic on Pacific learners' education (Ministry of Education, 2020), which has highlighted the lack of digital access in the home (Riwai-Couch et al., 2020), the implementation of these kind of innovative partnerships to support STEM learning are relevant to the education of Pacific learners. That is, innovative partnerships that promote engagement with technology might help Pacific students access learning opportunities which, otherwise, would not be available to them.

CREATIVE STEM PATHWAYS – MOANNA INNOATIVE LEARNING

Creative STEM Pathways (also known as Moana Innovative Learning) was launched in 2015 to help bring innovative approaches for teaching secondary school STEM subjects by linking practical tasks with 3D printing and creative design. The programme has a special interest in engaging Māori and Pacific learners with the aim of providing opportunities for engaging in evidence-based, hands-on learning to stimulate interest in STEM subjects. This programme has enjoyed considerable success and more than 20 teaching modules have been delivered to six secondary schools as well as a number of community groups.

The founder of Creative Pathways, Lionel Matamua, completed a Master of Design Innovation in Industrial Design in 2015 which was aimed at addressing plastic waste in the Pacific. With support from his masters' supervisors, Professor Simon Fraser and Dr Jeongbin Ok, Lionel went on to establish the Creative Pathways pilot programme to trial ideas from his study at a school in Aoteroa New Zealand. Supported by co-facilitator Petone Groome, the project sparked such a strong interest amongst teachers that it has grown to meet the demand for creative support with technology in schools. Facilitator Tavai Taefu has since joined the team. Petone and Tavai are both post-graduates from the School of Architecture and Design. Professor Simon Fraser has driven funding opportunities for the project which has benefited from the Toloa Kenese Fund provided by the Ministry of Pacific Peoples to support engagement in STEM learning for Pacific students. The team agreed to discuss their work for this article, as they wish to raise awareness of the project. To support their public profile, we refer to actual names throughout.

APPRECIATIVE INQUIRY

We decided an Appreciative Inquiry lens would help us explore the team's discussion of their project as they reviewed its successes and challenges. As a methodological approach, Appreciative Inquiry builds on the social constructionist principle that perceptions of reality are formed through dialogue (Grieten, et al., 2018). The emphasis is on language and the power of discourse to consider ever-evolving possibilities (Cooperrider & Whitney, 2000) where an affirmative and appreciative stance in conversation encourages creative thinking and forward-focussed solutions (Stavros et al., 2021). This approach avoids an emphasis on problems, or on blame which might prevent individuals from sharing ideas (Stavros et al., 2021). Appreciative Inquiry was originally devised as a method of action research to support organisational change, and its proponents (for example, Cooperrider & Whitney, 2000) recommend questioning that supports both a positive lens and the freedom to express ideas without fear of judgement. With this in mind, we set up a zoom meeting with members of the team for a discussion based on prompt questions about what they felt went well and, when problems arose, how they felt they were able to overcome them.

Appreciative Inquiry has received criticism for disregarding problems and inhibiting insightful evaluation (Dematteo & Reeves, 2011; Grant & Humphries, 2006). However, Bushe (2007) and Grieten et al. (2018) argue that a more accurate description of Appreciative Inquiry is to call it "generative" to explain that the purpose is to encourage participation and creativity in order that

different paths bring positive change (Grieten et al., 2018, p. 107). Problems need to be heard so that attention can then be given to what will forge a "new and better future" (Bushe, 2007, pp. 3-4).

It is in this spirit that we explore the conversation with the team so that we can learn from their innovative work. In sharing their experiences, we hope that other educators may feel similarly inspired to try creative and fresh approaches for engaging learners in STEM subjects.

THEMES

In our conversation we learnt why team members believe their work is worthwhile, what successes they have enjoyed and what difficulties they have overcome. We share some of these ideas with you now. The main spokesperson during the conversation was Lionel, himself, and we capture many of his contributions below.

