



# **Legends: Our Special Island**

**Monitoring, Evaluation and Learning Report** November 2018













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SecondMuse builds economies of the future in collaboration with visionary cities, countries, nonprofits and startups. From Bali to Brooklyn, they develop the communities and networks that help drive social, environmental and economic innovation - <u>secondmuse.com</u>

# DISCLAIMER

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# ACRONYMS

Арр	Application
AR	Augmented Reality
CEO	Chief Executive Officer
DFAT	Department of Foreign Affairs and Trade
GPS	Government Public School
iXc	innovationXchange
KEQ	Key Evaluation Questions
ΜοΕΤ	Tongan Ministry of Education and Training
МоН	Tongan Ministry of Health
MoU	Memorandum of Understanding
NCDs	Non Communicable Diseases
OSI	Our Special Island
ТоС	Theory of Change
VR	Virtual Reality

# **EXECUTIVE SUMMARY**

Cheap, imported, nutrition-poor foods, including instant noodles and sugary drinks are replacing traditional diets in the Pacific, and are linked to the devastating levels of diabetes, hypertension, and heart disease present in the regional population.

Non-Communicable Diseases now account for approximately 70% of all deaths in the Pacific.<sup>1</sup> Where once traditional diets mainly consisted of healthy and fresh foods, a mindset of 'imported food being better' has drastically reduced them from today's diets.

Our Special Island (OSI) is an Australian innovation for young children in Tonga that inspires positive attitudes towards healthy eating and traditional foods through play, music and culture. OSI is one of two pilot programs under the LAUNCH Legends project<sup>2</sup>, discovered through the LAUNCH Food Challenge<sup>3</sup> in 2016. The Our Special Island innovation has been developed by Australian game-based developer, <u>Millipede</u>, and was funded \$250,000 AUD in 2017 to pilot in Tonga.

# The project has three key goals:

- 1. Raise awareness about the value of play-based and game-based learning using innovative technological affordances (specifically an application, and supporting print-based materials)
- 2. Increase awareness of healthy food options, especially local foods
- 3. Shift children's preferences towards healthy food

To achieve this the program was contract managed by SecondMuse, who oversaw the delivery of the pilot in 11 primary schools across the island of Tongatapu in Tonga for six-weeks between April and June 2018. The program targeted children between the ages of 5 and 7.

It features a play-based app delivered on an iPad, plus accompanying print materials including posters, worksheets, flashcards, and a board game. The pilot is formally endorsed by the Tongan Ministry of Education and Training (MoET) and the Tongan Ministry of Health (MoH). It has also received logistical support from Tonga Health and the Australian High Commission in Tonga. An end-of-pilot evaluation was undertaken from July to September 2018.

<sup>&</sup>lt;sup>1</sup> World Bank, 2014 <u>http://documents.worldbank.org/curated/en/534551468332387599/Non-Communicable-Disease-NCD-Roadmap-Report</u>

<sup>&</sup>lt;sup>2</sup> <u>LAUNCH Legends</u> is an Australian Government and LAUNCH Initiative aimed at promoting healthy eating and better nutrition in Fiji and Tonga through the use of emerging, interactive education and storytelling technologies

<sup>&</sup>lt;sup>3</sup> <u>LAUNCH Food Challenge</u> is an Australian Government and LAUNCH open innovation program for innovators, entrepreneurs, or intrapreneurs with big ideas for improving health outcomes by enabling people to make healthy food choices

### This evaluation serves three main purposes:

- 1. To understand the reach and outcomes (effectiveness) achieved through the pilot
- To understand what worked (and didn't) around using technological affordances (a play-based app on an iPad in Tongan early years classrooms) to support learning, using other methods, including both the content elements (i.e. print-based materials) and the logistical side of delivery
- 3. To understand what has been learnt about doing innovation in the Pacific

The evaluation undertook a variety of data collection activities before the launch of the pilot, and again one week after the pilot had concluded. The evaluation methodology is detailed in Section 2 of this report. Methods included:

- identifying the age and gender breakdown of participants;
- conducting pre- and post-pilot surveys with students and teachers;
- observing and consulting with participants in classrooms and at workshops;
- conducting qualitative interviews with teachers and parents;
- collecting the structured reflections of the pilot delivery team, and
- collecting app usage data from iPads.



### Notable outcomes

Overall, the evaluation found the OSI pilot had effectively increased students' awareness of healthy food options by providing teachers with accessible, culturally relevant play-based learning resources that supported them in their teaching practices. The most notable outcomes of the pilot were as follows:

- 1. There was a measurable improvement in students' knowledge about healthy and unhealthy foods after engaging with the OSI materials
- 2. Students had begun to connect their digital play interactions in the app with their off-screen world
- 3. Students remained engaged with the app throughout the pilot
- 4. Teachers welcomed the iPads in their classroom and enjoyed using them
- 5. Some teachers used a teacher-led approach to using the OSI materials with their class
- 6. Use of the OSI materials varied significantly across schools
- 7. The pilot and suite of resources were, on the whole, culturally appropriate, engaging and accessible

# Effectiveness of OSI pilot

The evaluation found that participation in the OSI pilot helped students to become better at identifying healthy and unhealthy foods, which increased their awareness of the healthy food options that exist around them. Some students were also beginning to make connections between healthy foods and their own wellbeing by showing a preference for healthy foods in school and at home. While this demonstrates an initial shift in attitudes towards healthy food choices, the degree to which students understand how healthy food affects their wellbeing is difficult to determine in a six-week pilot.

# Key data in the form of statistics and quotes is listed below:

- 93% of students could correctly draw two healthy foods by the end of the pilot compared to 54% of students before the pilot began
- 81% of students could correctly differentiate between examples of healthy and unhealthy foods by the end of the pilot compared to only 3% of students before the pito began

- *"Yes, cutting, peeling. Cleaning. She started when she came back from school with this iPad thing. And that's when she started to identify some small things like healthy foods, especially the local ones."* 
  - Parent (interview)
- *"There is a special interest that children individually shown. There behavior's improved, their cooking skills improved and they are now confident to explain what healthy food they can get from home to eat."* 
  - Teacher (post-pilot survey)

The evaluation also found that participation in the OSI pilot helped to increase the majority of teachers' appreciation of the affordances of play-based apps for learning, as they were able to see the positive impact of the OSI app on their students' learning and, in some cases, also on their own.

The shift extended to an increased number of teachers appreciating the value of off-screen play and games in the classroom. This was especially significant in around one-third of participating teachers, as demonstrated by their willingness to create their own off-screen play-based health activities for use in the classroom.

### Key data in the form of statistics and quotes is listed below:

- Eight out of 10 surveyed teachers felt 'Very confident' using an iPad as a teaching tool by the end of the pilot, compared to only four teachers before the pilot began
- Nine out of 10 surveyed teachers agreed there were benefits in using play and games to support young children's learning by the end of the pilot, compared to five teachers before the pilot began
- Four of the 11 participating pilot schools had organised unprompted OSI presentations for the ilot delivery team as part of their post-pilot visit
- *"I think the app is the best...because they are able to do and see and also feel. They are using all, how many senses that they are using within the app. But with the activities of course they do like doing the drawing and colouring and cutting that is also helpful."* 
  - Teacher (interview)

# **Appropriateness of OSI pilot**

The evaluation found that the design of the OSI pilot was appropriate for the Tongan context, as the characters, activites, use of language, and the technical functionality of the play-based app were all well received by students, teachers and parents. This was the product of extensive stakeholder feedback throughout the pilot's development, and resulted in a high level of ongoing engagement with the app from participating students.

Participating teachers were provided with the tools needed to deliver the pilot in their schools, however, evidence suggests that the board game was not appropriate for use in the time-constrained context of the Tongan classroom. Time and resource constraints faced by some schools may also have led to the OSI pilot creating an additional burden on teachers and parents. In addition, some teachers were found to be using a teacher-led approach with the OSI materials. Additional training sessions for teachers may have helped to increase teachers' capability to use a more child-led teaching approach.

# Key data in the form of quotes is listed below:

- *"Awesome illustrations cartoons e.g. age appropriate, creative in ideal tone being used and relatable to Tongan language. Local voices! Very well executed towards target audience."* 
  - Teacher (post-pilot survey)
- "My addition was when I looked at the board game. I think it's too difficult to the kids (to use independently without adult support initially), but I tried some methods to make the kids familiar with this game."
  - Teacher (post-pilot survey)
- "Concern: not enough/ [need] more iPads so students can all use"
  - Teachers (group in teacher workshop)
- *'We try to make our voice to be like what's in the two characters in the story. One of the kids was trying to pretend to be Kelela and Pulotu and Maui.'* 
  - Teacher (interview)

### Learnings from OSI pilot

This evaluation has documented a number of lessons learned from the OSI pilot relating to a range of areas, including cultural representation, stakeholder engagement, in-country team members and the mitigation of external risks. These learnings are documented in Section 4.5 of this report.

### Recommendations

Based on the OSI pilot evaluation findings and lessons learned, the following key recommendations have been made.

### Recommendations for an OSI rollout in Tonga:

- Any extended rollout should continue to focus on Grade 1 and Grade 2 students. The OSI program content has been designed to be age appropriate and link with the existing national curriculum at this level.
- Parents should be fully briefed on the program, including what they can expect from it and how it will benefit their children, in order to support best uptake of the program messages outside of the classroom. Program timelines must be allocated in consideration of this.
- A series of (three or four) teacher training sessions should be held prior to the start of the program expansion. Where possible, these trainings should bring all participating teachers together in the one workshop setting. The training should focus on the fundamentals of play-based learning and should involve guidance and shared ideas on how the OSI resources can be used in the classroom.
- Teachers can be further supported by the delivery team spending more time conducting school visits before pilot launch. More time spent with teachers will allow for further training on play-based approaches to learning and lead to stronger working relationships.
- The method for achieving the intended outcomes of the board game will need to be revisited, as the board game was not an appropriate resource for the Tongan classroom context. Alternative methods to deliver the intended learning outcomes should be teacher-led and facilitated by the implementation team before the launch of any extended program.
- Program resources should be made using durable materials that can withstand the humidity and climate.

# Recommendations for implementing a version of the OSI pilot in other countries in the Pacific:

- Discovery and learning trips should continue to be taken prior to the pilot design. These should be built into pilot budgets and timelines.
- An in-country coordinator should be involved throughout every stage of the pilot. Navigating systems of government, identifying key stakeholders, and earning community support and buy-in is essential to success. Consideration should be given to making any in-country coordinator a formal member of any program team.
- Approval from the relevant Ministries in-country (i.e. Education and Health) should be sought before any engagement with schools or teachers takes place.
- Where possible, the pilot should complement the school curriculum as well as existing health programs.
- A teacher training session should be held prior to the start of the pilot. Where possible, the training should bring all participating teachers together in the one workshop setting. The training should focus on the fundamentals of play-based learning and involve guidance on how the pilot resources can be used in the classroom.
- Stakeholder feedback should be incorporated into the pilot design and changes should be socialised during return visits to country.
- Any pilot resources should be developed to be culturally appropriate. Stakeholder feedback should be central to the design of characters, art style, and recipes.
- Pilot implementation should be scheduled outside of cyclone season.



# Conclusion

This evaluation provided an opportunity to examine how play-based and game-based learning, using innovative technology, can be used to increase awareness of healthy food options and shift children's preferences towards healthy food in Tonga.

The evaluation findings confirm that innovative technologies, such as a play-based app, can be both effective and appropriate for use in a Tongan classroom context, when coupled with supporting print materials and designed in partnership with key stakeholders. Findings also point to areas where further support may be needed when implementing innovation projects of this nature in the future.

The lessons that emerged from this evaluation highlight the importance of strong Pacific partnerships, and the positive results of this short pilot demonstrates to the potential for innovative technology to affect positive change to health and nutrition in the region.

# **SECTION 1: INTRODUCTION**

# 1.1 Background

Cheap, imported, nutrition-poor foods, including instant noodles and sugary drinks are replacing traditional diets in the Pacific, and are linked to the devastating levels of diabetes, hypertension, and heart disease present in the regional population.

Non-Communicable Diseases (NCDs) account for approximately 70% of all deaths in the Pacific (<u>World</u> <u>Bank 2014</u><sup>1</sup>). Where traditional meals mainly consist of healthy and fresh foods, a mindset of 'imported food being better' has drastically reduced these dishes from today's diets.

The LAUNCH Legends project<sup>2</sup> is an Australian Aid and LAUNCH Food Platform<sup>3</sup> initiative, implemented by Millipede and SecondMuse on behalf of the Australian Government. It explores how interactive narratives and experiences can help promote healthy eating and better nutrition in the Pacific region. The Legends programs use fun, engaging gameplay to reconnect children with traditional foods in the hope of creating happier, healthier lifestyles.

The Legends project was conceived out of a 'Virtual Reality/Augmented Reality (VR/AR) Hack', which was held at the Australian Department of Foreign Affairs and Trade's innovationXchange (DFAT iXc) in October 2016. The ideas emerging from the hack demonstrated the potential of immersive technology to educate and impact the way people think and behave around issues facing their communities.

A global call for submissions was made in November 2016, and two innovative pilot programs were selected to be developed and implemented in primary schools in the Pacific.

This report covers a Final Evaluation of Our Special Island (OSI), one of the two pilot programs selected as part of the LAUNCH Legends project.

# 1.1.1 Outline of OSI

OSI is a \$250,000 AUD innovative pilot program developed by game-based education application developer Millipede, with support from DFAT iXc and the SecondMuse LAUNCH Legends team. The OSI program is formally endorsed by the Tongan Ministry of Education and Training (MoET) and the Tongan Ministry of Health (MoH). It has also received logistical support from Tonga Health and the Australian High Commission in Tonga.

<sup>&</sup>lt;sup>1</sup> Non-Communicable Disease Roadmap Report

http://documents.worldbank.org/curated/en/534551468332387599/Non-Communicable-Disease-NCD-Roadmap-Report

<sup>&</sup>lt;sup>2</sup> <u>LAUNCH Legends</u> is an Australian Government and LAUNCH Initiative aimed at promoting healthy eating and better nutrition in Fiji and Tonga through the use of emerging, interactive education and storytelling technologies

<sup>&</sup>lt;sup>3</sup> LAUNCH Food Challenge is an Australian Government and LAUNCH open innovation program for innovators, entrepreneurs, or intrapreneurs with big ideas for improving health outcomes by enabling people to make healthy food choices

# There are three key goals of OSI (Annex 1):

- 1. Raise awareness about the value of play-based and game-based learning using innovative technological affordances (specifically an application, and supporting print-based materials)
- 2. Increase awareness of healthy food options, especially local foods
- 3. Shift children's preferences towards healthy food

The program features an interactive tablet application, plus accompanying print materials including posters, worksheets, flashcards, and a board game. It has been designed specifically for Tongan students in Grades 1 and 2 and incorporates culturally relevant elements such as Tongan language, Tongan foods and Tongan characters.

The pilot was implemented in 11 primary schools across the island of Tongatapu in Tonga for a six-week period in April - June 2018. Program materials were developed by Millipede with support from SecondMuse, DFAT iXc and local partners. The program was delivered to students by teachers in participating schools.



