Legends: Beyond the Stars

Monitoring, Evaluation and Learning Report

May 2019

BEYOND THE STARS

Australian Aid

INNOVATION XCHANGE

S1 T2 STORY 1ST TECHNOLOGY 2ND

SECONDMUSE

LAUNCH

Quality Education for Change Peace and Progress

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AUTHORS' DETAILS

S1T2 stands for Story 1st, Technology 2nd. We are a creative technology company founded on a belief that technology can enrich the way we tell stories. This belief has driven us to work with some of the world's most famous organisations, agencies and governments posing creative endeavours and challenges. We relish every opportunity and work hard to instil each other with the courage to do things we're proud of - s1t2.com.au

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ACRONYMS

AUD	Australian Dollar
BTS	Beyond the Stars
DFAT	Department of Foreign Affairs and Trade
iXc	innovationXchange
M&E	Monitoring and Evaluation
NCDs	Non-Communicable Diseases
S1T2	Story 1st, Technology 2nd
VR	Virtual Reality

EXECUTIVE SUMMARY

Every year, more than 36 million people die worldwide due to non-communicable diseases (NCDs).[1] While the problem is global, in the Pacific Islands it is more pronounced, with over 70% of deaths caused by NCDs.[2]

The predicted rise in the percentage of people affected by NCDs over the coming years suggests that new solutions for combating NCDs are worth exploring.

In this context, Beyond The Stars (BTS) was conceptualised as an innovative approach to tackling one of the world's most persistent development challenges. The BTS program was comprised of six main activities, designed and developed in alignment with a dedicated Theory of Change model, that aimed to use transmedia storytelling and innovative technologies to inspire healthy eating habits in children across Fiji.

These activities included:

- Engagement with schools and communities to co-design the program and foster local ownership.
- Teacher training workshops and materials on using storytelling and technology in the classroom.
- An animated short film shown to introduce children to the narrative of BTS.
- A virtual reality experience inviting children to become the hero of their own story.
- An educational storybook that children can learn from both at school and at home.
- An interactive game that uses tangential learning on portable devices to inspire self-motivated learning.

Delivered over the course of five weeks to 313 Year 3 and 4 children (ages 8-10) across nine Fijian primary schools, the BTS pilot represented a $496,105 AUD investment by Australia's Department of Foreign Affairs and Trade (DFAT) innovationXchange (iXc).

[1] World Health Organisation. 2010. *Global status report on noncommunicable diseases 2010*. p. 9. https://www.who.int/nmh/publications/ncd_report2010/en/
[2] World Bank. 2014. *Non-Communicable Disease (NCD) Roadmap Report (English)*. p. 7. http://documents.worldbank.org/curated/en/534551468332387599/Non-Communicable-Disease-NCD-Roadmap-Report

The BTS program had three main goals:

1. Demonstrate how transmedia storytelling and innovative technologies are an effective method for educating children and fostering behaviour change.

2. Increase children's knowledge of and awareness about healthy and local food options.

3. Inspire a shift in children's dietary preferences towards healthy food.

Children in Fiji interact with the BTS game

Notable outcomes

After the pilot was completed, an end-of-pilot evaluation was conducted by S1T2 between November 2018 and January 2019. According to the program evaluation, a number of notable outcomes were identified:

1. **Participating children had, on average, an 11% increase in their ability to identify healthy foods and a 10% increase in their ability to identify unhealthy foods** (see **Chapter 4.1**).

2. **Participating children were, on average, 14% more likely to express dietary preferences for healthy foods and 37-58% less likely to express dietary preferences for unhealthy foods** (see **Chapter 4.1.2**).

3. **7 out of 9 (78%) teachers and 19 out of 43 (44%) parents observed a positive change in children's eating behaviours, reportedly as a result of participation in the BTS pilot** (see **Chapter 4.1.3**).

4. **All teachers and parents valued the use of transmedia storytelling and innovative technologies, with 6 out of 9 (67%) teachers suggesting this approach was more effective than traditional methods** (see **Chapter 4.2.2** and **Chapter 4.3.2**).

5. **38 out of 43 (88.3%) of parents interviewed reported either themselves or their families having experienced attitude and behaviour change around healthy eating** (see **Chapter 4.3.3**).

A child in Fiji interacts with the BTS virtual reality experience

Recommendations

Beyond these findings, a number of recommendations have been given to guide the future revision and expansion of the BTS program, as well as the development of other innovation programs across the wider Pacific region. They include:

- Adopting an approach to scalability that retains the program's contextual relevance, both for different age groups in Fiji and for different cultures across the Pacific.
- Integrating additional topics and curriculums into the program to build a more comprehensive tool for schools and help children to better contextualise and apply their learning.
- Accentuating the relationship between low- and hi-fi program materials and the real world, by providing greater opportunities for children to practice their learning in real life.
- Simplifying technology-based program resources and ensuring time for extensive testing to determine how best to scale the program within classroom environments.
- Facilitating regional training workshops for teachers and parents to provide more practical, hands-on training while cultivating ownership over the program's delivery and improvement.
- Providing more reliable and intuitive technology solutions suitable for a diverse range of hardware with minimal training requirements in order to make the program more accessible outside the school environment.

Conclusion

While the learnings that emerge from the BTS evaluation highlight that improvements can still be made in the field of technology-driven interventions, the results of the pilot suggest that innovative approaches to behaviour change can be used to tackle complex development challenges - such as NCDs. This approach may well provide the catalyst for transitioning the small-scale outcomes evident in the pilot to a much larger program that can sustain long-term impact in a cost-effective manner.

Children in Fiji interact with the BTS storybook

CHAPTER 1: Introduction

1.1 Background

Every year, more than 36 million people die worldwide due to non-communicable diseases (NCDs).[1] The burden continues to rise in low and lower middle-income countries where the poorest are often the most vulnerable. While the problem is global, in the Pacific Islands it is more pronounced, with over 70% of deaths caused by NCDs.[2]

This has led Pacific Governments to declare an 'NCD Crisis' in the region. With the continued increase in NCD rates year-on-year, finding more effective interventions is a priority.

In October 2016, a hackathon was held at the Australian Department of Foreign Affairs and Trade's (DFAT) innovationXchange (iXc) to bring together nutrition experts and technology practitioners to discuss how new technologies could be leveraged to address the issue of malnutrition and NCDs. Building on ideas that emerged from the hack, creative technology company S1T2 put forward a solution titled Beyond the Stars (BTS). BTS combines transmedia storytelling and interactive technology with health research, regional policy and school curriculum to combat some of the behavioural risk factors of NCDs by inspiring children to adopt healthy eating habits.

In creating the BTS program, S1T2 undertook an extensive discovery, design and development process over the course of two years. This process involved collaborating with local Fijian storytellers, teachers and nutrition experts to ensure that the materials created were culturally appropriate and educationally sound. During the two years, S1T2 also undertook numerous field visits to Fiji in order to consult with local stakeholders from education and health, as well as community leaders.

The final BTS pilot was delivered over the course of five weeks in nine Fijian schools to 313 Year 3 and 4 children (ages 8-10) by S1T2, with the support of SecondMuse and in-country assistance from KPMG Fiji.[3] It represents a $496,105 (AUD) investment funded by DFAT iXc and consists of a short animated film, a virtual reality experience, an educational storybook and an interactive game along with school engagement and teacher training.