We were curious to know what motivated Lionel and the team to pursue the use of 3D printers in STEM learning. We asked the team, "*What factors persuaded you to focus on New Zealand schools?*"

Opportunity

Lionel remembers his own time at school and how limited his learning of technology was until he went to university. He and his fellow Pacific colleagues realised they were in a unique position to offer back to the school system, helping deliver learning experiences in technology to Pacific students which might otherwise not be available:

> Giving the opportunity to the younger us who are still in college was an idea that sort of jumped out to us... This is the stuff that we're doing now at uni. Imagine what they could do if they started at an earlier age and let that progress, you know, and that's the sort of thinking if we're looking through a pacific lens.

As members of the local Pacific community, supporting others and giving back are important values for Lionel, Petone and Tavai. For instance, students might need help with their academic work. Perhaps, says Lionel, they can "help some of these kids who are struggling to gain some credits to go towards their overall NCEA (National Credit of Educational Achievement) accreditation." They realise they are well positioned to nurture the learning of their 'younger selves'.

Touching, feeling, making

In providing opportunities, they, themselves, did not receive, they recognise how they can make learning exciting for students. They can help Pacific learners get to grips with science concepts because, as Pacific facilitators, they understand how these students can turn their "natural creativity into some actual physical product." Lionel continues:

> Coming from a Pacific culture, we learn not only by singing and music but by touching, feeling, making. ... When doing my masters, we were

> struggling to find any reference to do with kinaesthetic learning so ... to utilize what we're doing ends up with, for example, the science project with spinning tops that was putting forces and motions through an actual physical object.

The skills the students are exercising are highly useful, as Professor Simon Fraser acknowledges, because they are "just fundamental to design – that whole process of solving problems by making and trying things out."

So, a motivation to continue has been to see the engagement of students in physical, hands-on tasks where they can make something tangible. A particular advantage is that students can make something which, as Lionel explains, "I can take home to show to my parents, you know, showing our Pacific families that there's more to education than just becoming a lawyer or doctor ...." They appreciate the importance of helping families understand their children's learning, illustrating alternative career paths which families may have no knowledge about or experience with.

The success the team has enjoyed with their 3D printing project has evidently inspired them to continue their work within schools, where they are keen to support Pacific learners and provide creative learning opportunities. Our next question, therefore, was, **"***What successes have you enjoyed with this work?***"**

Something that's really cool outside of the classroom

One success that the team has noted is their ability to bring relevance to learning. As Petone points out, "the skill that we're trying to teach them is something that's really cool outside of the classroom." The team members realise that they have supported engagement through learning that is relatable to student experiences and interests, helping develop valuable skills in CAD (Computer Aided Design) technology. One example of relevance is a request the team received from the Young Enterprise Scheme to help students recycle plastic into mobile phone cases. Another example is the visit to ESR (the New Zealand Government Institute for Environmental Science and Research) as part of the students' science curriculum. Simon explains:

> It worked really well because the kids went to the lab ... and she [the teacher] said they were just fascinated to see the bacteria wriggling under the microscope. I just thought it brings it all alive. And then they printed out different types of bacteria and viruses. It wasn't until covid hit us a couple of years later, and I saw what the covid virus looked like, I immediately remembered one of the models from one of the students and it's identical. I thought, well, there's a bunch of students out there who will certainly remember what they did.

Simon further reflects on his own teaching experience: "as soon as you bring in an outside professional ..., it's an immediate excitement or interest on the part of the students as if this is the real deal." A strength from the team, therefore, is the ability to bring a different perspective to the classroom experience which helps to create engaging and relevant learning opportunities for the students.

It just grew

The expertise that the project members have brought to schools is reflected in the growth of their work. An evident success is how, as Lionel puts it, the work "just grew into its own base because teachers (we didn't do any promotion or anything) through the grapevine heard what we're up to." The members, therefore, discovered there is a genuine demand for the skills they offer and have been pleased to help fill this gap. For instance, when they first started, they discovered that schools had acquired 3D printers but, as Lionel points out, the printer in a school was "sitting there collecting dust for about a year or so" because no-one knew what to do.

Even though they believe that schools are gradually developing expertise with 3D technology, they are conscious of the positive difference they can make. As Lionel says, "we're coming in with something, but we have kind of empowered not just students but have empowered the teachers to figure out how can we utilize this technology in that way." The team has witnessed growth, not only in demand for their work, but in the confidence of teachers to engage with 3D technology. Simon gives the example of one college where he observed at the start "just a passing interest in the 3D printing" to now where they:

> bought two really high spec 3D printers and they had a member of staff who's dedicated to maintaining and operating the printers almost to the point that they could cut us loose. And that would be the real success when we contact them and say what have you got for us this year, and they say, well, we don't need you anymore."