### The OSI pilot program utilised a human-centred design approach over four key phases



- 1. Discovery Phase, which included two in-country trips in June and August 2017. This phase enabled the team to:
  - Meet with government representatives, health experts, teachers and students
  - Learn about Tongan culture and traditions
  - Run an introductory workshop with key pilot stakeholders
  - Gain first-hand insight into the challenge of NCDs in Tonga
  - Present Millipede's capabilities to potential program stakeholders
  - Better understand the challenges of using technology in Tongan classrooms
  - Gather ideas and support for the program concept itself
- 2. Design phase, which included one in-country trip in November 2017. This phase enabled the team to:
  - Visit all 11 pilot schools and meet with teachers, parents and students
  - Present initial concept ideas to the schools and to other in-country stakeholders
  - Gather specific cultural guidance on content (suitable recipes, ingredients, character considerations, and use of language, including songs)
  - Source recipes directly from teachers and parents
  - Provide stakeholders with background information on the OSI pilot in both English and Tognan
- 3. Development phase, which included an in-country trip in late April 2018 for the pilot launch

This phase enabled the team to:

- Incorporate stakeholder feedback into the design and development of the OSI resources
- Socialise some work-in-progress versions of the resources in Tonga via the in-country coordinator

- Collate this stakeholder feedback and incorporate it into a Beta version of the resources
- Conduct baselines surveys with participating students and teachers
- Brief teachers on the app and resources
- 4. Pilot period, with a final end-of-pilot trip in June 2018 to collect findings This phase enabled the team to:
  - Visit each of the 11 schools mid-pilot to provide support to teachers and answer any questions
  - Collect end-of pilot data from teachers, students, parents, key stakeholders and via device downloads
  - Run a post-pilot workshop with participating teachers
  - Gather feedback and key learnings from pilot participants
  - Share pilot progress with government representatives, health experts and other key stakeholders

# 1.1.2 Resources Play-based application

The Our Special Island (*Motu Ta'e'iloa* in Tongan) application is the main program item. It features three culturally appropriate characters, including two children called Kelela and Pulotu, and Maui-Kisikisi, the youngest son of the cultural figure Maui.



The app focuses on demonstrating and developing positive attitudes to fresh healthy food. On launching the app, children select a play button to arrive at the main screen. Here, they meet the three characters who explain the player's goal - to visit the sea and the garden to collect food, such as fish, octopus, coconuts, bananas and yams, to use for cooking Tongan meals in the kitchen. Children can make up to seven different meals, including one traditional drink (Otai).

There are five key sections of the app (Annex 2):

- the main screen (which acts as a menu screen)
- the garden
- the sea
- the kitchen
- a song (Fruit Salad)



Four screens of the OSI app Top left: the main screen, Top right: the sea, Bottom left: the garden, Bottom right: song

# Child-facing print materials

The supporting print materials have broader messages about healthy and unhealthy foods and drinks.

# They include:

- two posters, promoting healthy fruit and drinks (**Annex 3**)
- two sets of flashcards, including healthy and unhealthy foods (**Annex 4**)
- a set of five classroom worksheets (**Annex 5**)
- a board game named *Tummy* (**Annex 6**)



Our Special Island board game - Tummy

# Teacher and family notes

OSI Teacher Notes (**Annex 7**) exist to support teacher implementation of the program during the pilot. They are designed to provide teachers with information on the program aims, learning outcomes, the resources, suggestions on how to use the resources and ideas for related off-screen activities. The Teacher Notes are available as a printed hard copy, as well as within the app itself. The notes come in both Tongan and English language versions.

OSI Family Notes (**Annex 8**) exist to provide family members with an overview of the program, including the resources and its aims. The notes come in both Tongan and English language versions. They are designed to be shared with interested parents and guardians by the class teacher.

A number of simple, healthy recipes intended for use in the home were provided separately as part of the resource material.

### **1.1.3 Participant selection**

Schools were chosen for inclusion in the program based on a number of factors to ensure that the data gathered reflected the wider student population in Tongatapu, Tonga. The Government Public Schools (GPS) in the pilot were chosen with the assistance of the Tongan MoET.

### The following factors were considered:

- **Location:** For ease of implementation, pilot schools were limited to the island of Tongatapu, with these schools being located in various districts of the island.
- **Type:** Of the 11 pilot schools, three were Mission Schools and eight were GPS primary schools. The GPS schools were located in different districts of Tongatapu, including Nuku'alofa (Tongan capital) and rural areas, thus representing a good spread of schools across different parts of the island. The three Mission Schools each represented a different religious faith, with two including children from expatriate families, and the third predominantly children from Tongan families.
- **Culture:** One of the educational aims of the program was to support Tongan language and culture. As such, all voice-overs and text in the app are in Tongan, to help instill pride in Tongan language and to ensure the app was culturally appropriate. For the two Mission Schools, where some children were from expatriate families, it was determined in discussions with head teachers and class teachers that the use of Tongan language was appropriate to support Tongan language learning for these children for whom it was a second or third language.
- **Existing programs:** All but one pilot school was taking part in the *Mai e Nima* (Give Me Five) program, which encourages primary school students in Grades 5 and 6 to consume at least five servings of fruits and vegetables a day, and provides participating schools with garden beds and access to seedlings.

- **Gender:** All classes in the pilot were co-educational, providing a mix of boys and girls in the pilot.
- **Age:** The children in the pilot were aged 5-7 years old. They were in Grades 1 and 2.

One class was selected from each of the 11 participating schools to take part in the pilot program. This class was either a Grade 1 or Grade 2 class, or a composite Grade 1 and 2 class (i.e. the first two years of school in Tonga). Classes within schools were selected at the advice of the head teacher in each school. However, care was taken to ensure a close-to-even distribution of grade levels across the pilot schools.

Teacher participation was determined by the classes that were selected. Where classes had more than one teacher (e.g. a class teacher and an assistant class teacher) the most senior staff member was selected as the primary participant.

Parent participation in the OSI pilot was informal and entirely voluntary.

# **1.2 Evaluation Objectives**

This section sets the boundaries for the evaluation. It outlines the purpose and audience of the evaluation and lists the evaluation questions, which were developed with reference to the <u>DFAT</u> <u>Monitoring and Evaluation Standards (2017)</u>.<sup>4</sup>

The evaluation methodology and Theory of Change (ToC) (**Annex 1**) draws upon a developmental evaluation approach, which is appropriate for a pilot stage program where solutions are still being developed and defined.

# 1.2.1 Purpose and audience

This evaluation serves three main purposes, which have been derived from the information needs of the evaluation audience (**Table 1**).

# These are:

- 1. To understand the reach and outcomes (effectiveness) achieved through the pilot
- To understand what worked (and didn't) around using technological affordances (a play-based app on an iPad in Tongan early years classrooms) to support learning, using other methods, including both the content elements (i.e. print-based materials) and the logistical side of delivery
- 3. To understand what has been learnt about doing innovation in the Pacific

<sup>&</sup>lt;sup>4</sup> DFAT Monitoring and Evaluation Standards (2017) <u>https://dfat.gov.au/about-us/publications/Documents/monitoring-evaluation-standards.pdf</u>

### Table 1: Evaluation audience

Audience	Information needs
DFAT (donor) and SecondMuse	• <b>Effectiveness:</b> Has the pilot achieved the reach and outcomes it set out to achieve? Were there any unintended outcomes?
	• <b>Appropriateness:</b> Was the pilot delivered well and relevant to the context, including teachers having the required capabilities and capacity?
	• Learning: What has been learnt about doing innovation in the Pacific? What could be scalable and replicable in other contexts (particularly within Tonga but also in other areas of the Pacific)?
Tongan Ministries of Education and Health	• Effectiveness: Has the pilot achieved the reach and outcomes it set out to achieve?
	• Appropriateness: Does the pilot 'look, sound and feel' Tongan? Was the program embraced by teachers and students?
Millipede (as for DFAT +)	• Learning: What has been learnt about Millipede processes and assumptions that can be transferred to other contexts?



### 1.2.2 Evaluation questions

Evaluation planning, data collection and analysis were guided by a set of Key Evaluation Questions (KEQs) and sub-evaluation questions (see below). These questions frame the inquiry for this evaluation and are also used to structure the report. There are four KEQs, which have been drawn from the information needs of the evaluation audience (**Table 1**).

### These are:

### **1.** Effectiveness (children)

### How has the pilot influenced children's attitudes around food choices?

- a. Who were the children reached in the pilot?
- b. To what extent can children identify some healthy (good) and unhealthy (bad) foods?
- c. To what extent do children understand there is a relationship between healthy food and wellbeing?
- d. To what extent are children aware of the availability of healthy food in the local environment?
- e. Were there any unexpected outcomes for children and/or did the outcomes vary for different groups (males, females, etc)?

### 2. Effectiveness (teachers)

### How has the pilot influenced teacher attitudes around using play-based apps for learning?

- a. Who were the teachers reached in the pilot?
- b. To what extent do teachers value the use of play-based apps for learning?
- c. To what extent have teachers supported children's understanding of the relationship between healthy food and wellbeing?
- d. Were there any unexpected outcomes for teachers and/or did the outcomes vary for different groups (males, females, etc)?

### 3. Appropriateness

### How well has the pilot program been designed and delivered for the Tongan school context?

- a. To what extent were the principles (**Annex 1**) applied across program design and delivery?
- b. To what extent did teachers have the capacity (time and resources e.g. enough iPads) and capabilities (knowledge, understanding and skills) to participate in the pilot?
- c. To what extent was learning through play using technological affordances supported by other methods important for engaging students?

### 4. Learning

### What is being learnt about doing innovation around health in the Pacific?

- a. What have we learnt about doing technology innovation in Tonga? What could be improved for participating children and teachers, and/or what could be scaled up?
- b. What have we learnt about doing innovation that can be transferred to other contexts?

# **SECTION 2: METHODOLOGY**

### 2.1 Overview

The evaluation has been conducted internally by the Millipede/SecondMuse team who also developed the pilot program and delivered its materials to teachers. This approach was taken due to the delivery team's emphasis on learning and adaptation throughout the course of pilot implementation.

This process has been supported by both an external M&E consultancy and independent reviewers to mitigate the potential for bias (see section **2.5: Limitations of the evaluation**). The evaluation process included a combination of data collection activities, and analysis and synthesis of results.

Data collection was conducted by the Millipede/SecondMuse team during five separate field visits to Tonga throughout the discovery, design, development and implementation stages of the pilot program. The OSI in-country coordinator also supported the collection of evaluation data during and between these field visits.

- 1. Initial discovery field visit June 2017
- 2. Secondary discovery field visit August 2017
- 3. Stakeholder engagement field visit November 2017
- 4. Pre-pilot field visit late April/early May 2018
- 5. Post-pilot field visit June 2018

The analysis and synthesis of the evaluation findings was conducted in August and September 2018.

### 2.2 Privacy, accessibility and ethics

All data collection tools have been set up in line with the Australasian Evaluation Society Code of Conduct and comply with the <u>DFAT Child Protection Policy (2017)</u><sup>5</sup>. During the pilot, all evaluators working with children had valid working with children checks and understood their responsibilities around mandatory reporting. All evaluation participants were given the opportunity to provide informed consent, including informed guardian consent for the photography and videography of children (**Annex 9**), and knowledge that their participation in evaluation activities was voluntary.

Although participant names were recorded as part of the data collection process, participant anonymity is retained throughout the findings of this report. Ethical reflexivity was built into the evaluation plan through the choice of methods that give power to the interviewees, including the Most Significant Change technique.

<sup>&</sup>lt;sup>5</sup> DFAT Child Protection Policy (2017)

https://dfat.gov.au/about-us/publications/Pages/child-protection-policy.aspx

### 2.3 Data collection activities

### 2.3.1 Reach, activity and output tracking

**Purpose:** To understand who participated, in what activities and where in the pilot period (where possible including disaggregation for gender).

Source/s: Pilot activity, output and reach records.

**Method:** School names, teacher lists and classroom breakdowns were gathered from written MoET records where possible, and supplemented by observations and note taking during each school visit, as well as by data gathered via student surveys (see section **2.3.2 Pre- and post-pilot surveys**).

### 2.3.2 Pre- and post-pilot surveys

**Purpose:** To understand knowledge, awareness and attitudinal shifts in pilot participants around healthy eating (pre-pilot surveys were conducted to establish a baseline).

Source/s: Children and teachers.

**Method:** Teachers and students were asked to complete a pre-pilot survey by the Millipede/SecondMuse team before the pilot began and a post-pilot survey (**Annex 10** and **Annex 11**) during the first week after the pilot had concluded.

Students completed identical surveys at pre- and post-pilot stages to enable a comparison of their responses that would indicate evidence of any changes. A total sample of 285 students took part in the OSI pilot. Of these 285 students, 137 (48%) pre- and post-pilot student survey forms were matched (i.e. identified as belonging to the same student) (see section **2.4: Data analysis**). The survey data referenced in **Section 3: Findings** refers to the data from these 137 'matched' surveys; however, the total number of surveys considered as 'valid' differed for each question, as some children did not complete all questions or complete questions in a legible format.

Given the young age of the student cohort, children were supported in completing the surveys to the extent that an adult read the question out loud and students then completed the question by circling an answer, drawing a picture to indicate their answer, or verbalising their response so that an adult could then record it.

Learning designers from Millipede, SecondMuse team members, a representative from the Tongan MoET, a representative from the Ministry of Health, and the classroom teacher were available to support students or provide translations. During the post-pilot visits, two nurses from the Ministry of Health's Health Promotion Unit also assisted during the children's survey completion sessions. Non-Millipede and SecondMuse staff were briefed to ensure they understood that students should provide their own answers and they should not receive coaching about the correct answers. Unlike the student surveys, the pre- and post-pilot teacher surveys were not identical in terms of questions. While some questions were common to both surveys, the post-trial survey included additional questions around the teacher's experience of the resources, which could only be asked at the end of the pilot. A total of 10 pre- and post-pilot survey forms were matched (i.e. identified as belonging to the same teacher) (see section **2.4: Data analysis**). The survey data referenced in section **3: Findings** refers to the data from these 10 'matched' surveys.

Teachers completed both survey forms individually while a member of the Millipede/SecondMuse team was nearby to answer any queries. The pre-pilot surveys were completed at school; whereas most teachers completed the post-pilot survey forms at the end-of-pilot teacher workshop.

### 2.3.3 Observation and consultation

**Purpose:** To understand participant attitudes towards and experiences of the pilot, and to identify concerns and/or specific areas of interest.

Source/s: Children and teachers.

**Method:** For both the pre- and post-pilot visits, after the student surveys were completed, informal workshops were conducted with small groups of two to six children. The post-pilot workshops were conducted during the first week after the pilot had concluded. During this time, a Millipede learning designer joined the children while they used the app to observe their interactions with it. At some schools, if time was available, workshops were also conducted with children playing the board game and using the flashcards so that their interactions could be observed.

Similarly, a general induction training session to the program was conducted with each teacher during the pilot launch visit, following the completion of the pre-pilot survey. These sessions focused on introducing teachers to the OSI resources, especially the app.