[1] World Health Organisation. 2010. *Global status report on noncommunicable diseases 2010*. p. 9. https://www.who.int/nmh/publications/ncd_report2010/en/
[2] World Bank. 2014. *Non-Communicable Disease (NCD) Roadmap Report (English)*. p. 7. http://documents.worldbank.org/curated/en/534551468332387599/Non-Communicable-Disease-NCD-Roadmap-Report
[3] See **Appendix 1** for more information about program partnerships.

Fiji was selected as the preferred country for piloting the intervention because of the Fijian government's commitment to cultivating digital literacy and access to technology, as well as its willingness to support the program, as demonstrated by a Cabinet Paper ratified by the Fijian Government and Memorandum of Understanding with the Fijian Ministry of Education, Heritage and Arts. Each pilot school was selected with guidance from the Fijian Ministry of Education, Heritage and Arts to ensure participants would accurately reflect the diversity of the Fijian population, with additional consideration given to the location, type and accessibility of the school, as well as the gender and cultural heritage of participants. Further attention was given to inclusive education students to ensure children with disabilities or special needs were afforded equal and increased opportunities to participate in activities (see **Appendix 2**).

Within pilot schools and communities, there were often a number of other active policies and initiatives related to NCDs that may have affected the design, implementation and outcomes of the BTS program. On a national level, the approach to food and nutrition in schools has been shaped by policies such as the Fiji School Health Policy and the Policy on Food and School Canteens.[4, 5] Additionally, some pilot schools had participated or were participating in the World Health Organisation's (WHO) Health Promoting Schools program and/or school feeding programs from international aid organisations or local Mothers Clubs.[6, 7, 8]

Children in Fiji interact with the BTS game

[4] Ministry of Health and Medical Services, Fiji & Ministry of Education, Heritage and Arts, Fiji. 2016. *Fiji School Health Policy*. http://www.education.gov.fj/images/2016/National_School_Health_Policy.pdf
[5] Ministry of Education, Heritage and Arts, Fiji. 2016. *Policy on Food and School Canteen*. http://www.education.gov.fj/images/Policy_on_Food_and_School_Canteen.pdf
[6] World Health Organization. 2019. *What is a health promoting school?* https://www.who.int/school_youth_health/gshi/hps/en/
[7] Save the Children Fiji. 2019. *School Feeding: Nutrition in Schools*. http://www.savethechildren.org.fj/school-feeding/
[8] Sanitarium. 2019. *Good Start Breakfast Clubs*. https://www.sanitarium.com.au/social-purpose/tackling-hunger/good-start-breakfast-clubs

1.2 Program narrative

To guide the development and implementation of BTS, a Theory of Change model was developed under the guidance of monitoring and evaluation (M&E) experts (see **Appendix 3**). As this model shows, the primary goal of the pilot was to show how transmedia storytelling and innovative technologies can be an effective method for learning and fostering behaviour change in children in relation to health and nutrition.

Transmedia storytelling is defined as the approach of telling a single, comprehensive story across multiple media platforms (e.g. film, virtual reality, storybook, game). In delivering a transmedia story, the BTS program creates a story world for children to explore and interact with in different ways. Year 4 children were identified as the ideal target age group for this transmedia story, as they were young enough for their behaviours to be influenced while old enough to benefit from the use of emerging technologies in an educational context.

To achieve the program's primary goal, it was anticipated that participating children would demonstrate attitudinal shifts around food choices, especially in their perception of healthy foods. These attitudinal shifts would then be supported by teachers and parents valuing the innovative use of storytelling and technology in teaching. It was also expected that the program would have some influence over parental thinking that could, in time, lead to sustaining longer-term behaviour change.

In an effort to ensure its success, both in terms of adoption within schools and achievement of anticipated outcomes, the BTS program was designed to integrate into the existing educational environment in Fiji. This involved acknowledging and enhancing the work of the local government and other organisations targeting NCDs, health and nutrition wherever possible. Accordingly, program materials were designed to complement content from the Healthy Living subject and educational methodologies from the Fiji Islands National Curriculum Framework.[9, 10] The program also incorporated resources from Pasifika Plates, data from the Pacific Island Food Composition Table, as well as learnings from the World Bank's NCD Roadmap Report.[11, 12, 13]

[9] Ministry of Education, Fiji. 2015. *Healthy Living: Year 4*. http://www.education.gov.fj/images/december_2015/textbooks_2016/Year_4_Final.pdf
[10] Ministry of Education, Fiji. 2007. *The Fiji Islands National Curriculum Framework: Education for a Better Future*.
[11] Pacific Community, Fiji. 2015. *Pasifika Plates - Serving nutritious island flavours*.
https://www.spc.int/sites/default/files/resources/2018-05/Pasifika_plates_web2.compressed.pdf
[12] Food and Agriculture Organization of the United Nations, Rome. 2004. *The Pacific Islands food composition tables*.
http://www.fao.org/3/y5432e/y5432e00.htm
[13] Joint Forum Economic and Pacific Health Ministers' Meeting. 2014. *NCD Roadmap Report*.
http://documents.worldbank.org/curated/en/534551468332387599/pdf/893050WP0P13040PUBLIC00NCD0Roadmap.pdf

Adopting an integrated approach to nutrition education, BTS further incorporated aspects of Fiji's Physical Education, Social Sciences and English curriculums into educational materials.[14] Similarly, the program used recommendations from international reports to ensure educational content was framed in ways likely to produce position health change (e.g. focusing on reducing behavioural risk factors associated with NCDs such as consumption of salt, sugar and fat).[15] Overall, the program was designed to complement existing nutrition-focused initiatives, aiming to provide an engaging framework through which teachers, children and families could learn, discuss and act on nutrition knowledge.

The BTS team working with students and teachers

[14] Ministry of Education, Heritage & Arts. *Year 4: Textbooks*. http://www.education.gov.fj/index.php/school/textbooks/year-4
[15] World Bank. 2014. *Non-Communicable Disease (NCD) Roadmap Report*. http://documents.worldbank.org/curated/en/534551468332387599/pdf/893050WP0P13040PUBLIC00NCD0Roadmap.pdf

1.3 Activities

In order to accomplish the changes outlined in the BTS Theory of Change, six main activities were delivered. The first two of these activities (community engagement and teacher training) were delivered by S1T2 to teachers, children and parents over a year-long period. The remaining activities involved interrelated transmedia storytelling aids that were delivered either by the S1T2 team (the animated short film and the virtual reality experience), or by classroom teachers (educational storybook and interactive game) over the five-week pilot period.

These activities were designed and developed by S1T2 in collaboration with local storytellers and nutrition experts through an iterative process. They include a unique mix of teaching resources and digital learning tools (outlined in further detail below), all of which apply storytelling and tangential learning to present educational content in an enjoyable context in order to inspire self-motivated learning. This combination of low-fi and hi-fi activities allowed BTS to pilot the use of emerging technologies for educational purposes while ensuring the program's broader accessibility and usability in Fijian schools.

1.3.1 Engagement with schools and communities

In the lead up to the pilot, the BTS team worked collaboratively with schools and communities in Fiji to develop the program. This in-country engagement served to ensure that resources developed for BTS were appropriate for the Fijian school context. It also assisted the team in building relationships with participating teachers, garnering community support for the program, and fostering a sense of local ownership.