Growth, therefore, includes the development of schools to successfully incorporate 3D technology into the curriculum where the direct delivery of a programme to students shifts to more of a facilitating role as schools learn to take ownership for themselves.

At that time, I was one of **...**the few

A further success has been the visible growth of the team itself. This starts with Lionel who was undecided on the way forward after his first degree. Simon suggested Lionel apply for a summer scholarship which led on to the master's degree and subsequent success with the Creative Pathways project. Lionel has appreciated these opportunities because after his degree he says, "I was pretty confused on what to do next..."

Lionel realises that "At that time I was one of the early few Pacific students in the space" and so success is visible not just in his personal growth but in the development of the other Pacific members of the team. As Lionel says, just as he received support to undertake outreach work, he has been able to pass this on:

> One success on my part is seeing Petone and Tavai come through. ... it's sort of become poetic in that sense that I brought Petone on in the early stages of his degree, just to help out, you know, just to get him out and earn a little bit of cash here and there. And then it turned into I'm more of the mentor now. Now these guys are running it and they've taken the reins putting their own spin on the stuff too.

Simon is impressed with the networking capabilities of the Pacific team members which he feels is a definite strength that has contributed to the success of the project, providing continuity and ensuring that the required delivery needs are met:

> There is always someone that they can call on and it doesn't matter what it is, and I find it fascinating how the whole network functions like that. If any gaps suddenly appear, then the gap can just be filled, really naturally, and it works really well.

Success is evident, therefore, in many ways – not just through the facilitation of creative and relevant learning but also in terms of growth. Growth includes the expansion of the project through demand for their work, through developing expertise within schools, and through the personal development of the team itself supported by Pacific networking skills.

Of course, not all projects can be expected to run smoothly, and we were curious to know how they had managed difficulties. We asked, "*What challenges have you overcome so the programme can continue?*"

Starting out as a team of one, an early challenge was getting the project up and running with only Lionel to do the work. It meant that he put in many hours of his own time and drew upon his own resources so that delivery did not disappoint. It meant "having to print pretty much every school's 3d prints from home. ... So I'll be up a little bit late ... running from my home."

Added to that, Lionel was then seconded to the Student Success Team at the university (for supporting Pacific students). This concerned Simon because, "when you've got the funding contract that you have to deliver on, and then the person who was delivering the programme suddenly can't," there is a real possibility of not actually being able to deliver as promised.

However, it is the strength of Pacific relationality and networking that has helped overcome this challenge where, as mentioned, individuals step forward to help provide a seamless service. Thus, as Lionel stepped back, Petone stepped forward, followed by Tavai.

Digital Access

For Lionel, the biggest challenge has been "digital access at some of the schools." He and his team have noticed the difference between delivering to schools in higher socioeconomic areas where students generally have their own devices compared to delivering in poorer areas. In the low socioeconomically situated schools:

> If we wanted to give them homework, some of them couldn't do the homework, because they didn't have internet at home or a computer at home, similar to what we saw with covid when it first hit when lockdown first came in for some of the Pacific students.

This meant, according to Lionel, that "we could only do stuff when we went in pretty much because we had to borrow the laptops. Even those laptops were as slow as ..." Some students have been evidently disadvantaged through limited

access to technology, further exacerbated by the disruption of lockdown periods during the covid pandemic.

From classroom observations, Margaret noticed the difference on one of her school visits where students with access to technology at home were more confident than those whose experiences were limited to the classroom. As Petone and Tavai collectively note, the former "don't need as much help and they want more attention to show off their skills."

However, Margaret further noted the inclusive style of delivery offered by these two who teamed up in the classroom. As Petone says, they like "sharing knowledge". He adds, "it's not coming to them as teacher to student. It's more coming as an approach of 'big brother little brother' or just older sibling."