At the end-of-pilot visit, participating teachers were invited to attend a two-hour workshop, which was led by Millipede's Senior Learning Designer and supported by the SecondMuse team. This took place during the first week after the pilot had concluded. Seven of the 11 pilot teachers attended the workshop, along with representatives from the Australian High Commission, the Tongan MoET, and Tonga Health. After an initial welcome and individual completion of the post-pilot surveys, teachers broke into two groups to discuss focus questions, which were provided by Millipede.

# 2.3.4 Qualitative interviews

**Purpose:** To understand in-depth participant experiences of the pilot, including capturing unexpected outcomes.

Source/s: Teachers and parents.

**Method:** Following the completion of the pilot, interviews were conducted with two teachers and three parents of children who had interacted with the OSI resources. These took place during the first week after the pilot had concluded. Using the Most Significant Change Technique, a member of the SecondMuse team asked the interviewee a series of questions about their role in the program and any changes that they could identify in themselves or the students since the pilot began. In most instances the interviewees responded in English, however, on two occasions the interviewee answered in Tongan and a member of the Ministry of Health's Health Promotion Unit provided translations.

### 2.3.5 Structured reflection

Purpose: To systematically capture learnings or instances of impact.

Source/s: Pilot delivery staff (Millipede/SecondMuse).

**Method:** During the pre-pilot and post-pilot field visits, members of the Millipede/SecondMuse team completed an After Action Review (**Annex 12**) at the end of each day to document their observations and experiences in a series of consistent questions.

# 2.3.6 App data collection points

**Purpose:** To track children's use and preferences within the OSI app.

Source/s: Children using the app.

**Method:** The OSI app was built to track specific data points to provide information about children's use of it. This captured event data was stored on each school's device against an anonymous device ID. At the end of the pilot, when a network connection was available, it was compressed for transfer to a central server.

The data points enabled Millipede to provide general statistics on session frequency and duration, as well as the relative frequency and success of different player actions within the game. This data is available for each pilot device, but not per user (see section **2.5: Limitations of the evaluation**).

Data points captured have allowed analysis of the following, for example:

- Key screens: amount of time spent & frequency of visits to key screens
- Recipes: which recipes were most popular and percentage of recipes completed once started
- Food items: which items in the sea and garden were most frequently collected
- Frequency of use: how often per week the app was used throughout the pilot period

### 2.4 Data analysis

As discussed above, the following data was collected: participant records, pre- and post-pilot surveys, observations of student and teacher workshops, qualitative interviews with parents and teachers, structured reflections, and app data points. This section outlines the methods that were used to analyse this data.

### 2.4.1 Participant records

Teacher names and a breakdown of the demographics of each class were tracked in program spreadsheets and compared over time to identify any inconsistencies between student numbers or changes in teaching staff.

### 2.4.2 Pre- and post-pilot surveys

The student and teacher surveys were reviewed and the responses to each question were entered into a spreadsheet for analysis. The names of participants on the post-pilot surveys were 'matched' to the corresponding names of the participants on the pre-pilot surveys, as only these matched surveys could be analysed for changes over time.

Each question in the matched student surveys was then evaluated to see if results could be used. If the student had not provided an answer, or had provided a drawing that was not clearly identifiable, then their result for that question was unable to be compared. If a drawing was clearly identifiable, or a legible written answer or annotation was provided by the student and able to be translated, or a transcribed answer or annotation was provided by the teacher on behalf of the student, then a comparison was made for that question, for that student. This method means that the number of 'valid' student results varies with each survey question, ranging from 52 to 135.

From the comparable results, the percentage of correct or desirable answers in both the pre-pilot survey and post-pilot survey was calculated. This was used to measure student improvement. There were a very small number of students (<7 on any one question) who gave a correct or desirable answer in the pre-pilot survey and an incorrect or undesirable answer in the post-pilot survey. Since these numbers were small, this was not considered representative of the pilot's impact.

Each question in the matched teacher survey that was able to be compared was analysed, and the indicated percentage of positive change was recorded. Positive change was indicated in teachers' qualitative responses regarding self-reported use of the different resources supplied. For example, if a teacher reported an increased confidence in using the play-based app as a tool for learning, this was considered to be positive. Observations regarding areas of demonstrated student improvement were also recorded, and key quotes were identified and highlighted.

### 2.4.3 Observations of workshops, qualitative interviews and structured reflections

Notes were taken during the formal and informal workshops with students and teachers. All qualitative interviews were recorded on video with a digital audio recording that was then transcribed and translated into English (where needed). Notes from the delivery team's structured reflections were recorded and entered into a template document (**Annex 12**). The data from these three sources was then entered into a central database. The data was then analysed for key themes and patterns and, where relevant, significant convergence and divergence of findings was noted.

### 2.4.4 App data

The app data was compressed for transfer to a central server against the anonymous ID of each school's device at the end of the pilot. The app data for each participating school were logged in program spreadsheets, and analysed for comparisons of total usage, and frequency of use.

### 2.5 Limitations of the evaluation

Evaluations performed by teams who are based outside of the location where a pilot takes place can be challenging, as the evaluators are working within different environmental and cultural contexts, often in a language other than their own. Evaluators also need to adapt to changes as they happen, as the timing constraints of their visits limit opportunities for rescheduling. These challenges were acknowledged early on and mitigated through prior trips to the region, involving cultural advisors and extensive planning, however, the limitations of the evaluation process have been noted below.

#### Student attendance

Inconsistencies in student attendance from the time the pilot began to the time the pilot concluded, impacted on the number of pre- and post-pilot student surveys that could be matched for comparison. That is, not all children who took part in the trial completed a pre- and post-pilot survey. This was due to teachers being away sick so classes had to be combined and children being away from school for various reasons, including heavy rainfall preventing students from travelling. One pilot school had suffered extensive damage during Cyclone Gita (February, 2018), which impacted their staffing, classroom availability and overall student attendance.

#### **Teacher changes**

Changes in teacher staffing affected the ability of evaluators to gather comparable teacher data at the beginning and end of the pilot. Out of the 11 pilot schools, the classroom teacher at two of the schools changed between the pilot launch week and end-of-pilot week. These two staffing changes meant that the teachers had moved to another school and were no longer engaged with the program, so they could not complete the post-pilot survey (see section **2.3.2 Pre- and post-pilot surveys**). While efforts were made to engage with the new teachers during the pilot period (by the OSI in-country coordinator) and at the end of the pilot (by the Millipede/SecondMuse team), the change may have affected the experience of the pilot in these two schools. Similarly, it is not known if the initial teachers provided an OSI handover briefing and, if they did, the quality of the handover is unknown.

# General availability

Unforeseen circumstances, both personal and environmental, impacted the ability of teachers and parents to participate in formal interviews at the end of the pilot. For example, one teacher who was scheduled to be interviewed had gone into labour a few days before so could not attend. Although interviews were conducted with parents and teachers, interviewee selection was based on availability rather than suitability.

### Influence of existing programs

It is important to acknowledge that OSI is one of a number of health and nutrition programs that are being or have been run in primary schools in Tonga. Pilot participants may have been exposed, either directly or indirectly, to other programs such as <u>Mai e Nima</u>, <u>NRL Wellbeing Program</u> and <u>Malimali</u>, which may have broadly influenced their understanding of health and wellbeing. <u>Mai e Nima</u> was running in 10 out of the 11 pilot schools but targeted Grades 5 and 6 so did not directly affect the curriculum of the participating pilot students. External variables such as community health events or national media health campaigns may also have had effects on participants' understanding of health and wellbeing.

### App data collection

An absence of reliable internet connection in Tongan schools, combined with the need to share one tablet device among multiple students, meant that the app did not include a function that required users to log in or identify themselves as a player. Instead, a 'pick-up and play' design approach was intentionally implemented. In addition, an anonymous device ID was assigned to each school's iPad to ensure privacy surrounding data collection. This therefore precluded some forms of individual data tracking and profiling over time.

### Delivery team as evaluators

As the team conducting this evaluation is the same team who delivered the pilot (Millipede/SecondMuse), there is a risk of both participant and evaluator bias. Participants may have been aware that, to some degree, the people conducting interviews, holding workshops and distributing surveys, were also the same people who determined their participation in the program. This may have led to participants answering questions in a way they believed the evaluation team wanted to hear. Evaluator bias must also be noted. There is a risk of evaluators favouring pilot findings in an attempt to extrapolate success during the data collection, analysis and reporting process. While the evaluation team obviously want to see the pilot succeed, they were also interested in genuinely learning from the process, which underpinned a commitment to a fair and transparent evaluation.

The evaluation team have aimed to mitigate these risks by:

- Engaging an external M&E consultancy during the Framework planning stage; Clear Horizon Consultancy
- Using multiple forms of data to verify and triangulate findings
- Performing external/independent reviews

Internal evaluation does have benefits in regards to a pilot stage program. An internal evaluation approach was taken due to its appropriateness for learning and reflection - important for a pilot program where solutions are still being developed and defined; i.e. internal evaluators understand elements of the pilot that an external evaluator may not.

# **SECTION 3: NOTABLE OUTCOMES**

The evaluation has identified seven notable outcomes of the OSI pilot, which are supported by evidence outlined in section **4: Findings**. These outcomes are described below.

1. There was a measurable improvement in students' knowledge about healthy and unhealthy foods after engaging with the OSI materials

Comparisons of pre- and post-pilot data showed that an increased number of students were able to correctly identify and draw healthy foods by the end of the pilot. This suggests that the play-based approaches used in the OSI pilot are an effective method of supporting students' learning. This is especially significant given that these improvements were achieved after only six weeks of participating in the OSI pilot.

2. Students had begun to connect their digital play interactions with their off-screen world

Students in the majority of pilot schools had begun to demonstrate an increased interest in healthy food and healthy eating at school and in their homes. This is an example of students transferring their experiences and learnings from the OSI app and connecting them to other parts of their lives. This is significant because it shows how a play-based approach can support children's learning, both in and out of the classroom.

# 3. Students remained engaged with the app throughout the pilot

Students across all pilot schools were as excited to use the app at the end of the pilot as they were at the beginning. In some cases, levels of engagement appeared higher at the end of the pilot. This demonstrates that the OSI play-based app maintained student engagement over a six-week period, and suggests engagement would likely continue into the future.

### 4. Teachers welcomed the iPads in their classroom and enjoyed using them

Teachers across the majority of pilot schools embraced the iPad and the OSI app to the point that all but one teacher requested more iPads in the classroom at the end of the pilot. This demonstrates that new technologies can have a place in the Tongan education system, as the teachers within that system have a desire to use them as part of their teaching.

# 5. Some teachers adopted a teacher-led approach when using the OSI materials with their class

Some participating teachers were observed using the OSI materials in a teacher-led way, e.g. holding the iPad in front of the class. Likewise, some used the materials, especially the app, as disciplinary tools, rather than tools for open-ended exploration and collaboration. This suggests that a theoretical shift may be required before some teachers are able to engage fully in the aims of a pilot program of this kind.

### 6. Use of the OSI materials varied significantly across schools

The usage rates of the OSI play-based app across schools ranged from 184 sessions to just two sessions over the six-week period. A number of factors that may have contributed to these differences in usage have been identified. They highlight the need to address time and resourcing constraints faced by some schools.

# 7. The pilot and suite of resources were, on the whole, culturally appropriate, engaging, and accessible

Feedback received on the OSI pilot from participating teachers, parents of participating students and key pilot stakeholders indicate that the pilot resources were well received, with the exception of the board game. Feedback from some stakeholders indicated that the board game was too complicated to be used in this context, given the time available for teachers. The otherwise positive reception of the resources signifies the importance of stakeholder consultation and program iteration throughout the design the innovation pilots in the Pacific.

# **SECTION 4: FINDINGS**

The evaluation findings are discussed under five key headings. **Section 4.1** provides an overview of the participation of schools, students, teachers and parents in the program. **Section 4.2** reports on outcomes against the effectiveness of the pilot with children. **Section 4.3** reports on the effectiveness on the pilot with teachers. **Section 4.4** presents a summary of pilot appropriateness, and how well it was designed and delivered for the Tongan school context. **Section 4.4** addresses the key findings and lessons learned about doing innovation around health in the Pacific.

# **4.1 Participation**

There was a high rate of participation in the OSI pilot from each of the school, teacher and student samples. One class from each of the 11 schools participated for the six-week duration of the pilot, and all but three teachers implemented the program themselves from start to finish (with only two of these staffing changes affecting survey results). A total of 285 students took part in the OSI pilot. Given the difficulty in tracking student attendance across the six-week period, the rate of participation within the student sample group cannot be determined in greater detail.

### **School participation**

Eight Government Public Schools (GPS) and three Mission Schools participated in the OSI program. All schools are located on the island on Tongatapu. Three schools are located within the district of Kolomotu'a, two are located within the district of Tatakamotonga, two are located within the district of Lapaha, and the remaining four are located within the districts of Kolofoou, Kolomotu'a, Nukunuku, and Vani.

Of the individual classes that took part, four are Grade 1 classes, five are Grade 2 classes, and two are composite classes made up of Grades 1 and 2.

See Table 2 (**Annex 13**) for a breakdown of participating pilot schools.

# **Student participation**

A total sample of 285 students took part in the OSI pilot. Of these 285 students, 137 (48%) pre- and post-pilot student survey forms were matched (see sections **2.3.2 Pre- and post-pilot surveys** and **2.5:** Limitations of the evaluation).

Of the 137 students who completed both the pre- and post-pilot surveys, there is an almost even split in the number of male (50.5%) and female (49.5%) participants. The ages of these students range from 5-7 years.

See Table 3 (**Annex 13**) for a breakdown of participating students.

# **Teacher participation**

Over the course of the pilot, a total of 19 teachers (including some head teachers) were briefed on the program. As a result of staffing changes mid-way through the pilot, a total of 14 class teachers participated in the delivery of the pilot across the 11 schools. Ten pre- and post-pilot teacher survey forms were matched as a result of these same staffing changes (see sections **2.3.2 Pre- and post-pilot surveys** and **2.5: Limitations of the evaluation**).

Of the 14 teachers who participated in the delivery of the pilot, 13 were female and one was male.

See Table 4 (**Annex 13**) for a breakdown of participating teachers.

### **Parent participation**

Parent participation was not a requirement of the OSI pilot, however, parents were observed interacting and engaging with the program and its materials at some participating schools. At one school, three parents attended the end-of-pilot session to support students with their class presentation to the Millipede/SecondMuse team. At another school, parents supported their children's end-of-pilot class presentation to the Millipede/SecondMuse team by providing fresh fruit for use in fruit-salad making at school.

# 4.2 Effectiveness (children)

The effectiveness of the pilot for children refers to the extent to which the OSI activities and resources were able to support children's learning. Within the context of this pilot, this refers specifically to learning around the topics of healthy eating and nutrition. The findings in this section relate to the key evaluation question (KEQ): *How has the pilot influenced children's attitudes around food choices?* 

In summary, evidence shows that participation in the OSI pilot helped students to become better at identifying healthy and unhealthy foods, which increased their awareness of the healthy food options that exist around them. Some students were also beginning to make connections between healthy foods and their own wellbeing by showing a preference for healthy foods in school and at home. While this demonstrates an initial shift in attitudes towards healthy food choices, the degree to which students understand how healthy food affects their wellbeing is difficult to determine in a six-week pilot.