1.3.2 Teacher training workshops and materials

A series of training workshops were held with teachers at each of the participating schools in the lead up to the pilot launch. At the request of teachers, a suite of training materials were also created as part of this training. The Program Handbook (**Appendix 4**) was designed to provide information about the BTS educational approach and program materials, while the Teaching Workbook (**Appendix 5**) provided example lesson plans and guidance on how to use storytelling and technology in the classroom.

In order to ensure trouble-free implementation of the program in schools, additional support materials were developed in the form of explanatory posters, a troubleshooting guide about the interactive game, a flipbook teaching digital and game literacy, and a sticker chart to track children's progress throughout the pilot (see **Appendices 6-9**).

Examples of supplementary BTS training materials

1.3.3 Animated short film

Shown at the beginning of the pilot, the animated short film served to introduce the story of BTS to children (see **Appendix 10**). The film's aim was to extend Fijian traditions of oral storytelling through visuals that would entertain and engage children in the narrative of the program.

Throughout the film, children learn about how their ancestors once lived in harmony with a group of magical guardians, who shared with them the secrets of nature. Over time however, the secrets of the guardians have been forgotten and both the land and the people have become sick. But hope is not yet lost. At the end of the film, children discover that a brave young hero may once again bring health and happiness back to the land.

The BTS animated short film displayed for children in a Fijian classroom

1.3.4 Virtual reality experience

After watching the animated short film, children were invited to explore a bespoke virtual reality experience (see **Appendix 11**). Children were given the opportunity to actively explore this virtual world, in the process becoming the hero of their own story. This choice, to accept their quest and take control of the story for themselves, marks the beginning of each child's personal journey to learn the guardians' secrets and bring health and happiness back to the Pacific.

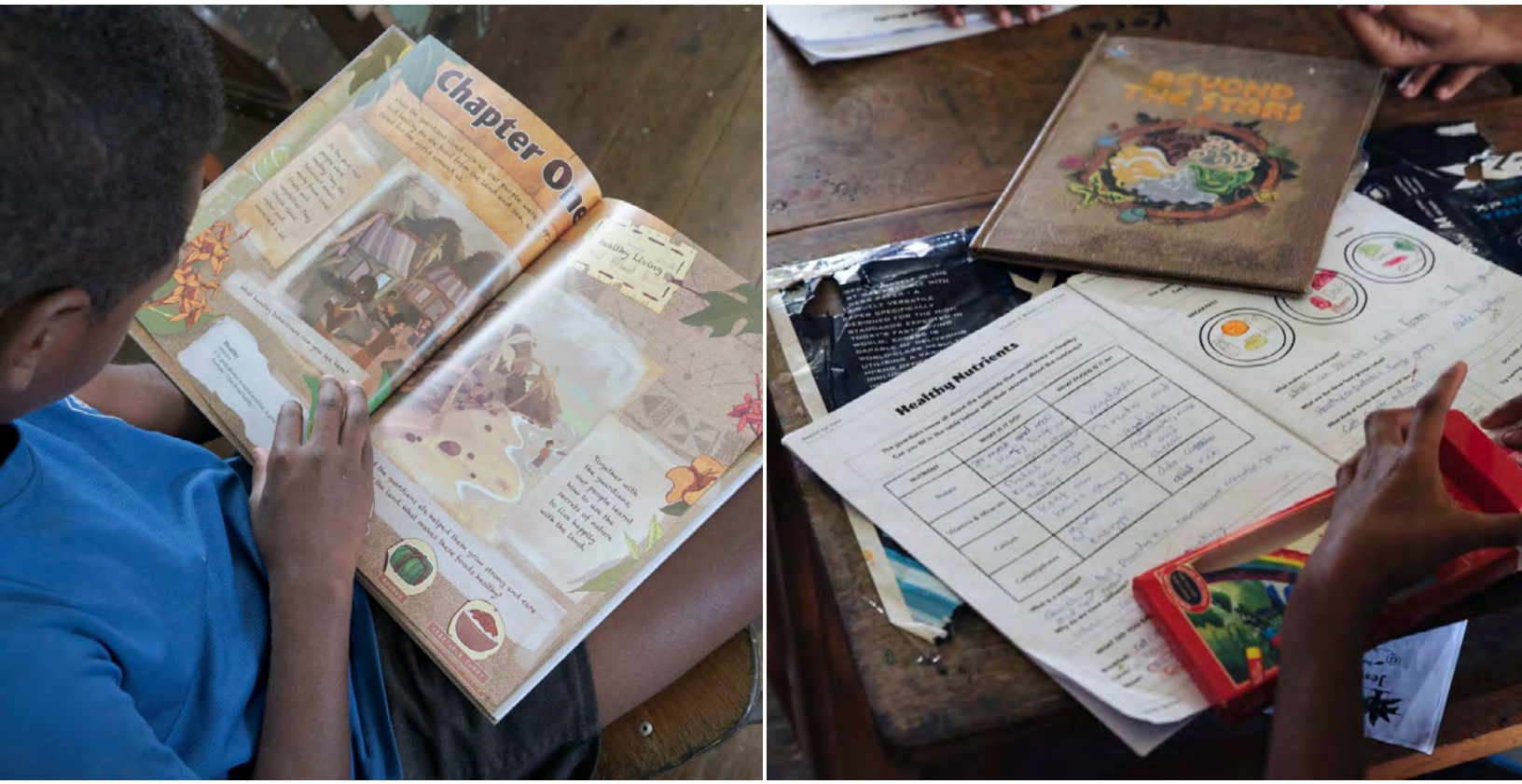
The virtual reality experience was designed with the aim of helping students become personally and emotionally invested in the story world, heightening their engagement in the rest of the program through immersion and agency.

Children can explore an immersive fictional world in the BTS virtual reality experience

1.3.5 Educational storybook

At the conclusion of the virtual reality experience, children were presented with their own copy of the BTS educational storybook and activity book (see **Appendices 12-13**). By appearing inside the virtual world and then existing in the real world, the storybook became a point of connection for the transmedia story, suggesting to children that what they learnt throughout the story could also affect their own lives.

This storybook (and the accompanying activity book) act as a guide for the rest of the BTS program, and are designed to continue the BTS narrative in a more accessible format that children can take home and share with their families. Throughout the storybook, children could explore different aspects of the story while learning about healthy eating, physical education, local produce, the environment and Fijian culture. Supported by example lesson plans provided in the Teaching Workbook, together the low-fi resources incorporated school curriculum, national policies and global recommendations into an accessible and enjoyable learning resource.



Children use the BTS educational storybook and accompanying activity book

1.3.6 Interactive game

During the BTS program, schools were also provided with a number of tablets preloaded with the BTS interactive game (see **Appendix 14**). Designed to be used alongside the low-fi program materials, the interactive game capitalised on the principle of tangential learning, providing a child-driven learning experience enhanced by hands-on activities.

The goal of the interactive game was twofold. Firstly, children needed to keep their own village healthy by earning 'Food Cards' and using their nutritional knowledge to feed only healthy foods to their digital communities. Secondly, children needed to travel to new islands and communities, each with their own unique stories and challenges to be explored. Here, children were able to rediscover the guardians' secrets, earn more Food Cards and help the island become happy and healthy by completing a variety of 'Mini Games'. These mini games were designed to be enjoyable for children, encouraging them to explore lessons in new and interesting ways.