Although it is beyond the power of the project members to address the challenge of digital access for some students, they maximise learning opportunities in the classroom by providing a supportive atmosphere. As observed by Margaret, they sit with students and support them in an encouraging and empathetic manner, and they empower those more skilled to step up and help others where they can.

The budget

For Simon, he feels the main challenge has been accessing funds to continue the work. As he says, "a lot of the schools just really don't have the budget to finance a programme like this." He continues, "if they can't integrate it into their normal operating budget, they basically don't have the budget to pull in an outside consultant." In Simon's view, this is an "ongoing problem" that is unlikely to change.

Despite this pessimism, the programme is still ongoing, and Simon is clear that the commitment of the team has helped to ensure its delivery. As he says of Lionel when the project began, Lionel "was running off the smell of an oily rag and there was a lot of goodwill and there was a lot of idealism there and, yes, we could fund him. But we weren't funding him at a fully professional rate...."

It is not only Lionel's passion which has kept the programme going but the concerted efforts of Simon, too, who has persevered with funding opportunities. So, although the work may appear seamless and constant, its existence relies on successful access to funding streams which have finite timescales.

CONCLUSION

We are grateful to the team members for sharing their knowledge and experiences. They demonstrate how innovative STEM learning opportunities can be created, helping us to visualise how theoretical understandings translate into practical projects. Pacific students appreciate a classroom environment which fosters a caring atmosphere, and which validates their cultural identities (Hunter & Hunter, 2018; Surtees et al., 2021; Tolbert, 2015). Moreover, Pacific students benefit from mentors who can help them consider the possibility of a STEM pathway, given that they may not have direct experience of anyone in their community with a STEM background (Meador, 2018). As Pacific people, who demonstrate success with STEM studies, Lionel, Petone and Tavai facilitate learning in a supportive and encouraging manner; they set high expectations by teaching skills which they, themselves, did not learn until university. Their desire

to benefit the education of those still at school is an example of the commitment that exists within Pacific communities, where a collective and relational focus helps promote the educational success of Pacific young peoples (Ministry of Education, 2020).

Furthermore, a successful way to support learning is through a hands-on, tactile approach where the tangible outcome of making a product promotes engagement, problem solving, comprehension and creativity (Amir & Subramaniam, 2012; Goldsmith, 2018; Taraban et al., 2007). This kind of approach works particularly well for Pacific learners, who benefit from opportunities to collaborate and work through challenges (Hunter & Hunter, 2018; Meador, 2018). As the team is aware, the trial-and-error process which students undergo in making something replicates the design process used in the workplace (Amir & Subramanian, 2012). The Pacific members of the team also realise, from their own learning experiences, how creating something through 3D printing aligns with how Pacific students often learn outside of the classroom. An added advantage, they realise, is that they can support home-school relationships by enabling students to take home what they have created as a way of explaining learning to parents. However, as we discovered in student feedback, their activities are overall just fun to do!

This innovative project has been possible through partnerships forged between Victoria University and schools in the Wellington region. Schools can benefit enormously from the expertise from external organisations, providing a more informal learning environment to spark students' interest and open their minds to the possibility of a STEM career (Harlow et al., 2020; Taraban et al.' 2007). Team members are clear: their work has been possible because of the effective partnerships that have been formed. In our conversation, they were emphatic that their role is to work with teachers at every step of the programme. They realise that, although teachers appreciate their presence to help relieve the pressure of their daily work, the ultimate aim is to support them in becoming autonomous in using 3D printing technology in the classroom.

The aim of this article has been to share the experiences of the team in the hope that it may inform others interested in a similar path. An Appreciative Inquiry lens helps us understand the life-giving energy of this project which has demonstrated growth in so many ways – in the number of programmes, in the development of expertise within schools, with the learning of the students, and with the professional development of the team members. Nevertheless, we cannot ignore problems which the project has encountered, and which have largely been overcome through the dedication and commitment of all involved – both team members and teachers. Such commitment has ensured funding to date, but the need for continuity in funding is an ongoing issue. Funding is particularly critical given the lack of access to technology in the home of many Pacific learners. We hope that, in the very near future, this innovative work may find security in resourcing so that it can continue to grow from strength to strength. We believe that, in disseminating its successes in this article, we have shown the programme's viability and deserved attention for dedicated funding.

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