These findings have been informed by four sub-evaluation questions, which are explored in greater detail below.

# 4.2.1 To what extent can children identify some healthy (good) and unhealthy (bad) foods?

The evaluation found that students' ability to identify healthy and unhealthy foods improved significantly over the course of the six-week pilot period. Evidence of this improvement was found in the student and teacher survey responses, as well as in interviews with teachers and parents.

In the pre- and post-pilot student surveys, two questions provided relevant data. First, participants were asked to draw pictures of two healthy foods, and two unhealthy foods. By the end of the pilot, the number of participants who were able to correctly draw two healthy foods had increased to 93%, compared to 54% recorded in the pre-pilot survey (**Table 5**). Similarly, the number of participants who were able to correctly foods had increased to 98% compared to the pre-pilot result of 67% (**Table 5**).

### Table 5: Student Survey - Section 1

	Before pilot	After pilot
Draw two healthy foods*	54%	93%
Draw two unhealthy foods*	67%	98%

\* From a total of 56 'valid' student survey results

Watermelon, bananas and yams are foods that are all featured in the OSI resources. Results show that 28% of participants drew one or more of these OSI-featured foods in their post-pilot survey that they hadn't listed as a healthy food in their pre-pilot survey.



A student survey response providing examples of healthy and unhealthy foods meleni = melon, ika = fish, 'aisi kilimi = ice cream, lole = lolly
Second, in the same pre- and post-pilot student surveys, participants were presented with images of four foods and asked to circle the ones that they thought were healthy. Two of these foods were healthy (a banana and watermelon) and two were unhealthy (an ice-cream and a hamburger). Before the pilot, only 3% of participants were able to correctly identify both examples of healthy foods, while 81% of participants answered correctly after the pilot (**Table 6**). Initially, only one-third (33%) of participants identified watermelon as a healthy food, compared to 93% of participants who circled it correctly after the pilot had ended (**Table 6**).

#### Table 6: Student Survey - Section 2

	Before pilot	After pilot
Banana correctly identified as healthy*	61%	92%
Burger correctly identified as unhealthy*	44%	83%
Ice-cream correctly identified as unhealthy*	63%	96%
Watermelon correctly identified as healthy*	33%	93%
All food items correctly identified as healthy or unhealthy*	3%	81%

\* From a total of 135 'valid' student survey results



A student survey response identifying the correct foods as healthy

An improvement in students' ability to identify examples of healthy and unhealthy food was also observed by teachers and parents, with all teachers reporting in their post-pilot surveys that students' knowledge in this area had improved over the six-week period of the pilot. Furthermore, a number of teachers recounted that students were proactively calling out instances when they saw unhealthy food being served around them. Teachers described some of this new behaviour in the post-pilot surveys and in their interviews with the evaluators.

- *"There is a canteen at school some of my students came running to me and tell me that the canteen sell unhealthy food like ice blocks and lollies and other stuffs and my co workers look surprise to know my students learn a lots from your program."* 
  - Teacher (post-pilot survey)
- *"What I notice is some kids are telling me about other kids who eat unhealthy foods like sweets at school. I told them you don't have to eat noodles and sweets and those kids of unhealthy foods. It's so funny when you hear someone calling "teacher" and name the person he or she is eating sweets."* 
  - Teacher (interview)
- "Now, they [the students] don't each junk food anymore. Not only because it's the school policy, but it's our classroom policy. So whenever someone sees someone bringing junk food to class, directly they will come and report it to me. Then what I will do I will take it away and try to change it into something healthing. Having kids share. They like it that way. So whenever someone is bringing in an orange they will be shouting "oh wow, that is healthy." So the atmosphere is also changing because now they are sharing and also because they are all bringing food to class."
  - Teacher (interview)

Individual instances of students identifying healthy and unhealthy foods at home were also observed by the three parents who were interviewed.

- *"Yes, cutting, peeling. Cleaning. She started when she came back from school with this iPad thing. And that's when she started to identify some small things like healthy foods, especially the local ones."* 
  - Parent (interview)

It is important to note that the increase in students' ability to differentiate between healthy and unhealthy foods may not be solely due to the OSI pilot. Other contributing factors may have been involved. For example, some of these results may be the product of the standard primary curriculum taught in participating schools. However, this is unlikely since health and nutrition are not formal subjects in the Tongan primary curriculum for Grades 1 and 2 (these subjects are introduced at the Grade 7 level). There may also have been potential bias in teacher survey responses, as teachers may have felt it was best to respond positively to the questions. The six-week period over which these improvements were observed does suggest that the OSI pilot has been a significant contributing factor, as does the high-rate of improvement that was recorded. That participants were drawing foods from the OSI resources in their survey examples also suggests that this increase was a direct product of their participation in the pilot, and that the ideas and symbols within the pilot have resonated with them, at least in the short term. The pattern of students calling out unhealthy foods around them in at least three schools is also encouraging, as its demonstrates a willingness to engage with the ideas of the OSI pilot outside of a structured lesson environment – that is, it shows transfer of learning from one context to another.

Since only three parents were interviewed, it is not known if there were examples of students from all 11 schools who were identifying food categories at home or if that behaviour was limited to the individual families who were interviewed. Even so, the fact a small number of students had begun to identify healthy foods at home is a positive result, as it demonstrates the potential for students' learning at school to reach other areas of their lives.

Given the constraints of the six-week duration of the pilot, it is difficult to assess whether or not these changes will result in the broader, long-term goal of shifting children's preferences towards healthy food. However, it is clear that the OSI pilot has contributed to a measurable increase in student's ability to identify healthy and unhealthy foods.

# 4.2.2 To what extent do children understand there is a relationship between healthy food and wellbeing?

The relationship between healthy food and personal wellbeing is a higher-order, more abstract concept than whether a food is good or bad for you. Therefore, the impact of the pilot on children's understanding in this area was more difficult to determine, especially given the short-term nature of the six-week pilot. Even so, the evaluation did find evidence that students were beginning to make connections between healthy foods and their own wellbeing.

The student surveys included questions that asked children to identify their favourite food and food they didn't like. These questions were designed to probe children's attitudes to food and, indirectly, their understanding of the relationship between healthy food and wellbeing. In particular, the evaluators were keen to see if any changes occurred in students' pre- and post-pilot responses.

When asked to draw pictures of their favourite food 95% of participants answered the post-pilot survey by drawing a healthy food compared to 67% in the pre-pilot survey (**Table 7**). When asked to draw a food they didn't like 86% of participants answered by drawing an unhealthy food in the post-pilot survey compared to 59% in the pre-pilot survey (**Table 7**). Furthermore, in the post-pilot surveys, some students were able to substantiate their choice with comments such as 'I like it because it's healthy' compared to pre-pilot answers such as 'I like it because it's yummy'.

### Table 7: Student Survey - Section 1

	Before pilot	After pilot
Draw your favourite food*	67% (healthy food)	95% (healthy food)
Draw a food you don't like**	59% (unhealthy food)	86% (unhealthy food)

\* From a total of 56 'valid' student survey results

\*\* From a total of 52 'valid' student survey results

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A student survey response providing examples of their favourite foods ufi = yam, talo = taro

An increase in students' understanding was also observed by teachers, with nine out of 11 teachers noting in their post-pilot surveys that students demonstrated an increased understanding of the relationship between wellbeing and healthy food choices over the six-week pilot period. In the post-pilot surveys, interviews and the end-of-pilot teacher workshop, teachers reported that in addition to students proactively calling out instances when they saw unhealthy food being served (see section **4.2.1** for examples), they had also begun to bring healthier food to school for their lunch, and were expressing a strong interest in growing and cooking healthy foods at school.

- "At first my students came with unhealthy food like lollies and bongo biscuits for lunch but when they learn about healthy foods some came with healthy food for lunch like fried fish with yam and lettuce."
  - Teacher (end-of-pilot workshop)
- *"Yes, my students want me to do a food growing and cooking"* Teacher (end-of-pilot workshop)
- *"My students want me to do a food growing and cooking and let my students into grouping for competition and up to cooking as it was on the iPad"* 
  - Teacher (post-pilot survey)

- *"They can demonstrate cooking and they can choose the food to provide it."* Teacher (post-pilot survey)
- *"They are enjoying to participate in cooking or food growing activities its make their understanding easier and also the picture is colourful to them. Also they [now] know well the healthy food and unhealthy food to eat at home or any place."*

- Teacher (post-pilot survey)

Similarly, parents observed in their interviews how their children's food choices at home had changed since they began participating in the OSI pilot.

- "Junk food is one of the Tongan's favourites. But since the beginning of the program it's different now. They make their own attachment. (Impersonating his daughter) 'Healthy good, yup."
  - Parent (interview)
- "Perhaps when the program was introduced, I noticed some changes in [my child's] life. As you may see, this little boy is quite big and his favourite foods are from the shops. But since the program started, I have seen some big changes, like with drinks which he usually likes to drink SAP (flavoured milk). [He] now drinks water and as for lollies, he still eats lollies but much less now. He usually repeats at home that lollies and biscuits are foods that are not healthy for him. So I try as well to help [him] by reminding him about Motu Ta'e'iloa and that food from the shops are not good for it."
  - Parent (interview)
- *"He also eats less biscuits and such because of his toothaches and so he tells me not to give him anymore biscuits because that is the cause of his toothache. So the program is very important to [him]. He understands that a big part of life depends on the kinds of food that he consumes."* 
  - Parent (interview)

The increased preference for healthier foods indicated in the student surveys offers strong evidence that, after participating in the OSI pilot, students have a greater understanding that healthy food is good. What is more difficult to determine, is the extent to which they understand that healthy food is good *for them.* It is possible that students answered that their favourite foods are healthy because they know that this answer is 'correct', or simply because they like the taste, rather than because of a more sophisticated understanding of the benefits that these foods bring to their bodies and overall wellbeing. While it is difficult to assess the intent behind these answers, the fact that there was a trend towards healthier foods does show that the participants understood enough about what is healthy by the end of the pilot to generate a measurable change in the results.

The attitudinal shifts towards healthier foods observed in the participants' school and home lives offer evidence that students recognise the links between the food that they eat and their wellbeing, albeit to varying degrees. For example, a student deciding to eat fewer sweet biscuits because they are harmful for his teeth demonstrates a clear understanding of cause and effect, while a student's desire to cook healthy food at school may demonstrate a more indirect association between healthy food activities and learning in a fun way in the classroom. As these are observations from a small number of parents and teachers in the pilot population, the extent to which this understanding exists across the whole student sample is unknown.

Although these results are significant for such a short pilot, a more detailed evaluation held over a longer period would be needed to determine if these initial attitudinal shifts are sustained and continue to deepen over time.

### 4.2.3 To what extent are children aware of the availability of healthy food in the local environment?

Overall, the evaluation found that students were more aware of the healthy food available to them in their local environment after taking part in the OSI pilot. Evidence of this improvement was found in the student and teacher survey responses, in interviews with teachers and parents, and is supported by the reflections of the Millipede/SecondMuse delivery team.

In their post-pilot survey responses, all 11 teachers noted that students had demonstrated an increased awareness of the healthy foods around them. A common observation in post-pilot surveys, interviews, and the end-of-pilot teacher workshop was that students were displaying an interest at school in growing, gathering and cooking healthy foods.

- *"We were able to plant papaya seeds and watered the patch every day. They also asked to do salati fua'i 'akau (fruit salad) and were willing to gather the fruits from their homes."* 
  - Teacher (post-pilot survey)
- *"There is a special interest that children individually shown. There behavior's improved, their cooking skills improved and they are now confident to explain what healthy food they can get from home to eat."* 
  - Teacher (post-pilot survey)
- "My students want me to do a food growing and cooking"
  - Teacher (post-pilot survey)
- *"They can demonstrate cooking and they can choose the food to provide it."* Teacher (post-pilot survey)
- "They are enjoying to participate in cooking or food growing activities its make their understanding easier and also the picture is colourful to them. Also they know well the healthy food and unhealthy food to eat at home or any place."
   Teacher (post-pilot survey)

For some participants, this interest extended to cooking in the home, as observed by parents in their interviews with the evaluators.

- *"She often comes and talks about the food she needs to eat and not to eat food from the shops."* 
  - Parent (interview)
- *"She says that it is very delicious and to always buy vegetables as she likes to have it with some meat as well as liking fruits. She always requests to buy vegetables to eat, whether in our cooking or to eat it raw, she really likes to eat vegetables and fruits."* 
  - Parent (interview)
- *"They...really enjoys this program and it makes her happy. At times she tells me that they are cooking at school. They are collecting watermelons and she really likes it."* 
  - Parent (interview)

It should be acknowledged that efforts by other programs, such as *Mai e Nima*, to increase the availability of healthy foods on school grounds may have helped to create a foundational awareness among both teachers and students, upon which the OSI pilot could build. Similarly, the OSI pilot appears to have also benefited the *Mai e Nima* program by reminding teachers of the messages within it, and providing new ideas and opportunities for using the garden beds in the schools. In their interview with the evaluators, one teacher described how they intend to use the ingredients for cooking at school.

- *"The Mai e Nima they get us some seeds and then I plant it and at harvest time we share it with the kids and the other staff. I look forward to some this year."* 
  - Teacher (interview)

While the *Mai e Nima* program helped to increase the awareness and availability of healthy foods, the OSI pilot helped to inspire a fun, practical way for students to learn about those foods in the classroom. Although an isolated example, this demonstrates the potential for existing programs and the OSI pilot to compliment one another for the benefit of the students.

That students were not only identifying healthy foods around them, but were actively requesting to grow and cook with these foods demonstrates both an awareness of, and an enthusiasm for, locally available healthy foods. The fact that students were requesting to cook the dishes featured in the OSI resources suggests that this awareness and enthusiasm was generated from, or as least supported by, their experiences participating in the pilot. The degree to which this enthusiasm will extend to a long-term shift in behaviour is difficult to assess in a six-week pilot. Even so, these moves by some students to want to grow, prepare and consume healthy food at school and at home are an encouraging start.

# 4.2.4 Were there any unexpected outcomes for children and/or did the outcomes vary for different groups (males, females etc)?

Analysis of the pre- and post-pilot survey data shows no evidence to suggest that one gender outperformed the other in either correct versus incorrect answers, or in the degree of improvement shown over the six-week pilot. For example, 57 female participants showed improvement when answering the question around circling healthy foods, while 49 male participants showed improvement answering the same question. This was the largest gender margin identified for any of the survey results and is not significant enough to draw any conclusions.

While it was anticipated that participants would begin to take their learnings from the OSI pilot and apply them to contexts outside of the classroom, the degree to which this occurred during the short six-week period was unexpected.

In their structured reflections, the Millipede/SecondMuse pilot delivery team describe a particularly overt display of enthusiasm from one of the students.

- *"In one school, where children were making and then eating fruit salad as a hands-on cooking activity, one child spoke to a Millipede team member in Tongan. One of the nearby parents translated for the team member, explaining that the child said:* 'Yum! I'm going to make this at home!'"
  - Pilot delivery team (structured reflection)

In one interview, a parent recounted his own experience of the impact the OSI pilot had on how his daughter relates to food at home.