The four mini games featured in the pilot were:

- **Food Chop:** Players must 'chop' foods into the cooking pot. Players were required to make quick choices about which foods to slash, with good foods improving their score and bad foods hurting it.
- **Snack Pack:** Players needed to identify good and bad foods on a conveyor belt, removing bad foods before they are eaten by their avatar.
- **Food Run:** Players had to run away from the lizard while navigating past obstacles and collecting foods that would make their avatar run faster or slower, depending on their nutritional value.
- **Meal Deal:** Players were presented with random foods that they must correctly identify based on a question posed to them and the information they've learnt elsewhere in the game.

Screenshots from the BTS interactive game

1.4 Principles and assumptions

A set of four principles have informed the way all BTS activities have been developed and implemented:

- **Storytelling** is the best method of communicating/learning.
- **Innovative technology** has the power to enrich storytelling experiences.
- **Play-based learning** and active participation fosters more effective learning.
- **Socially/culturally inclusive stories** make learnings more personal and effective.

In line with these principles, BTS was expected to create two mutually reinforcing outcome pathways; one of enabling outcomes for teachers and parents, and another of primary outcomes for children.

However, for the Theory of Change to hold true for the pilot, one main assumption was identified as underpinning the innovation's success:

- An assumption that transmedia storytelling using both traditional and innovative mediums will allow an educational experience to permeate across different aspects of a child's life, and that the pilot will be enough to overcome barriers to attitudinal change around healthy eating.

A number of other assumptions were identified and mitigated for, when possible, through program design:

- An assumption that presenting educational material in an enjoyable context will foster tangential learning for children, leading them to self-educate about nutrition and healthy habits.
- An assumption that children, teachers and parents will use Beyond the Stars resources as intended, both in the classroom and at home.
- An assumption that the local school community (including parents, families and community leaders) will support the pilot.

One external assumption around the enabling environment was also identified as important for success:

- An assumption that governments will support and continue to support the program.

CHAPTER 2: Evaluation Framework

2.1 Scope

The program's Theory of Change and overall evaluation framework were developed in consultation with independent monitoring and evaluation company Clear Horizon.[16] This process was developed in reference to the DFAT Monitoring and Evaluation Standards, with emphasis placed on effectiveness, appropriateness and new knowledge for potential scalability and replicability if the pilot is deemed a success.[17]

Both the evaluation methodology and the Theory of Change draw upon a developmental evaluation approach appropriate for a pilot stage program where solutions are developed and defined iteratively.

At the end of the pilot, there were three purposes for evaluation derived from the information needs of the evaluation audience (see **Appendix 2**):

- To understand the reach and outcomes achieved through the pilot (effectiveness).
- To understand what did and didn't work around using transmedia storytelling and innovative technologies to address issues of healthy eating and nutrition (appropriateness).
- To understand what has been learnt about doing innovation in the Pacific (learning).

BTS team members conducted evaluation activities with children, teachers and parents

[16] See **Appendix 1** for more information about the program's partnership with evaluation consultants Clear Horizon.
[17] Australian Government Department of Foreign Affairs and Trading. 2017. *DFAT Monitoring and Evaluation Standards.* https://dfat.gov.au/about-us/publications/Documents/monitoring-evaluation-standards.pdf

2.2 Evaluation questions

Five evaluation questions were developed based on the evaluation objectives and according to the information needs of the evaluation audience. These questions have been designed to assess both the end-of-pilot outcomes outlined in the Theory of Change as well as the principles and assumptions that underpin the design and implementation process of BTS.

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 do children have an (increased) ability to identify healthy foods?
   c. To what extent are children's dietary preferences informed by an increased knowledge and understanding of healthy eating and the link between health and nutrition?
   d. Were there any unexpected outcomes for children and/or did the outcomes vary for different groups?

2. **Effectiveness (teachers):**
   How has the pilot influenced the attitudes of teachers (as an enabling audience) towards the use of transmedia storytelling through innovative technology in teaching?
   a. Who were the teachers reached in the pilot?
   b. To what extent do teachers value transmedia storytelling through innovative technology in teaching?
   c. Were there any unexpected outcomes for teachers and/or did the outcomes vary for different groups?

3. **Effectiveness (parents):**
   How has the pilot influenced the attitudes of parent (as an enabling audience) towards the use of transmedia storytelling through innovative technology in teaching?
   a. Who were the parents reached in the pilot?
   b. To what extent do parents value transmedia storytelling through innovative technology in teaching?
   c. Were there any unexpected outcomes for parents and/or did the outcomes vary for different groups?

4. **Appropriateness:**
   How well has the pilot program been designed and delivered for the Fijian school context?
   a. To what extent was learning through transmedia storytelling and innovative technology important for engaging children?
   b. To what extent have teachers found transmedia storytelling through innovative technology engaging for child learning?
   c. To what extent were the Principles outlined in the Theory of Change applied across program development and delivery? How did they influence the program's success?
   d. What were the strengths and weaknesses of pilot development and delivery?

5. **Learning:**
   What is being learnt about doing innovation around health in the Pacific?
   a. What has been learnt have we learnt about doing innovation in Fiji?
   b. What have we learnt about doing innovation that can be transferred to other Pacific contexts?

Children using the BTS program during class

2.3 Methodology

2.3.1 Timeframe

Data collection was conducted by the S1T2 team during seven separate field visits to Fiji throughout the design, development and implementation stages of the pilot program (see **Appendix 16** for more details).

1. **Initial discovery field visit** - March 2017
2. **Secondary discovery field visit** - July 2017
3. **Early feedback field visit** - November 2017
4. **Intermediate feedback field visit** - March 2018
5. **Final feedback field visit** - May 2018
6. **Pre-pilot field visit** - October 2018
7. **Post-pilot field visit** - November 2018

The analysis and synthesis of the evaluation findings was conducted from November 2018 to January 2019.

2.3.2 Privacy, accessibility and ethics

All data collection tools have been set up in line with the Australasian Evaluation Society Code of Conduct, and are compliant with the DFAT Child Protection Policy 2017.[18, 19] The BTS evaluation framework also adopts a child-friendly approach that balances a protectionist approach while respecting the agency of all children. All evaluators working with children had completed Child Protection Training and understood their responsibilities around mandatory reporting.

Evaluation participants were given the opportunity to provide informed consent at each point of the evaluation process (see **Appendix 16**). Ethical reflexivity was built in through the choice of methods that give power to the evaluation participants, including the Most Significant Change technique.

[18] Board of the Australasian Evaluation Society. 2013. *Guidelines for the Ethical Conduct of Evaluation.* https://www.aes.asn.au/images/stories/files/membership/AES_Guidelines_web_v2.pdf
[19] Australian Government Department of Foreign Affairs and Trading. 2017. *DFAT Child Protection Policy*. https://dfat.gov.au/international-relations/themes/child-protection/Documents/child-protection-policy.pdf

2.3.3 Data collection

For the purposes of this evaluation, a convenience sampling approach was adopted, whereby children were included based on their attendance during both the pre- and post-pilot evaluation sessions, while teachers and parents were included on a volunteer basis.