"Whenever she came across junk food, like lollies, noodles, she always said

 'is this one of the Motu Ta'e'iloa'. I say 'no' and she is 'oh!'. It's good for
 me, good for her. She said, 'This is not the Motu Ta'e'iloa thing.' So she
 went and put the lollies in the refrigerator."

 Parent (interview)

As the evaluation has only limited access to information regarding participants' behaviour outside of the classroom, these examples may only be representative of a small number of the students who participated in the pilot. Even so, the themes and elements of the OSI resources were clearly enjoyable and memorable enough for these particular students to engage with them, organically and unprompted, outside of the classroom.

#### 4.3 Effectiveness (teachers)

The effectiveness of the pilot for teachers refers to the extent in which the OSI app was used by teachers to support their teaching practice. Within the context of the pilot, this refers to teachers valuing the use of play-based apps for learning - specifically as a tool to help teachers support children's understanding of the relationship between healthy food and wellbeing. Programs that use play-based apps for learning had never previously been implemented in the pilot schools. Therefore, the OSI pilot was the first time that participating teachers had used technology in the classroom in this way. The findings in this section relate to the key evaluation question (KEQ): *How has the pilot influenced teacher attitudes around using play-based apps for learning?* 

In summary, participation in the OSI pilot helped to increase the majority of teachers' appreciation of the affordances of play-based apps for learning, as they were able to see the positive impact of the OSI app on their students' learning and, in some cases, also on their own. The shift extended to an increased number of teachers appreciating the value of offscreen play and games in the classroom. This was especially significant in around one-third of participating teachers, as demonstrated by their willingness to create their own offscreen play-based health activities for use in the classroom.

These findings have been informed by three sub-evaluation questions, which are explored in greater detail below.

### 4.3.1 To what extent do teachers value the use of play-based apps for learning?

The evaluation found evidence that, by the end of the pilot, the majority of participating teachers valued the use of play-based apps for learning. This included most teachers reporting an increased confidence in the use of both the iPad and the app as digital tools, and an expansion of their teaching practices in the classroom to include more play-based, child-led activities. Evidence of this was found in the teacher survey responses, teacher interviews, and observations made in the classrooms and at the teacher workshop.

Two questions in the pre- and post-pilot surveys were designed to track any changes in teachers' attitudes towards iPads and play-based apps for learning. First, in both the pre- and post-pilot teacher surveys, participants were asked to rate their level of confidence using an iPad as a teaching tool with young students as either 'not confident,' confident' or 'very confident'. Every teacher who did not consider themselves 'very confident' with the iPad in the pre-pilot survey reported a higher level of confidence in their post-pilot responses. Furthermore, by the end of the pilot, eight out of 10 surveyed teachers felt 'Very confident' using an iPad as a teaching tool, compared to only four teachers at the pre-pilot stage (Table 8).

# Table 8: Teacher Survey - Section 2Confidence in ability to use an <u>iPad</u> as a teaching tool with young students

How confident are you in your ability to use an iPad as a teaching tool with young students?	Not confident I would like some guidance	Confident	Very confident
Teacher 1			Before and after pilot
Teacher 2		Before pilot	After pilot
Teacher 3	Before pilot	After pilot	
Teacher 4			Before and after pilot
Teacher 5	Before pilot	After pilot	
Teacher 6	Before pilot		After pilot
Teacher 7			Before and after pilot
Teacher 8			Before and after pilot
Teacher 9	Before pilot		After pilot
Teacher 10		Before pilot	After pilot

Teachers commented on their increased confidence using an iPad during their interviews and at the end-of-pilot teacher workshop.

"I think I am comfortable using the iPad, so whatever function at school, I can take it."
 Had you used an iPad before this program?
 "No"

- Teacher (interview)

Second, in the pre- and post-pilot teacher surveys, participants were also asked to rate their level of confidence using a play-based app (as distinct from an iPad) as a teaching tool with young students as either 'not confident', 'confident' or 'very confident'. Before the pilot began, three of the 10 surveyed participants reported being 'very confident', two reported being 'confident' and five reported being 'not confident'. By the end of the pilot, one participant reported being 'confident' when they had been 'not confident' previously, and seven participants reported being 'very confident'.

Only one participant remained 'not confident' in their use of the play-based app as a teaching tool by the end of the pilot, and three participants reported as progressing from 'not confident' to 'very confident' over the pilot period (**Table 9**).

### Table 9: Teacher Survey - Section 2Confidence in ability to use a play-based app as a teaching tool with young students

How confident are you in your ability to use a play-based app as a teaching tool with young students?	Not confident I would like some guidance	Confident	Very confident
Teacher 1			Before and after pilot
Teacher 2		Before pilot	After pilot
Teacher 3	Before pilot		After pilot
Teacher 4			Before and after pilot
Teacher 5	Before and after pilot		
Teacher 6	Before pilot		After pilot
Teacher 7			Before and after pilot
Teacher 8		Before and after pilot	
Teacher 9	Before pilot		After pilot
Teacher 10	Before pilot	After pilot	

Informal conversations held at the end-of-pilot workshop also revealed how the teachers were learning alongside, and even from, the students in terms of using the OSI app and the iPad. These same teachers also reported that, through observing the students' highly engaged use of the app and their engagement with the content, they could see the benefits of a more child-directed, play-based approach to support learning, rather than a purely teacher-led approach.



Teachers playing with the OSI app

Data was also collected about teachers' pre- and post-pilot attitudes to using play and games to support their teaching. Before the OSI pilot, participants were using play-based approaches to support their teaching to varying degrees. For example, only three of the 10 surveyed teachers reported that they often used games as part of their usual teaching practice. However, most teachers reported that they used a variety of methods to support their teaching in the area of health and nutrition, with four of the 10 participants including drawing, poster creation and song compositions among the methods used. One participant had involved students in cooking simple dishes (the exact dishes were not specified in the survey form), while two reported discussing the food pyramid and balanced diets with students. One participant referenced planting vegetables as part of the *Mai e Nima* program.

When specifically asked about the benefits of using games and play to support young children's learning, half of the participants felt that young children are more focused with a play-based approach. Furthermore, all participants in the pre-pilot survey group gave a positive response to the described OSI play-based learning approach, with one teacher noting:

# • *"I think this will make the children more focus and willing to learn because most of them like playing games outside and also inside the classroom too."*

- Teacher (pre-pilot survey)

By the end of the OSI pilot, an increased number of teachers agreed there were benefits in using play and games to support young children's learning, with nine of the 10 participants in the post-pilot surveys reporting such benefits. Teachers also specifically referenced the benefits of the multimodal approach to the learning design within the app. For example, in the post-pilot surveys, three teachers made specific mention of the benefits of students learning through a variety of communication modes within the app such as voice-overs, verbal prompts, music, song, gesture and visuals. All teachers at the end-of-pilot workshop agreed that the interactive nature of the app supported students' learning about healthy foods by drawing on multiple senses and providing an environment where children work collaboratively. This point was reaffirmed in the post-pilot survey and in interviews.

- *"I think the app is the best...because they are able to do and see and also feel. They are using all, how many senses that they are using within the app. But with the activities of course they do like doing the drawing and colouring and cutting that is also helpful."* 
  - Teacher (interview)
- *"[There is ] Much improvement of their learning through speaking, spelling and writing too."*

- Teacher (post-pilot survey)

- *"Their behaviour improved, their cooking skills improved and they are now more confident to explain what healthy food they can get from home to eat."* 
  - Teacher (post-pilot survey)

The quantity of data collected from the different device data downloads reveals that some participating schools had used the app significantly more than others. The school with the highest use rate recorded 184 sessions over the six-week pilot period, while the school with the lowest use rate recorded only two sessions during that time. In terms of frequency, eight of the 11 schools used the app at least once a week for six weeks during the pilot period. In the school with the most frequent use, the app was used on average 32 times a week. On average, across all devices, the app was used six times per week for an average of 30 minutes per session (Table 10 - **Annex 13**). Despite this variation in use, all but one of the 10 participating teachers requested more iPads for each class if the OSI pilot was expanded.

The game and play-based activities that were described in the pre-pilot survey responses indicate that most teachers were at least aware of play-based learning approaches prior to the OSI pilot, even if they did not identify them using those terms. However, almost all teachers self-reported an increase in their appreciation of play- and game-based activities for learning over the six-week period, suggesting that, overall, the pilot has helped them to value these learning approaches more than before. That teachers were linking the positive changes in student behaviour, such as being more communicative, directly to their interaction with the OSI app demonstrates that teachers value the app as a tool for learning. This is further supported by evidence showing that almost all teachers expanded on the OSI activities in their classroom, for example, by jointly creating new songs with students and designing resources using the recipes from the app.

As indicated in the survey and interview results, all teachers had either increased or maintained their level of confidence using the iPad and play-based app as a teaching tool by the end of the pilot. Through their own activities of using and becoming familiar with the app, teachers were able to experience the value of this technology first-hand as it aided them in their own learning. Furthermore, many of the participating teachers were learning new skills alongside or in some cases from their students, which allowed them to observe their interactions and see the affordances of this technology. In recognising that students use multiple senses when interacting with the app, for example, many teachers demonstrated an ability to look past the novelty of the iPad - instead, valuing it for its affordances in supporting learning.

All but one teacher called for more iPads in the classroom, which may also be a reflection of the value they found in using the app with their students. However, this request may also have been fuelled by a desire to have more iPads generally, particularly in classrooms with little access to resources of this kind. It is fair to say that a number of factors may have also influenced this request.

As evidenced by the differences in app usage rates, participating schools did not use the iPads and play-based app to the same degree. This is a strong indication that some teachers may not have valued these resources as much as others, however, these usage rates may have also been affected by a number of factors during the six-week period such as large class sizes or staffing changes.

While it cannot be said that participating teachers all valued the use of play-based apps for learning to the same degree by the end of the OSI pilot, overall, teachers' appreciation of these resources had been seen to increase over the six weeks. Furthermore, the teachers who engaged the most with the play-based app appeared to significantly value it as a tool for learning, as demonstrated by their sophisticated understanding of the affordances of this technology, and by seeking to build on OSI through their own play-based activities.

# 4.3.2 To what extent have teachers supported children's understanding of the relationship between healthy food and wellbeing?

Overall, the evaluation found evidence that just over a third of the teachers actively supported children's understanding of the relationship between healthy food and wellbeing during the pilot period. These teachers demonstrated this through using a combination of additional follow-up activities, including child-led performances around health and food, and by including parents in their child's learning.

For example, the following quotes from four of the post-pilot teacher surveys provide evidence of how these teachers engaged with the benefits of the OSI app to support student learning, and how they used the app as a springboard for other classroom activities to promote understanding about healthy food and wellbeing:

• *"All three places [in the OSI app] eg gardening, helps with our real life gardening. The sea helps our students with fishing and getting the octopus. The cooking is the most important part for learning by using fingers for cutting eating etc."* 

- Teacher (post-pilot survey)

• *"[It helped] greatly in questioning the children in "healthy eating"... as well as following up work'* 

- Teacher (post-pilot survey)

- *"I used the app during science lesson when we are talking about healthy foods."* 
  - Teacher (post-pilot survey)
- *"Yes it created the students mind on how to pick each food from their group and also the strategies for teaching them how to classify things."*

- Teacher (post-pilot survey)

Furthermore, when working in groups at the post-pilot workshop, teachers were forthcoming in noting how the OSI program had supported them in their teaching practice surrounding healthy food and wellbeing. In particular, they highlighted that the OSI resources had helped them to maintain students' interest in the topic and keep them focused. In addition, the seven teachers at the workshop highlighted that the OSI resources had helped them to effectively link the topic to key learning objectives about healthy eating and wellbeing. This was also indicated in two of the end-of-pilot teacher interviews:

- "And with the learning of the children they are looking forward to have health or science when they can go on the iPad and do some games in their cooking and... But also because what I wanted them to do is to do it in the iPad and the in real life. So we have to come up and do the garden. Maybe in field trips we can go and watch the sea and see what they can get from there. If I expand it then the children will be benefited more from that."
  - Teacher (interview)

- *"They enjoy doing the cutting and the pasting of food that is healthy in the healthy side and what is junk food and not good on the other side. But they also talk about it. Even with the cards, we do flash cards."* 
  - Teacher (interview)

As noted in section **4.2.2**, many students who participated in the OSI pilot expressed an interest in cooking with healthy, local ingredients - an activity that helped them better understand the links between the food that they eat and their wellbeing. From their responses in the post-pilot survey and interviews, it is evident that in at least three pilot schools, teachers had actively supported and encouraged students' understanding of the relationship between healthy food and wellbeing by setting up regular weekly healthy cooking sessions in the classroom.

- "The thing I notice is very interesting, is the kids try to do the cooking, but we haven't got much resources, but we try to choose only some to do it, while the others are watching. It's very interesting when I say "you collect the fruits or vegetables so we can do the cooking in my Peito" I use the words in the iPad and they all happy we can connect with anything in the iPads. Like go fishing in the Tahi and they go to the bush, plus in the Peito for cooking."
  - Teacher (interview)
- *"I've been planning for all the months. I have a cooking for each month. So I keep reminding them "on September, we have 'this," on October we have Ota ika". So we can prepare and try to catch those food for that cooking."* 
  - Teacher (interview)
- *"After using the iPad and then asked them to bring all what they found in the iPad for how cooking and we make it and then we eat it."* 
  - Teacher (post-pilot survey)
- *"When we making fruit salad I asked some students to come and bring the fruits that we are going to prepare for our fruit salad and tell me the colour and ask him/her is it healthy or not."* 
  - Teacher (post-pilot survey)
- *"At school we grab the vegetables and fruits and have it at school during the lunch time with the kids. So that's the change. And the kids enjoy it. I'm planning to do that once a term to do the cooking, like fruits and vegetables. Using salads, it's easier to do."* 
  - Teacher (interview)

One parent described the positive impact that these cooking activities had for her child.

- *"I have seen the tablets (iPad) and [my son] enjoys playing with it. The day he was supposed to return it, he did not really want to. Sometimes, [his class teacher] teaches them about making fruit salads and such. So last week [my son] asked me to buy some apples and a small watermelon and some milk to make what the teacher taught him."* 
  - Parent (interview)

In addition, four of the 11 participating pilot schools had organised OSI presentations for the Millipede/SecondMuse team as part of their post-pilot visit. The schools had not been asked to do this and the presentations were completely independent of any pilot requirements. In three of the four cases, the presentations included having the students prepare meals in the classroom using the recipes from the OSI app. In all four cases, the students also sang the Fruit Salad song that featured in the app.

As noted in the delivery team's structured reflections, the students appeared highly engaged in all of the presentations, seemed to enjoy the opportunity to display their knowledge of healthy food and were greatly encouraged by their teachers. A performance in one participating school lasted for over 30 minutes and included a performance of the song (with new verses written by the class), a performative sorting of the flashcards into healthy and unhealthy categories by individual students at the front of the class, and the preparation of food and drinks by following the OSI recipes.

While the end-of-pilot performances were, in part, created for the benefit of the visiting Millipede/SecondMuse team and the representatives from the Ministry of Education who were in attendance, the students' familiarity with the OSI resources and their enjoyment in performing was evident.



Students preparing meals in the classroom

In two of the 11 pilot schools, teachers had engaged the parents of their students to assist with the performances and the preparation of the meals. During interviews, one teacher indicated that they intended to continue engaging with parents in the future in order to involve them more with the student's learning.

- *"I'm thinking of having all the parents of Class 2 to talk about, but I just get few mothers to share the program with them. At the third term, I'm going to write a letter, let them come here, and I'll talk about this program to them and share. So they try to have it at home, plus we doing it here."* 
  - Teacher (interview)

That some pilot teachers involved, or planned to involve, students' parents in their lessons and activities around healthy eating is a further indicator of the commitment they show to their students' long-term learning and health outcomes. This recognition of the importance of eating habits in the home demonstrates how some teachers in the pilot expanded the responsibilities of their role beyond the boundaries of the classroom. While only one example among a larger sample of students, the fact that a student requested to recreate the classroom cooking activities at home is a promising indication that the teacher's engagement with the OSI program is having a broader impact on their students' lives.

The lengths to which some participating teachers had gone to create playful, health-related activities for their class demonstrates their commitment to increasing students' understanding of this topic. The regular cooking activities in class and the extensive end-of-pilot presentations are strong examples of teachers finding creative ways to relate the ideas of health and wellbeing to the lives of their students, and support the transfer of learning into the home.

# 4.3.3 Were there any unexpected outcomes for teachers and/or did the outcomes vary for different groups (males, females, etc)?

Out of the 11 pilot teachers, there was only one male, so it was not possible to gain any significant data about teacher outcomes based on gender differences.

An unexpected outcome of the pilot was that the teachers would engage meaningfully with the app beyond its function as a tool for their students to learn. Some teachers even said that they enjoyed the app as much as their students did, as is described in this teacher interview.

- "I like, I really like the games. Sometimes I take it home and sit with my grandchildren and I have to show them what to do they are still two or three. But I think that it's not for a particular age. What it's taught, you know what it teaches me is that, I know now what is going on and what to do. Even though it's for kids, but, I love, I mean I like it more (laughs). I always want to have a go before everyone. Yeah. That's to be honest."
  - Teacher (interview)

Similarly, one teacher noted in their interview that the OSI pilot had led them to think more about their own food choices, and how it affects their health and wellbeing.

- *"Because at first I would just go pick from the chinese [junk food] shop, whatever I need. Since we started this program I had to grow my own garden at home, and also encourage my husband to grow our own crops instead of going to the market, which we had saved much much more from that. Even able to feed my in-laws and my family with our plantations. So I think it's very very helpful."* 
  - Teacher (interview)

While not true of all teachers who participated in the pilot, that even some teachers would enjoy playing with the app and learning from the ideas within it as a result of participating in the OSI pilot is an unintended but positive outcome.

It was also not expected that any of the participating teachers would allow students to take the iPad home with them, as was revealed in an interview with a parent:

- *"That she's very happy. She always wanted to bring the iPad home. But I know there is only one. I think the teachers class chance for every kid to take home the iPad, but there is only one. But when she got the chance to bring it home, she is very happy."* 
  - Parent (interview)

As this wasn't an anticipated possibility, the evaluation was unable to determine if this student was receiving preferential treatment, or if students were allowed to take the iPad home at multiple schools.



### 4.4 Appropriateness

The appropriateness of the pilot refers to how positively or negatively the different components of the OSI pilot were received by pilot participants. The findings in this section relate to the key evaluation question (KEQ): *How well has the pilot program been designed and delivered for the Tongan school context?* 

In summary, the design of the OSI pilot was appropriate for the Tongan context, as the characters, activites, use of language, and the technical functionality of the play-based app was well received by students, teachers and parents. This was the product of extensive stakeholder feedback throughout the pilot's development, and resulted in a high level of ongoing engagement with the app from participating students.

Participating teachers were provided with the tools needed to deliver the pilot in their schools, however, evidence suggests that the board game was not appropriate for use in the time-constrained context of the Tongan classroom. Time and resource constraints faced by some schools may also have led to the OSI pilot creating an additional burden on teachers and parents. In addition, some teachers were found to be using a teacher-led approach with the OSI materials. Additional training sessions for teachers may have helped to increase teachers' capability to use a more child-led teaching approach.

These findings have been informed by three sub-evaluation questions, which are explored in greater detail below.

#### 4.4.1 To what extent were the principles (Annex 1) applied across program design and delivery?

Throughout the OSI pilot, Millipede made ongoing efforts to ensure its design and delivery were appropriate for Tongans generally and, more specifically, young students and their teachers. The five principles of the pilot (**Annex 1**) were applied through a combination of play testing, stakeholder engagement and design iteration, the inclusion of cultural advisors, the design of age-appropriate and culturally relevant characters, and an informative but not prescriptive delivery of the resources and their uses to participating teachers.

**User-centred design:** The principle of user-centred design was employed by Millipede at all stages during the design and development of the OSI pilot resources. Play testing was conducted with early app designs and early versions of the board game to ensure the games were appropriate for the target age groups and enjoyable to play. The results from this testing then informed the next phase of the design. At all times, design decisions were made that allowed children to control their own play and progression within the app.

The following comments provide observational evidence of children's enjoyment when interacting with the app.

- *"They [students] enjoyed them alot and also happy because they can pick food from the garden and from the sea"* 
  - Teacher (post-pilot)
- "It's about the teaching delivery. 1 it's quite friendly and it's actually students based. It appears from the results that students learn things in a very friendly environment, friendly way, and they just pick it up. And they are very happy, looking at the materials. And they do it by themselves so it's a real student-based approach, apart from things I have seen in the classroom. They are self-motivated. The creativity of the program is quite outstanding."
  - CEO, MoET (interview)

User-centred design was also employed when considering class teachers' needs. Millipede recognised that teachers would choose to engage with the resources in different ways, depending on their students' needs and their existing programs of work. So, Millipede made a conscious choice not to prescribe exactly when (ie, what order) and how (eg, in groups, individually) the resources should be used in the classroom. Instead, the Teacher notes offered examples and suggestions for how the resources could be used and expanded on; however, these were suggestions not requirements of the pilot. While encouraging best-practice approaches, teachers were also encouraged to use the resources in the way that would most suit their unique classroom environment and their existing program.

**Learning through play and games:** The principle of learning through play and games underpinned the design of the OSI pilot resources, particularly the app. Different play types were considered. For example, care was taken to ensure the OSI app involved open-ended exploration as well as goal-oriented tasks, so that the app supported return use and children remained engaged with it throughout the pilot.

Where possible, the app design supports player agency with clear goals. For example, players do not need to unlock some recipes or environments before being able to access others; however, they are required to collect certain types of ingredients in order to make the recipes. While they have the ability to choose what to make, their choices help them to become familiar with the ingredients needed for each recipe.

This principle was also employed in the delivery of the app to schools. While not making it a requirement of the program, Millipede encouraged teachers to allow their students to explore the app as they wished. When demonstrating the app to a class, Millipede staff would show how multiple players could play at once in an attempt to encourage the students to use the app collaboratively.

Evidence that students were learning over time can be found in observations by teachers and parents and in the structured reflections of the Millipede/SecondMuse delivery team.

In schools where students exhibited high levels of engagement with the app, their engagement was found to increase over time. For example, in structured reflections both before and after the pilot, it was noted that students were 'quietly observing' the song animatic and listening to the characters at the start of the pilot. In contrast, by the end of the pilot, students were 'singing along with the words of the song' and 'using the deep voice of the song when singing it.' This is evidence of how students moved from being novices to experts, as they scaffolded their use of the app over the six-week period.

Elements of the OSI pilot also made their way into other areas of the participants' school and home experiences, demonstrating how students' learning was transferring from the screen and into other environments. In their post-pilot survey, one teacher described how the song and prayer in the OSI app had become part of the children's lunch and dinner routine at school and in the home.

- "The song in the iPad when we do our exercise some students sing and do their exercise but most of all the prayer inside the iPad before eating the students use it for their eating prayers. A mother asks me one day that her child change her eating prayer just like my son too. Also the song [Fruit Salad], we change it [the words] to another cooking [recipe] as the students ask me for help."
  - Teacher (post-pilot survey)

The ability of the app to support students' learning through play and games was also observed by the CEO of the Tongan Department of Education and Training when viewing footage of students using the OSI app.

- "They are quite attracted to the program. The program itself, they are very happy to work with it and that is what we call learning by doing. So I think that's going to last long. We all know in education that if the students are learning by doing, the understanding is going to last long. And that's exactly what the program has done."
  - CEO, MoET (interview)

**Using affordances of technology:** Both the use and the design of the OSI app is underpinned by a belief that technology (in this case tablet devices and apps) offers affordances that support learning. All the resources in the OSI program, especially the app, were designed and developed to encourage multimodal learning, based on the understanding that all learning is multisensory and well-designed apps can be powerful tools for engaging children through the use of the various modes. In the case of the OSI app, this includes touch, music, animation, voice-overs, sound effects and appealing graphics.

Furthermore, consideration at design stage was given to the classroom context, and the knowledge that (as witnessed during initial discovery visits to schools in Tonga) multiple users were likely to use the OSI app at the same time. So, drawing on the affordances of technology, multitouch was included for many interactions. This approach also acknowledges the value of learning collaboratively.

The structured reflections made by the Millipede/SecondMuse delivery team observed that collaboration between multiple students using the app at the same time was generally positive. However, there were some students who preferred to play with the app alone, and others who would push their fellow students to try and get the iPad from them. So, while almost all user interactions were observed as being positive, it must be recognised that even the most collaborative of app designs cannot lead every student to want to play with others. This is not a flaw in the design of the app as such, but rather a consequence of having many children wanting to play with a single, new device. In almost all cases, students were observed playing the app together as a group, and were able to adapt their play to include two, three or sometimes as many as five users simultaneously.

Teachers also noted at the end-of-pilot workshop how students would use their whole bodies when interacting with the app, particularly when participating in joint activities like fishing or singing. This demonstrates the apps ability to engage children in a way that can elicit a physical, as well as verbal, response.



Students playing the OSI app together

**Power of popular culture:** The principle of the power of popular culture in young children's lives was acknowledged by Millipede in the design of the OSI pilot resources, along with children's desire to relate to others in safe, meaningful ways. As such, the three guiding characters that feature in the OSI app, posters and board game were designed to be age appropriate in both their appearance and their language. For example, the popular Pacific-inspired Disney film *Moana* influenced the initial design direction of the OSI characters and setting. The unique OSI art style was then further developed based on art and photographic references sourced from Tonga, ensuring cultural relevance.

In their post-pilot surveys, teachers observed how the students responded positively to the characters.

- *"They [students] named the characters Maui and Moana every time they open the game. They said they are Tongans for their skin colour."* 
  - Teacher (post-pilot survey)
- *"The first time they use to play with the apps in the iPad, they know how to press the radio for the song and fishing fish from the sea. Some students said that MAUI was in the cartoon!"* 
  - Teacher (post-pilot survey)

**Being socially inclusive:** The principle of being socially inclusive was taken into consideration by Millipede at an early point of the design phase and was revisited throughout to ensure any revisions to the resources remained culturally relevant and accessible for a young Tongan audience. Cultural advisors were consulted during the pilot design, specifically to address questions around representation in the artwork and appropriate use of Tongan language. In addition, extensive stakeholder feedback was gained on key screen designs, songs, use of language, and other content items such as proposed recipes and food lists.

For example, labels were added to the baskets in the recipe section of the app, the program name was changed from 'Our Secret Island' to 'Our Special Island', and the design of the mat on the home screen of the app was changed so that it looked more Tongan. These changes were all made as a result of feedback from the OSI in-country stakeholders.

Millipede also made the decision to balance the genders of the two main characters, Kelela (a girl) and Pulotu (a boy). Where feasible, while retaining cultural appropriateness, care was also taken to ensure both characters had balanced roles, to avoid implication that roles were gender-based.

Observations from both teachers and parents in the post-pilot survey and interviews highlight the importance of, and success in, making OSI culturally appropriate.

- *"Awesome illustrations cartoons e.g. age appropriate, creative in ideal tone being used and relatable to Tongan language. "local voices!". Very well executed towards target audience."* 
  - Teacher (post-pilot survey)
- "I think the most important part of the program, I believe the name is really important – as Motu Ta'e'iloa is something that Polo, my son, often speaks about at home and often tells me that Motu Ta'e'iloa has food that is healthy"
  - Parent (interview)

The CEO of the Tongan Department of Education and Training also highlighted the cultural appropriateness of the app and supporting materials.

- "That's once successful of this one, you know, the program was developed to take into considerance the importance of cultural friendly. So the words, everything that are there, it's Tongan culture. And it's quite happy, we are very happy to see that. And it's very important for us to look at how little programs get into the students, because the students learn the Tongan culture in the right way. Appropriate words and appropriate activities."
  - CEO, MoET (interview)

The benefit of making the program distinctly Tongan was not limited to students. Having a program that was designed in Tongan, for Tongan people also resonated with teachers:

- *"For me I had learned to respect and honor our Tongan food because the program itself points to what is important in Tonga. What we have already, not waiting for something to be brought from overseas. I really like the idea of having fresh food, fruits and whatever is in here for us. Saying that that is the healthy food for us."* 
  - Teacher (interview)

In addition to providing teacher and student participants with engaging and appropriate materials, adherence to these principles has enabled this evaluation to focus on the end-of-pilot outcomes outlined in the Theory of Change (**Annex 1**).



Four Tongan recipe screens in the OSI app

# 4.4.2 To what extent did teachers have the capacity (time and resources e.g. enough iPads) and capabilities (knowledge, understanding and skills) to participate in the pilot?

The evaluation found that, overall, teachers had the capacity to participate in the pilot at a minimum level, however, limits on time in the classroom prevented some teachers from engaging fully with the OSI supporting materials. The amount of resources available to each school also affected how they were able to expand on the OSI activities, and having more iPads per classroom would have enabled more students to participate more often.

All teachers either had, or were able to, develop the technical capabilities required to use the iPad in their classroom. Teacher capacity in the areas of play-based and child-led approaches, however, was found to be lacking, and teachers would have benefited from more detailed training on these approaches if time and pilot budget had allowed.

This section will provide an overview of how frequently the OSI play-based app and supporting materials were used over the six-week period, as well as how evident it was that teachers had expanded on the resources in the classroom. It will then analyse what this evidence suggests in terms of teacher capacity, and then in terms of teacher capabilities.

A combination of app data, post-pilot survey responses and observations by the Millipede/SecondMuse delivery team provides an indication of how frequently the OSI resources were used in schools. As noted in section **4.3.1** some participating schools used the play-based app significantly more than others, with total usage ranging from two to 184 sessions over the six-week period. Post-pilot survey responses, coupled with the structured reflections of the delivery team, indicate that all teachers had integrated the OSI supporting print materials into their implementation of the program, with some print materials being used more regularly than others.