This approach saw 228 of 313 children participate in evaluation activities, representing 73% of the overall program cohort with a gender split of 104 (46%) female and 124 (56%) male. 17 teachers took part in qualitative surveys (9 or 53% female and 8 or 47% male) while 39 parents participated in post-pilot evaluation activities, representing 16% of participating families with a gender split of 31 (72%) female and 12 (28%) male. More information on evaluation participation can be found in **Chapter 4**.

Data was collected from these groups through five main data collection methods. These methods are listed below, and outlined in more detail in **Appendix 17**.

1. **Reach, activity and output tracking**
2. **Pre- and post-trial surveys**
3. **Qualitative interviews**
4. **Game use tracking**
5. **After action reviews**

Given that the pilot was implemented in a live environment, a combination of quantitative and qualitative data collection methods were used. While the quantitative methods of surveys and game save data were helpful in detecting any change produced, they were limited in the extent they can attribute this change to the pilot. As such, qualitative data collection methods were also included in the form of teacher and parent interviews in order to support quantitative findings.

2.3.4 Data analysis

Data was analysed during the post-pilot period according to a variety of analysis methods including statistical hypothesis testing for quantitative data and thematic coding with illustrative quotes and stories of change for qualitative data. More information on these analysis processes can be found in **Appendix 17**.

Once data was analysed, it was necessary to undertake ‘sense making’ in order to draw out findings and recommendations against the evaluation questions and sub evaluation questions. To do so, analysed data was assembled against the evaluation questions and synthesised using an evidence table to ensure transparency of synthesis and data presentation (see **Appendix 18)**.

2.4 Limitations

The analysis undertaken and results presented are subject (and not limited) to the assumptions and limitations of data quality, iterative design process and program's nature as a pilot. These challenges were acknowledged by the team and mitigated when possible through program design, ongoing engagement in the region and the inclusion of independent experts and advisors.

Key limitations include:

- **Class disruptions:** School disruptions (e.g. public holidays, examination periods, extra-curricular commitments, etc.) during the pilot period had an impact on program usage and evaluation activities, resulting in uneven participation across pilot schools.

- **Influence of existing curriculum and programs:** The BTS pilot was conducted in a live environment where other initiatives targeting health and nutrition may have influenced participant outcomes to various levels across different schools.

- **Non-random participant selection:** Due to the program's implementation in live school environments and the evaluation's use of a convenience sampling approach, more extensive testing would be required to definitely assign any outcomes to the BTS program specifically.

- **Language and cultural barriers:** While evaluation activities were designed to minimise reliance on English language skills, some children were hesitant to engage with the evaluation team, suggesting language and/or cultural barriers may have impacted the reliability of child engagement.

- **Small sample size:** Due to the relatively small sample size involved in the BTS pilot and the associated evaluation, it is difficult to compare results from different sub-groups (e.g. gender, location, ethnicity) to the degree that findings could be considered statistically significant.

- **Implementation team as evaluators:** Both program implementation and data collection activities were conducted by the same delivery team, which may have influenced the design, planning, data collection and reporting of evaluation results.

2.5 Reporting and utilisation

Following the data collection, analysis and synthesis, this evaluation report was developed with the goal of capturing outcomes, findings and recommendations from the BTS pilot evaluation. This report has been developed in accordance with the program's Theory of Change and Evaluation Framework. Emphasis has been placed on the identification of relevant outcomes and the development of recommendations around what can be scaled in Fiji and/or transferred to other contexts around the Pacific Islands.

At completion, this report will be disseminated to DFAT and the Fijian Ministry of Education, Heritage and Arts. Where relevant, evaluation findings will also be provided to key stakeholders and participating schools to share pilot learnings and inform future practices and projects.

BTS team members conducting child friendly pilot surveys

CHAPTER 3: Key Outcomes

This evaluation has identified a number of key findings with relation to the end-of-pilot outcomes outlined in the program's Theory of Change framework (see Appendix 3). These findings have been summarised below, with supporting evidence outlined in Chapter 4.

- **Participating children had an increased ability to identify healthy and unhealthy foods.** Statistical analysis of the pre- and post-pilot child surveys found that children who participated in the program demonstrated an average increase in marks of 11% in their ability to identify healthy foods and a 10% increase in their ability to identify unhealthy foods.

- **Participating children demonstrated a shift in dietary preferences towards healthy foods.** Statistical analysis of pre- and post-pilot child surveys revealed that participating children were, on average, 14% more likely to express a dietary preference for healthy foods. Additionally, children were also 37-58% less likely to express a preference for unhealthy foods by the end of the pilot.

- **Participating children experienced a positive change in their eating behaviours.** Thematic analysis of the interviews and surveys conducted with teachers and parents at the conclusion of the pilot revealed that 7 out of 9 (78%) teachers and 19 out of 43 (44%) parents observed a positive change in their child that extended beyond attitudinal shift to a change in behaviour around healthy eating.

- **Transmedia storytelling through innovative technologies was a key factor in achieving outcomes.** Both teachers and parents agreed that the program's unique approach of using storytelling through innovative technologies in an educational context was a driving force behind its ability to inspire meaningful learning and real-world change in participating children.

- **Teachers valued the use of transmedia storytelling and innovative technologies in teaching.**
  All participating teachers valued the program's innovative educational approach, with 6 out of 9 (67%) suggesting it was more effective than traditional methods at inspiring meaningful child learning.

- **Parents valued the use of transmedia storytelling and innovative technologies in teaching.**
  All parents who engaged in pilot evaluation activities were supportive of using innovative storytelling in teaching, with 20 out of 43 (47%) parents specifically noting its effectiveness in a school context.

- **There is potential for the program's educational approach to be applied across other school years and subject matter.**
  All participating teachers agreed that the BTS program could be expanded to include other subjects and year groups, with 7 out of 9 (78%) teachers reporting that they had already begun to implement aspects of the program's educational approach in other areas of their teaching.

- **There is potential for parents and families of participating children to have experienced attitude and behavioural change around healthy eating.**
  Analysis of the parent interviews and surveys found that 38 of 43 (88.3%) parents reported that their engagement with the BTS program had an effect on their own attitudes and behaviours around eating habits and food preparation.

CHAPTER 4: Findings

The findings detailed in the following sections have been organised according to the evaluation questions outlined in Chapter 2 of this report. These questions were designed to assess the program's end-of-pilot outcomes (effectiveness), evaluate the principles and assumptions involved in the design, development and delivery of the program (appropriateness) and identify key areas of success and improvement to inform future iterations of this and other innovations in the Pacific (learning).

4.1 Effectiveness (children)

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

The evaluation shows that after completing the program, participating children had an improved ability to identify healthy and unhealthy foods, and that their dietary preferences were positively impacted by this increased knowledge in that they were more likely to express a preference for healthy foods.

On average, children demonstrated an 11% increase in their ability to identify healthy foods, and a 10% increase in their ability to identify unhealthy foods. In terms of dietary preferences, participating children were, on average, 14% more likely to express a dietary preference for healthy foods, and 37-58% less likely to express a preference for unhealthy foods.

Furthermore, according to 7 out of 9 teachers (78%) and 19 of 43 parents (44%), these positive changes in children's attitudes towards healthy eating went on to prompt behavioural changes, leading to children adopting healthier habits. While these kinds of behavioural outcomes were not specifically measured for by this evaluation, they were nonetheless a major recurring theme in qualitative responses.

These findings speak directly to the child-related end-of-pilot outcomes outlined in the Theory of Change and were informed by a number of evaluation sub-questions detailed below.

Children participating in the BTS pilot program

4.1.1 Who were the children reached in the pilot?

Program participation

Nine schools across urban, rural and remote areas of Viti Levu, Fiji were randomly selected to participate in the pilot, representing 1.23% of primary schools in Fiji.[20] Within these schools, the program was offered to 313 children, with a gender split of 142 (45.4%) female and 171 (54.6%) male. Given that the BTS program was offered equally to all children in the target cohorts within pilot schools, regardless of gender, this difference reflects the gender ratios present at the pilot schools.

Table 1: Child participation according to engagement level (disaggregated by gender).

	Total	Female	Male
Children who were provided with materials	313	142	171
Children who actively participated with materials in class	273	125	148

The age of participating children ranged from 7-10 years old, with children in the target Year 4 cohort (aged 9-10) accounting for 264 (84.3%) of children, while children in Year 3 (aged 7-8) made up the remaining 49 (15.7%) (see **Table 2**).

Table 2: Child participation according to year group (disaggregated by gender).

	Total	Female	Male
Children in Year 3	49	26	23
Children in Year 4	264	116	148

Of participating children, 273 (87.2%) engaged with the educational storybook, 208 (66.5%) experienced the virtual reality, and 132 (42.2%) played the interactive game during the pilot period (see **Table 3**). Children's ability to experience the virtual reality was based on whether or not they were present during the implementation team's school visit launching the pilot, while the ability to use the interactive game was limited in part due to software and internet issues afflicting the provided tablets during the pilot period.

[20] Asian Development Bank. 2016. *Fiji Country Gender Assessment 2015.* p. 12. https://www.adb.org/sites/default/files/institutional-document/210826/fiji-cga-2015.pdf

Table 3: Child participation in each component of the BTS program (disaggregated by gender).

	Total	Female	Male
Children who used the educational storybook	273	125	148
Children who experienced the virtual reality	208	95	113
Children who played the game	132	N/A	N/A

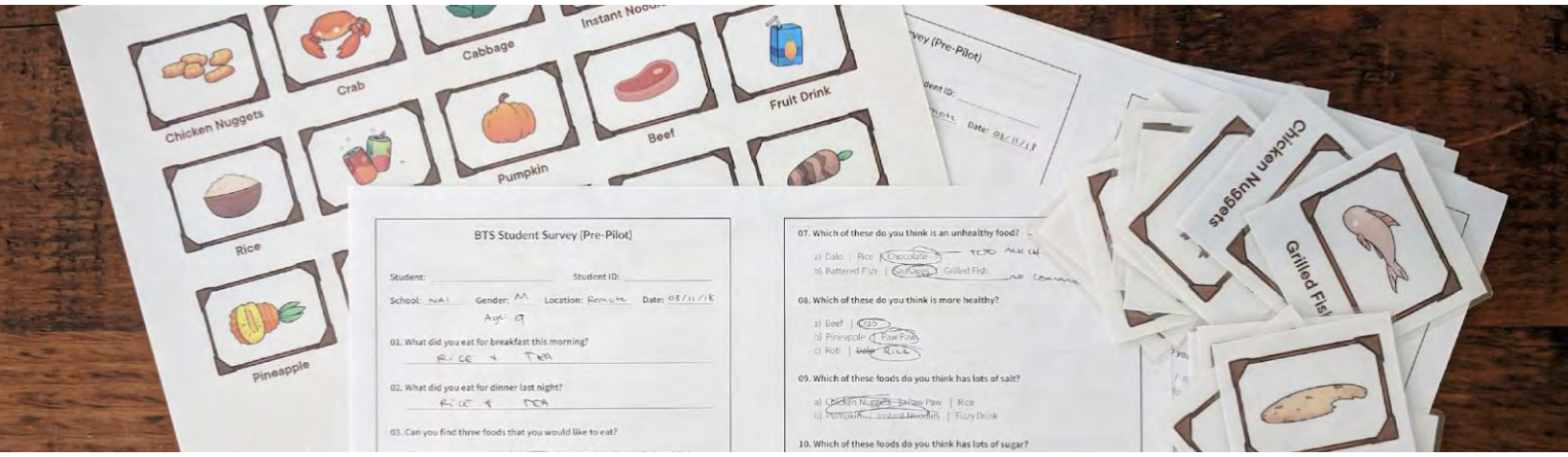
*Usage of the interactive game could not be disaggregated by gender due to limitations in how game data was collected.

Evaluation participation

228 of the 313 participating children also took part in evaluation activities, representing 72.8% of the overall cohort, with a gender split of 104 (45.6%) female and 124 (56.1%) male (see **Table 4**).

Table 4: Children who participated in evaluation activities (disaggregated by gender).

	Total	Female	Male
Year 3 children who participated in evaluation activities	48	25	23
Year 4 children who participated in evaluation activities	180	79	101
Total children who participated in evaluation activities	228	104	124



Completed BTS pre-pilot child surveys

With regard to the pre- and post-pilot surveys , 214 (68.4%) children participated in pre-pilot surveys, 118 (37.7%) participated in post-pilot surveys, and 96 (30.7%) participated in both (see **Table 5**). For the purposes of this evaluation, only the data from children who participated in both pre- and post-pilot surveys was used to inform findings and recommendations. Among these children, the gender division was largely equal, with 52 (54.2%) children being female and 44 (45.8%) being male.

Table 5: Children who participated in evaluation surveys (disaggregated by gender).

	Total	Female	Male
Children who participated in pre-pilot surveys	214	100	114
Children who participated in post-pilot surveys	118	58	60
Children who participated in both pre- and post-pilot surveys	96	52	44

Additional evaluation activities were also conducted in the form of game use data tracking, post-pilot interviews and activity book completion (see **Table 6**). While all 132 (42.2%) children who engaged with the interactive game had game session data recorded, for the purposes of this evaluation only 91 (29.1%) of those children were considered to have engaged meaningfully in that they recorded at least one play session of over 180 seconds. Data gathered from the post-pilot child interviews and activity book completion was not considered to be relevant to this evaluation due to each being deemed not entirely accurate sources of data.

Table 6: Children who participated in additional evaluation activities (disaggregated by gender).

	Total	Female	Male
Children who had game data saved	91	N/A	N/A
Children who participated in post-pilot interviews	30	14	16
Children who completed activities in the activity book	148	73	75