In the post-pilot survey, all participants reported that they had used the flashcards, and all but two had used the worksheets. Notes from the structured reflections indicate that almost all schools had displayed the posters in the classroom, and those that weren't visibly displayed on the walls were easily made available to the Millipede/SecondMuse delivery team upon request. The board game was the only resource that was used minimally, with only three teachers reporting using the board game with their students.

Observations made in the Millipede/SecondMuse team's structured reflections also offer evidence of the extent to which teachers expanded on the OSI resources. Evidence suggests that the majority of teachers used the extension ideas suggested in the OSI Teacher Notes (**Annex 7**). For example, eight out of the 11 participating schools had created OSI 'corners' in their classroom where they displayed the pilot posters and examples of the students' OSI-related work.

However, not all teachers engaged in these activities to the same degree. In some schools it appeared that the activities had only been taking place in the few days before the evaluation team were due to visit, as indicated by time stamps on the photos presented to the evaluators from the OSI program iPads. While in other schools, it was evident that these additional, in-class activities had been used regularly, as there was wear and tear on the resources and the students were familiar with handling them.

One participating teacher, for example, had involved the children in making hanging mobiles out of food and drink packaging to display healthy and unhealthy food options. The mobiles were hung from the ceiling of the classroom, providing an ongoing display of key messaging from the OSI program.



An OSI-inspired food mobile and 'OSI corners' in participating schools

**Teacher capacity (time and resources):** As noted in Section **4.3.1**, all but one of the participating teachers noted that more iPads would help them to provide their students with equal and regular access to the app. This need was clearly stated in teachers' post-pilot survey responses and at the end-of-pilot teacher workshop.

- *"They [the students] really enjoy the app but it's [there are] not enough apps/also not enough time for them to have a turn to play. The students all want to participate but only one iPad so they have to play in groups."* 
  - Teacher (post-pilot survey)
- "[Need] to get more iPad so most kids can have a chance to play."
   Teacher (post-pilot survey)
- "Concern: not enough/ [need] more iPads so students can all use."
  - Teachers (group in teacher workshop)

Teachers did not come to a consensus of how many iPads per class would be most beneficial, but rather, agreed that it was challenging to provide all students with equal access with only one iPad per class in the time they had available to them. As shown by the high app usage rates recorded in some of the participating schools, however, it is evident that some teachers were able to overcome this hardware limitation and provide students with regular access to the app. While one iPad per class was said to not be enough, there was consensus among the teachers at the end-of-pilot workshop that one iPad per student was not necessary. This view was also expressed by one of the parents in their interview, who noted how having one iPad per student could mean that their experience of the OSI app goes by too quickly.

• *"The program is a bit small right now. So if my kid have her own one, I think it would only take a month and then when she mastered everything, she begin to just throw away or ignore the iPad."* 

- Parent (interview)

It is also possible that the teacher's own interest in the technology influenced how often the OSI app was made available to their students. One teacher commented, for example, during an informal conversation with the evaluators that she did 'not believe in the use of technology for children,' a stance which likely would have affected their access to the iPad. In one school, it was also apparent that the teacher had been using the iPad for personal use, as there was a photo of her family as the iPad background and the iPad had been locked with a passcode. While a degree of individual use may be required for teachers to familiarise themselves with the technology, students' access to the app may be affected if the iPad spends too much time in the hands or the home of their teacher.

Evidence also suggests that the board game, the only item among the OSI supporting materials that remained unused by the majority of the pilot schools, was not an appropriate resource for use within a Grade 1 and Grade 2 Tongan classroom context. Unlike the app or the flashcards, the complexity of the rules of the board game meant it could not be picked up by a student and intuitively understood. As the student participants were of a typically pre-reader age, the rules of the board game needed to be read and explained by an adult in a process that requires dedicated time with small groups of students.

The OSI board game was play tested with children in both Australia and Tonga during the design phase of the pilot, and was found to be suitable for children in the target age group, as long as they received adult support. Given the time and staffing constraints faced by teachers in the Tongan classroom context, however, it was not possible for teachers to provide this support to small groups of children in a way that would be fair and equal to their students. Therefore, while the board game may have been an appropriate resource generally, it was not an appropriate resource within the context of the Tongan classroom environment. This issue was confirmed by teachers at the end-of-pilot workshop and in the teachers' post-pilot survey responses.

• "My addition was when I looked at the board game. I think it's too difficult to the kids (to use independently without adult support initially), but I tried some methods to make the kids familiar with this game."

- Teacher (post-pilot survey)

The Millipede/SecondMuse delivery team also acknowledged this challenge in their structured reflections, noting that the inclusion of the board game may have overburdened teachers, given the limited time they get to spend with each student in the classroom.

- *"We possibly gave them too much to work with in a short amount of time, hence why they didn't use the board game very much."* 
  - Pilot delivery staff (structured reflection)

With the exception of the board game, the teachers in all schools were provided with the resources they needed to participate in the OSI pilot activities. In some schools, however, limited access to resources such as fresh fruits, and stationary supplies did affect the teacher's capacity to expand on the pilot activities and create their own activities and materials.

One teacher described in the interview with evaluators how resource challenges directly affected her ability to expand on the OSI pilot activities, namely the cooking activities in class. While some ingredients could be provided by the food in the *Mai e Nima* gardens, this supply was insufficient, and the teacher was still required to personally purchase the ingredients needed.

- "The thing I wish to have like the seed for the vegetable to plant. I can get most of the stuff from my bush. The Siaine and the Pele, only the vegetable seeds. That's from my own pocket, so that's what I do here at this school. The Mai e Nima they get us some seeds and then I plant it and at harvest time we share it with the kids and the other staff. I look forward to some this year. But I'm trying to have the Yam to plant, because there is Yam in the program and the ngoue'anga and the Lesi. I would try to plant them specially for this program."
  - Teacher (interview)

Other teachers overcame this resource challenge by asking families to supply the school with fresh fruits from home. While this alleviated the strain on teachers, it did transfer the burden of responsibility to parents, some of whom did not have the resources themselves to supply what their child needs for class. One parent highlighted this this challenge in their interview:

- *"For me, what my daughter is most happy about is eating fruits. She always asks to buy her some apples. She would ask, "Mummy, the teacher said to bring me some apples." At times, we don't have the money to buy apples but she would say, "The teacher said to get some apples." So we buy it and she says that the teacher will ask and check if they've eaten and so we will buy them. So she is happy when we buy her fruits to eat."* 
  - Parent (interview)

More generally, the Millipede/SecondMuse delivery team also observed how teachers in some schools needed to recycle old materials in lieu of stationary supplies, adding an additional strain on teachers' time and resources.

- *"The class teacher is keeping the exercise books from the previous year so that she can reuse the blank pages for the next round of students."* 
  - Pilot delivery staff (structured reflection)
- *"One teacher told us that she brings in cardboard boxes from home and cuts them up to make flashcards and games for the class."*

- Pilot delivery staff (structured reflection)

This is not something specific to the OSI pilot, but rather, is an issue faced by teachers in all aspects of their teaching. It must also be noted that the 11 participating OSI pilot schools are a combination of GPS and Mission Schools that span a number of rural and urban districts in Tongatapu. Therefore, the financial and in-kind resources available to teachers in these schools ranges significantly. The observations made above do not relate to all schools in the pilot, but are still important to note. Although most teachers were able to find a creative solution to these resource challenges, it should be acknowledged that the burden of limited resources in the classroom does fall on them, and in some cases, on parents.

**Teacher capability (knowledge, understanding and skills):** Two assumptions of the OSI Theory of Change (ToC) (**Annex 1**) were that teachers in the pilot classrooms have an understanding of play-based approaches to learning and that teachers have an existing level of understanding about the benefits of healthy eating, and that they can use this knowledge to discuss and scaffold children's understanding of the program content. An additional capability area required to participate in the OSI pilot includes the skill to either use or to learn how to use an iPad.

That all teachers considered themselves either 'confident' or 'very confident' using an iPad and a play-based app as a teaching tool by the end of the pilot suggests that teachers did have the technical understanding and skills required to participate in the OSI pilot. Similarly, that almost all schools were found to be using the OSI supporting print materials during the six-week period (with the exception of the boards game) also suggests that teachers had the knowledge required to use these materials with their students at a basic level.

Evidence from teacher interviews and the observations of the Millipede/SecondMuse staff, however, indicates that some teachers did not had enough of an understanding of play-based approaches to learning to use the OSI pilot resources to their full potential. This is most apparent in instances where teachers were using the iPad as a disciplinary tool rather than as a tool for collaborative, play-based learning. At least three participating teachers recognised that the excitement their students had for the app could be used to manage their behaviour in class. In interviews and at the end-of-pilot workshop, teachers described how the iPad helped them to keep order in their class.

- *"So I think everyone enjoyed, especially the iPad. I think that's the heart. Whenever I had someone like, the one that's been the most disciplined in that day, they will have a go before going home. So they know, they are expecting what they should get when they are sitting nicely or behaving in class. So I haven't tried it with the other games but with the iPad it works better."* 
  - Teacher (interview)
- *"I use the iPad to discipline them to finish other subject, then he or she can sit down and use the iPad."* 
  - Teacher (interview)

By only allowing 'well behaved' students to play with the app, these teachers were actually withholding a useful learning experience from some of their students, rather than helping to create one. So, while teachers may have understood the theory underpinning a play-based learning approach, it is evident from the example above that some teachers would have benefited from a greater understanding of how this approach can be used in practice. Again, this was not true of all participating teachers, as some teachers had developed charts to actively track students' app use and ensure that all students were getting a turn.

# 4.4.3 To what extent was learning through play using technological affordances supported by other methods important for engaging students?

As noted in section **4.4.1**, students were observed to be highly engaged when using the OSI app throughout all stages of the pilot. These observations were reported by both the teachers and the Millipede/Second Muse delivery team. Photographs and video footage from the pilot also capture students' high levels of engagement.

Some observable evidence of this engagement included: students' body language, which showed them actively focused on the app and other activities; students speaking back to the characters in the app, which provided evidence of their depth of involvement in the play context; students singing along with and performing the actions for the app song; and students smiling and laughing in reaction to events in the app, such as the coconut grating when shaking the iPad.

In their post-pilot surveys and interviews, many teachers commented on the characters' appeal to students and noted how students would repeat the spoken words of the characters back at them.

- *"They [students] relate to them because they can participate in the singing game in the app and words study the most."* 
  - Teacher (post-pilot survey)
- "They [students] can be able to sing the song about fruit salad some of them said "Taimi ketau kuki" (Let's cook)."
  - Teacher (post-pilot survey)
- "They [students] speak as what the iPad voice said, eg "Ifo" (Yum)."
  - Teacher (post-pilot survey)
- "They [students] can say what they say after like going to the sea for fishing they can say the octopus catcher ("Maka feke")."
  - Teacher (post-pilot survey)
- *"We try to make our voice to be like what's in the two characters in the story. One of the kids was trying to pretend to be Kelela and Pulotu and Maui."* 
  - Teacher (interview)

This was supported in the structured reflections of the Millipede/SecondMuse delivery team, who also observed students mimicking the OSI characters.

• "A Millipede staff member] was showing the kids the data download and said 'Ika' at the fish. They then played a game where they would go through the different names in the app and [the Millipede staff member] would try and say it in Tongan. Including singing the octopus song. The kids were using the deep voice of the song when singing it."

- Pilot delivery staff (structured reflection)

The students' animated body language while playing with the app also stood out to some of the teachers who informally commented on their excitement and engagement during the evaluators' school visits. This was highlighted by one of the participating teachers in her post-pilot survey response.

"The parts of the Special Island app [they] did enjoy the most are the playing cards and all the activities and iPad games. Why?? Because .... some learn through visual, hearing and touching these parts had all the types of learning [approach] a child [is] eager to use. The visual learners learn through picture inside ipad and cue cards too. For touching, they really learn how to prepare a healthy food to eat and for hearing they learn from playing cards by saying the name of the food and which category a healthy or unhealthy belong to. For me as a teacher it's really useful for my students inside the classroom ... It's also help my students to know healthy food and unhealthy food and minimise [inappropriate, unfocused] playing and talking inside the class during lesson time but make use of their time on iPad gaming."

- Teacher (post-pilot survey)

That students were still visibly engaged with the OSI app, even after having used it extensively in some cases, shows that the appeal of the app is substantial enough to keep them interested over time. This is significant as continued exposure to the resources also means continued exposure to the ideas around healthy food and wellbeing that exist within them. The longer the students' engage with OSI, the longer that information and images around healthy eating are a part of their regular routine.



Students engaging with the OSI app

### 4.5 Learning

Learning refers to what has been learnt from designing and delivering the OSI pilot. Within the context of this pilot, this refers to learnings around technology innovation in Tonga specifically, as well as technology innovation in different contexts. The findings in this section relate to the key evaluation question (KEQ): *What is being learnt about doing innovation around health in the Pacific?* 

In summary, accurate representations of culture, fully developed and implementable 'prototypes', in-person engagement on the ground, identification of key gatekeepers and delivery partners, and the mitigation of uncontrollable external factors are all essential to doing innovation around health, or indeed around any topic, in the Pacific. An initial discovery or exploratory phase is necessary to be able to understand how the concepts listed above relate to the particular context that the innovation pilot intends to operate in.

These findings are explored in greater detail below.

# 4.5.1 What have we learnt about doing technology innovation in Tonga? What have we learnt that can be transferred to other contexts?

### Discovering information about cultural, environmental and political contexts at the beginning of the project improves the end product and increases the likelihood of in-country approval

The OSI pilot resources that were delivered to participating schools were developed beyond what would be considered a pilot prototype within an Australian context. This is especially evident in the detail of the OSI app, which was produced to the point of having final graphics, professional voice-over recordings and seamless gameplay interaction, as opposed to beta graphics and design, and placeholder audio. Much of the success of this resource both in schools, and within the Tongan MoET is a result of having a fully functioning product, with high production quality and extensive attention to detail.

This need to develop the pilot beyond what would be considered a prototype in Australia was only identified because of the inclusive stakeholder engagement that took place throughout the pilot's design. It was through extensive in-person engagements with MoET staff, teachers, parents, local health professionals and other community leaders that the Millipede/SecondMuse design and delivery team were able to identify and incorporate their needs. The main goal of this discovery phase of the pilot design was to listen and to learn. This enabled the Millipede/SecondMuse team to gain a greater understanding of the problem and the context in which it sits so that they could create a solution that would be sustainable, and be specific to Tonga. Much of the positive feedback around student and teacher engagement with the app and other resources is a result of the information that was received on these initial discovery and engagement visits to Tonga.

### Being authentically Tongan is incredibly important to Tongan participants

Another element of the OSI pilot that emerged in participant and stakeholder feedback was the degree to which the app and print-based resources were made to be distinctly Tongan. The inclusion of the Tongan language, the design of the characters and the detail in the featured environments and ingredients were all repeatedly noted as being unexpected but welcomed by Tongan people.