**Game save data could not be disaggregated by gender due to limitations in how game data was collected.*

4.1.2 To what extent do children have (increased) ability to identify healthy foods?

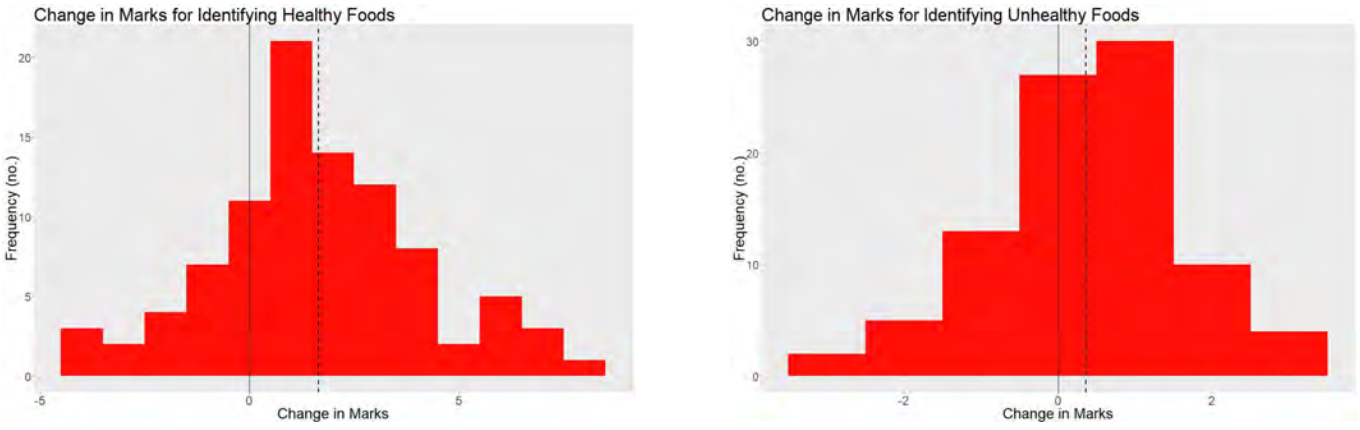
The evaluation found that children were, on average, more likely to be able to correctly identify both healthy and unhealthy foods after participation in the BTS pilot. Evidence for this outcome was found in analysis of pre- and post-pilot child surveys, and further supported by both game save data from relevant mini games and responses to the teacher and parent interviews.

On average, participating children demonstrated an 11% increase in marks regarding their ability to identify healthy foods, an increase that goes beyond that achieved by traditional teaching methods.

Hypothesis testing of the pre- and post-pilot child surveys conducted by an independent consultant concluded that participating children did appear more likely to correctly identify healthy foods after the pilot program.[21]

According to analysis of individual survey questions, participating children on average achieved an 11% increase in marks for survey questions relating to the identification of healthy foods, and an average mark increase of 10% for survey questions relating to the identification of unhealthy foods (see **Figure 1**), both of which were determined to be statistically significant at the 5% level.[22]

Figure 1: Change in marks for identifying healthy and unhealthy foods.



[21] See **Appendix 1** for more information about independent data analysis consultants Phoensight.
[22] Phoensight. 2019. *Beyond the Stars (Fiji Pilot): Program Evaluation*. pp. 9-11. See **Appendix 19**.

This outcome was formally tested by conducting paired t-tests on both the two themes and the individual questions. Based on the results from the paired t-tests on the two themes, participating children did, on average, appear more likely to correctly identify healthy and unhealthy foods after the program, with the null hypothesis being rejected and findings found to be statistically significant at the 5% level.[23]

Results from paired t-tests of the individual questions underlying these themes did, however, suggest that recorded changes in average marks were ambiguous for more detailed questions.[24] That said, it is reasonable to assume that these seemingly contradictory results could arise from the testing environment, whereby children felt more comfortable identifying foods in simpler questions.

These findings were also supported by children's engagement with the interactive game. Results from the 'Food Chop' mini game were deemed to be most relevant for this analysis, as this was the first game children were introduced to when playing and thus more likely to be the mini-game which they would be most familiar with. When data was analysed for the 31 children who played this mini game at least once across three play sessions, these children were found to demonstrate an average 8.41% improvement in their ability to identify healthy foods.

When evaluating the significance of these results, it is important to note that children who participated in the program may have, due to the timing of the pilot at the end of the school year, already learnt similar health-related content. This prior education may have impacted children's knowledge of healthy and unhealthy food and the subsequent degree of change elicited by the BTS pilot.

All participating teachers and 37 of 43 (86%) of responding parents noted an improvement in children's ability to correctly identify healthy foods.

The results of the quantitative analysis of child surveys were supported by the qualitative interviews and surveys conducted with teachers and parents. A majority of participants in both groups suggested that children had an increased ability to identify healthy and unhealthy foods. In addition, many teachers and parents observed an improvement in children's understanding of why foods were healthy or unhealthy.

When asked what had changed for children as a result of the pilot, teachers at all 8 schools who actively used the pilot responded that they had noticed a change in children, with 6 out of 9 (75.0%) teachers interviewed specifically mentioning an improvement in children's ability to identify healthy and unhealthy foods:

- ***"Now they are able to identify what foods to eat and what not to eat."***

  - Participating parent

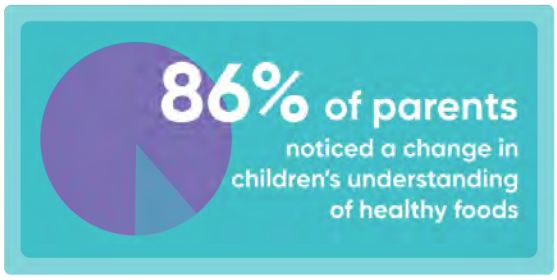
[23] Phoensight. 2019. *Beyond the Stars (Fiji Pilot): Program Evaluation*. pp. 9-11. See **Appendix 19**.

[24] Phoensight. 2019. *Beyond the Stars (Fiji Pilot): Program Evaluation*. pp. 9-11. See **Appendix 19**.

Of those 6 teachers, 5 (83.3%) further noted that this improvement in education led to positive attitude or behaviour change in participating children:

- **"In chapter seven and six where [they learnt] about eating fatty food and all that, the kids were able to differentiate. When they bring the lunch and then I could see the difference that they actually told their parents."**

  - Participating teacher



This finding was mirrored in the qualitative interviews with parents, where 37 of 43 (86.1%) interviewed parents said they had noticed a change in children, with 18 (48.7%) of those parents linking this change with their child's improved ability to correctly identify healthy and unhealthy foods:

- ***"The program really helped my child because he was able to identify the difference between healthy and unhealthy food."***

  - Participating parent

Interestingly, many teachers also mentioned that the improvement in children's ability to identify healthy and unhealthy foods extended to more detailed questions, whereby children were able to identify why certain foods were healthy or unhealthy, and the presence of macro-nutrients such as salt, sugar and fat:

- ***"Children are coming up with fruits as their morning snack and when we call out about foods in high salts they quickly respond to foods they know that are high in fat, salt and sugar."***

  - Participating teacher

Game data and parent interviews provide some evidence to suggest that participating children demonstrated a noticeable change in their understanding of nutritional complexity.

Analysis of game use data revealed that children who engaged with the interactive game throughout the pilot period appeared to have an improved ability to identify the presence of salt, sugar and/or fat in foods. Indeed, children who played the 'Meal Deal' mini game more than once during the course of the pilot were found to demonstrate, on average, a 23.3% improvement in their ability to identify foods high in salt, sugar and/or fat. This mini game required children to answer questions about the levels of salt, sugar and/or fat in certain foods, and thus can be seen as an effective test of their more complex nutritional knowledge.