- *"I like it when it's in Tongan. Because most of them are Tongans and because culturally I know that they should speak Tongan fluently rather than... and you know they can just change it into the language, the second language, like the English. But for them to, to improve and to be smarter for them in the future in any language, they have to speak Tongan first."* 
  - Teacher (interview)
- *"For me I had learned to respect and honor our Tongan food because the program itself points to what is important in Tonga."* 
  - Teacher (interview)
- *"There are octopus, fruits, vegetables, green leaves, and so I've learnt to wake up in the morning and think of other foods that are different from what he [my son] is used to."* 
  - Parent (interview)
- *"I think they like it [the application] because it says, you know, it is speaking to them. So it is similar to what they have heard at home."* 
  - Teacher (interview)

The fact that the OSI resources were considered culturally appropriate was also highlighted as an essential criteria for the pilot program to receive the approval of the Tongan MoET.

- *"I think for a program to come and participate in schools it has to be look at it very carefully before we implement it because there are lots of landscapes to look at it and to make sure it's right. This one is quite appropriate because I'll put it this way the people behind the program have done their homework first. So when it gets into the classroom, there is no complaint. Because if things are not coming friendly, there will be lots of complaints."* 
  - CEO, MoET (interview)

Without this approval from MoET, the pilot would not have been able to operate within GPSs and therefore would have been too narrow to be a viable pilot. As an Australian Aid funded program, it would not have taken place without the support of a Tongan Ministry.

The importance of being culturally appropriate and relevant and unique to Tonga was observed by the delivery team in their structured reflections.

• "Delivering something that isn't culturally appropriate or representative of the country's values and traditions in any way, will be immediately rejected. This includes everything from the implementation of the curriculum, to the cultural detail in the art."

- Pilot delivery staff (structured reflection)

### Responsibilities of pilot implementation predominantly fall on individual teachers

Although the OSI pilot received the full support of the Tongan MoET and was assisted in Tonga by the Tongan Ministry of Health, the responsibilities of implementing the pilot resources, fitting them into the existing class program and using them with students in the classroom fell on the individual teacher in each participating class. It is incredibly important therefore to understand the needs of the teachers and how they may differ from participant to participant.

While the Millipede/SecondMuse team did make efforts to engage with the teachers extensively during the design phase of the pilot, this engagement was limited by time and budget constraints. The pilot would have benefited from more engagement and training with the resources at the beginning of the pilot, and more support for the teachers during the six-week implementation period.

Teachers would have been more thoroughly supported if the Millipede/SecondMuse delivery team had spent more time conducting school visits before the pilot began. More time spent with teachers before the pilot's launch would have allowed for more training on play-based approaches to learning. This may, for example, have helped to highlight the reasons why the board game would not be as useful in the classroom as other resources. In addition to these larger benefits, more time spent with teachers would have led to stronger working relationships. This also may have helped the delivery team to pick up on small details that would help to make it easier for the teachers to participate, for example, the different language needs of particular schools.

# • "Should have brought English version of the student surveys for the kids at [the Mission Schools]'

- Pilot delivery staff (structured reflection)

Throughout the delivery of the pilot, the participating teachers were visited within their individual classrooms. The Millipede/SecondMuse delivery team was advised to only bring teachers together to interact with one another at the end-of-pilot workshop as it would have been too challenging to organise a pre-pilot workshop at that time. However, the success of the end-of-pilot workshop suggests that teachers may have benefited from a similar opportunity to share and learn before the pilot began.

The delivery team comments on the success of the end-of-pilot workshop in their structured reflection, identifying how it was beneficial for maintaining relationships with the teachers, but also provided an opportunity for them to form relationships with one another.

- *"Having people like [one of the participating teachers] come along to workshops and talk about the ideas she's used with her class and why she has done it would help other teachers in the program."* 
  - Pilot delivery staff (structured reflection)
- "The professional development part of it for teachers is really key. If you have teachers who are working with the child-led approach then the results can be amazing. We can make the resources as culturally friendly and as age appropriate and as fun as we want, but if we have a scenario where the teacher is still holding the iPad up in front of a class then we aren't going to get the results that we want."
  - Pilot delivery staff (structured reflection)

### Ownership of and accountability to the pilot outcomes encourages active participation in the pilot

One of the risks of the OSI pilot was that iPads would go missing or become damaged if provided to schools. This did not eventuate, however, as all 11 iPads were functioning and accounted for at the end of the pilot. Under the advice from the Ministry of Internal Affairs, steps were taken at the beginning of the OSI pilot to create a sense of responsibility for the iPads among the participating teachers.

The iPads were marked as the property of the MoET to make teachers aware that they were not personal gifts and were intended to be used for educational purposes. It was also made clear to the participating teachers that the Millipede/SecondMuse team would be returning at the end of the pilot to gather data from the iPads. Informing teachers that the iPad would need to be produced upon the delivery team's return may have provided them with an additional incentive to keep the iPad in full working order. Although the in-country coordinator did visit the participating schools once during the mid-point of the pilot, the pilot may have benefited from more touchpoints with the participants during the six-week pilot period in order to encourage even more accountability during this time.

# Ongoing, in-country support from a respected community member can determine the success or failure of a pilot project

The design, delivery and evaluation of the OSI pilot would not have been possible without the work of the OSI in-country coordinator. Relationships in Tonga are built almost exclusively on in-person interactions. Having someone in Tonga who is adept at navigating the systems of government, is familiar with existing NGOs (and their programs in-country), can identify key stakeholders, and has the local standing to earn community support and buy-in is essential. A pilot project's success is dependent on the continual support and enthusiasm of the local stakeholders. This is particularly pertinent in the Pacific region, which is the recipient of a large number of aid and development programs. The significance of the in-country coordinator role was identified in the delivery team's structured reflection.

- "The team cannot emphasise enough the importance of having access to someone on the ground who is not only known by the community, but someone who will be listened to. It's one thing to know who to email, it's another level to have the email opened and responded to, and a meeting time agreed to."
  - Pilot delivery staff (structured reflection)

The unique abilities that the OSI in-country coordinator brought to this role on the OSI pilot were also noted in the reflections, and were specifically highlighted by the CEO of the Tongan MoET in his interview with the evaluators.

- "[The in-country coordinator's] soft-skills and cultural navigation ie, being able to read between the lines in meetings - subtle body language - are invaluable. Her networks and ability to get us to the right people within Ministries and other organisations. Her and knowledge of the history of Tongan politics and advice on how to approach certain people in meetings."
  - Pilot delivery staff (structured reflection)
- "I thank you for her [the in-country coordinator] for the right guidance. If not for her guidance, things were going to go wrong. A counterpart would come in a different way and assist you people in a different way. But she listened well, and I think that is a great asset. Although she is living in New Zealand but when she comes, she does not act like a Tongan living somewhere else - just fall in and listen well. That's part of the success, a great part of the success. If she advises you wrongly, things go wrong. We must thank [her]for being a very good counterpart."

- CEO, MoET (interview)
# External events such as extreme weather and changes in participant availability are possible and require contingency plans

One of the major events to impact the OSI pilot delivery was Cyclone Gita, which hit Tonga in February 2018. The cyclone caused damage and disruption to the country, severely affecting a number of the proposed pilot schools, leaving the launch and participation rates of the pilot in a state of uncertainty. While instances of extreme weather cannot be prevented, the vulnerability of the Pacific to these events is well known. The OSI pilot should not have been scheduled to take place in cyclone season, as moving the launch to another date would have minimised the risk of a cyclone causing disruption to the delivery of the pilot.

Taking the physical environment of the Pacific into consideration is generally an area where the OSI pilot could have improved. Small details such as *'laminate the print resources so they don't fall apart in the humidity'* were identified by the delivery team as areas of improvement in their structured reflection.

The realities of the primary education system in Tonga also could have been taken into consideration more thoroughly in the delivery of the OSI pilot, specifically in regards to changes in staffing. In Tonga, it is not uncommon for teachers to be moved to another school, or for classes to change their teacher during a school year. Out of the 11 pilot schools, the classroom teachers at two of the schools changed between the pilot launch week and end-of-pilot week (Table 4 - **Annex 13**). These two schools were among the lower end of the school sample in terms of effectiveness for both students and teachers, and overall in terms of engagement with the program. For example, these schools were not represented at the end-of-pilot workshop.

The impact that staff changes had on the program may have been mitigated through more regular touchpoints with the participating teachers, as mentioned above. Although by no means a guarantee, more regular touchpoints with the teachers would have made it easier to identify staffing changes as they happened, rather than after they had occurred. By knowing about them as they happened (or even in advance), the Millipede/SecondMuse delivery team would have had more of an opportunity to address the change by bringing the replacement teacher up to speed on the pilot, via the in-country coordinator who was working with schools on the ground.

# **SECTION 5: RECOMMENDATIONS**

This section, informed by the evaluation findings, provides an overview of recommendations for the future of the OSI program. These recommendations cover two scenarios. **Scenario A** involves an expansion of the OSI pilot into a full OSI program that can be implemented in further primary schools across Tonga. **Scenario B** involves an adaptation of the OSI resources so that the program can be recreated and piloted in other countries throughout the Pacific.

Recommendations from this evaluation are grouped under the following audiences: Program Funders, Government, and Program Implementers.

# Scenario A

#### Recommendations for an OSI rollout in Tonga

#### **Program Funders**

- 1. Monitoring and evaluation should be incorporated from the outset of any program expansion. The process should engage all program stakeholders from the outset of the program.
- 2. The number of tablet devices should be increased per class (e.g. one device per five students), allowing students greater access to the app and increased use in the classroom.
- 3. Any extended rollout would benefit from exploring the option of being optimised for locally sold smart devices (ie Android). This would enable the app to be distributed easily within the local market. To help facilitate this, partnerships with local telecommunication providers such as Tonga Communications Corporation, Digicel and Vodafone can be considered. Telecommunication partnerships can provide valuable distribution channels for app content and potentially supply devices for an extended rollout.
- 4. Any extended rollout should continue to focus on Grade 1 and Grade 2 students. The OSI program content has been designed to be age appropriate and link with the existing national curriculum at this level.

#### Government

 The program should continue to incorporate the school curriculum and existing health programs to ensure the program remains relevant and supports national learning outcomes. Any extended rollout should include the creation of a new Memorandum of Understanding (MoU) with the Ministry of Education and Training and Ministry of Health. This will ensure a prolonged partnership in-country and set clear roles for each stakeholder.

- 2. Parents should be fully briefed on the program, including what they can expect from it and how it will benefit their children, in order to support best uptake of the program messages outside of the classroom. Program timelines must be allocated in consideration of this.
- **3.** A full OSI program should be formally linked to the existing *Mai e Nima* program (aimed at children in older year levels), so that the two programs complement each other as children progress through grade levels.
- 4. A series of (three or four) teacher training sessions should be held prior to the start of the program expansion. Where possible, these trainings should bring all participating teachers together in the one workshop setting. The training should focus on the fundamentals of play-based learning and should involve guidance and shared ideas on how the OSI resources can be used in the classroom.
- 5. A number of program 'ambassadors' should be selected to aid a full program rollout. These could include standout teachers from the pilot schools to provide mentorship and guidance at teacher trainings, nurses from the Ministry of Health's Health Promotion Unit to check in on classes during their regular school visits, or *Mai e Nima* program officers to encourage the creation of OSI recipes from a *Mai e Nima* garden.

## **Program Implementers**

- 1. Any program expansion should ensure appropriate organisational arrangements in classrooms to support the facilitation of written survey responses with young children.
- 2. For Tongan classroom contexts with Grade 1 and 2 students, the design of any game-based resources should ensure students require minimal adult support to learn the rules.
- 3. The method for achieving the intended outcomes of the board game will need to be revisited, as the board game was not an appropriate resource for the Tongan classroom context. Alternative methods to deliver the intended learning outcomes should be teacher-led and facilitated by the implementation team before the launch of any extended program.
- 4. Teachers can be further supported by the delivery team spending more time conducting school visits before pilot launch. More time spent with teachers will allow for further training on play-based approaches to learning and lead to stronger working relationships.
- **5.** Program resources should be made using durable materials that can withstand the humidity and climate.

## Scenario B

Recommendations for implementing a version of the OSI pilot in other countries in the Pacific

## **Program Funders**

- 1. Monitoring and evaluation should be incorporated from the outset of any future pilot. The process should engage all program partners from the outset of pilot design.
- 2. Discovery and learning trips should continue to be taken prior to the pilot design. These should be built into pilot budgets and timelines.
- **3.** Any future pilot should be implemented over a prolonged period (at least eight weeks) to assist in the:
  - collection of substantial M&E data;
  - mitigation of any changes to teaching staff; and
  - mitigation of any other unforeseen external events.
- 4. An in-country coordinator should be involved throughout every stage of the pilot. Navigating systems of government, identifying key stakeholders, and earning community support and buy-in is essential to success. Consideration should be given to making any in-country coordinator a formal member of any program team.
- 5. Pilot implementation should be scheduled outside of cyclone season.
- 6. Approval from the relevant Ministries in-country (i.e. Education and Health) should be sought before any engagement with schools or teachers takes place.
- **7.** Relevant Ministries (i.e. Education and Health) should be involved in the selection of pilot schools.
- 8. Budgets and timelines must be allocated for return visits to country. These trips to country are vital in nurturing in-country relationships and maintaining stakeholder enthusiasm.
- 9. Beneficiary engagement should be documented via images and videos, and shared with stakeholders throughout the implementation process to aid in their understanding of the pilot and its impact.

#### Government

1. Representatives of the relevant Ministries (i.e. Education and Health) should accompany pilot delivery teams on at least one school visit to aid in their understanding of the pilot and its impact.

- 2. A teacher training session should be held prior to the start of the pilot. Where possible, the training should bring all participating teachers together in the one workshop setting. The training should focus on the fundamentals of play-based learning and involve guidance on how the pilot resources can be used in the classroom.
- **3.** Head teachers should be fully briefed about the pilot, ensuring they understand the importance of the continuity of teaching staff and participating students during a pilot period.

# Program Implementers

- A teacher training workshop should be held at the beginning and end of the pilot. These workshops should be conducted outside of the classroom or away from noisy school locations to remove distractions and improve engagement and retention. Budget and timelines must be allocated in consideration of this.
- 2. Time should be allocated to facilitate more formal interviews with parents in order to assess potential barriers to adoption in the home, and to gain more feedback on the impact of the pilot outside of a school setting.
- 3. For contexts with Grade 1 and 2 students, organisational arrangements should be made in classrooms to support the facilitation of written survey responses with young children (e.g. including more adults to assist students with their surveys). This is to ensure surveys are easily understood by students in the target age group.
- **4.** Stakeholder feedback should be incorporated into the pilot design and changes should be socialised during return visits to country.
- **5.** Where possible, the pilot should complement the school curriculum as well as existing health programs.
- 6. Any pilot resources should be developed to be culturally appropriate. Stakeholder feedback should be central to the design of characters, art style, and recipes.
- **7.** Pilot resources and supporting material (such as Surveys and Teacher notes) should be created in local language/s.

# **ANNEXES**

## Annex 1: Theory of Change



Figure 1 Our Special Island Theory of Change model

Annex 2: App Screenshots

Annex 3: Posters

Annex 4: Flashcards

Annex 5: Classroom Worksheets

Annex 6: Board Game

Annex 7: Teacher Notes

Annex 8: Family Notes

Annex 9: Consent for use of Images/Videos

Annex 10: Student Survey Form

Annex 11: Teacher Survey Form

Annex 12: After Action Review Template

Annex 13: Tables