Qualitative data collected during the post-pilot evaluation further supported the finding that children had a greater understanding nutrition, with teacher and parent interviews revealed numerous stories of children acting on improved nutritional knowledge of their own accord. For example, one teacher discussed how children were actively and confidently identifying the presence of salt, sugar and fat in foods during school meal times:

- *"If they bring junk foods, they will confidently point it out, 'Oh this has a lot of salt,' anybody brings chips and all those."*

  - Participating teacher

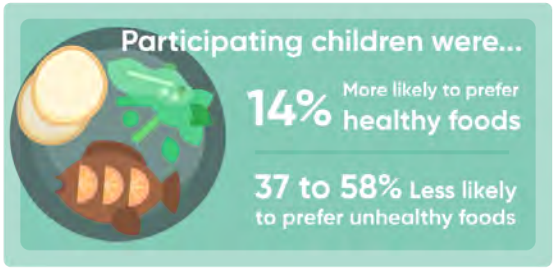
Parents also spoke of this kind of profound change in behaviour as a result of their children demonstrating an improved ability to identify healthy and unhealthy foods and further understand nutritional complexity:

- *"Now my child is opting to consume more fruits and healthy vegetables instead of junk foods and processed foods."*

  - Participating parent

4.1.3 To what extent are children's dietary preferences informed by an increased knowledge and understanding of healthy eating and the link between health and nutrition?

The evaluation found that children's dietary preferences were more likely to be informed by their increased understanding of healthy eating at the conclusion of the pilot. This outcome was supported by analysis of the pre- and post-pilot child surveys and the interviews conducted with teachers and parents.



Participating children were on average 14% more likely to express preferences for healthy foods and 37-58% less likely to express preferences for unhealthy foods after the pilot period.

In order to determine the level of change in children's dietary preferences, an independent consultant developed statistical summaries for child survey questions relating to reported food choices. These summaries, shown in **Table 7**, revealed that participating children demonstrated an increase in their preference for healthy foods, and an almost equivalent decrease in their preference for unhealthy foods.[25]

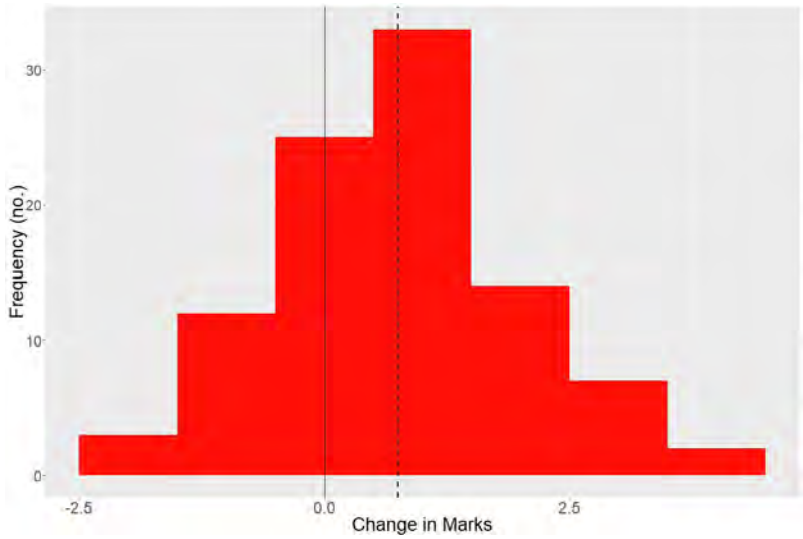
[25] Phoensight. 2019. *Beyond the Stars (Fiji Pilot): Program Evaluation*. pp. 12-13. See **Appendix 19**.

Table 7: Changes in children's reported food preferences by food status.

Question	Status	Pre-Pilot	Post-Pilot	Change (no.)	%
Q3 - Find 3 foods you would like to eat	Healthy	223	263	30	13
Q4 - Find your favourite food		68	78	10	15
Q5 - Find 3 foods you would have for dinner		211	237	26	12
Q3 - Find 3 foods you would like to eat	Unhealthy	52	22	-30	-58
Q4 - Find your favourite food		27	17	-10	-37
Q5 - Find 3 foods you would have for dinner		73	46	-27	-37

Accordingly, the hypothesis testing for this outcome found that children were more likely to express preferences for healthy food after participating in the BTS pilot. In particular, this testing showed that children who participated in the pilot on average demonstrated a 14% increase in their expressed preference for healthy foods (see **Figure 2**).[26]

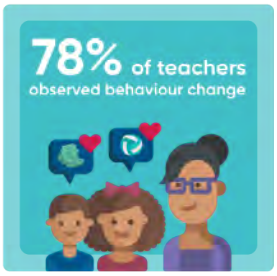
Figure 2: Change in marks for preferring healthy foods over unhealthy foods.



This finding was formally tested through paired t-tests on the individual questions and the theme overall, with the null hypothesis rejected at a level of 5% significance.[27] These results suggest that the observed changes were, both individually and as a whole, statistically significant.

[26] Phoensight. 2019. *Beyond the Stars aaaaaaaaaFiji Pilot): Program Evaluation*. pp. 12-13. See **Appendix 19**.
[27] Phoensight. 2019. *Beyond the Stars (Fiji Pilot): Program Evaluation*. pp. 12-13. See **Appendix 19**.

Due to the evaluation activities not including direct measurements of children's diets, the statistical analysis was unable to find any clear quantitative evidence to support the claim that the diets of participating children had improved after the BTS pilot.[28] However, the qualitative responses from teacher and parent interviews (discussed below) do suggest that there may have been some level of change with regard to children's diets as a result of the program.



A majority of teachers and parents identified a shift in children's preferences towards healthy foods, with 78% of teachers and 44% of parents suggesting that the impact of this went beyond attitudinal shift towards behavioural change.

Results from the qualitative interviews support the fact that participating children demonstrated a shift in dietary preferences towards eating healthy foods. When asked about whether children exhibited any change as a result of the program, 5 of 9 (55.6%) teachers interviewed spoke of an attitudinal shift in children towards preferring healthy foods. More significantly, 7 (77.8%) teachers observed that children were actually starting to act on their increased dietary knowledge:

- ***"It is really working a lot, and it has changed our students attitude, especially eating good meals, having good meals. Good eating habits. What we have seen that children are bringing now, it's not that every day they're bringing balanced meals, but at least maybe three meals in a week they're bringing balanced meal."***

  - Participating teacher

These findings were mirrored in the responses of parents, with 37 of 43 (86.0%) parents noticing a positive change in their child that they attributed to participation in the program. 18 (41.9%) of those parents observed a positive change in their child's attitude towards healthy eating, while 19 (44.2%) reported that their children were acting on this by actively changing their diets:

- ***"My child's mindset has really developed and matured in her choice of healthy food that she eats."***

  - Participating parent

Many responses from parents and teachers supported their assertion that children had experienced a change in dietary preferences by speaking about the real actions children had taken as a result of this attitudinal shift. For teachers, this evidence predominantly came in the form of children actively sharing what they'd learnt through the program with their parents:

[28] Phoensight. 2019. *Beyond the Stars (Fiji Pilot): Program Evaluation*. pp. 14-15. See **Appendix 19**.

- *"But once, I was teaching the children about this, we were discussing daily, they were really eager and when they go back home, they ask their parents, 'Mommy, I want a balanced meal. My teacher wants me to get balanced, healthy meal for my lunch."*

  - Participating parent

Similarly, the physical changes parents pointed towards as evidence for attitudinal change most often centred around how their children were talking about food at home:

- *"Everytime we have meal at home she always make sure and ask me if the three food groups all apply inside our meal."*

  - Participating parent

All teachers and parents agreed that the changes they observed in children's attitudes and behaviours concerning healthy eating and healthy lifestyles were a direct result of the BTS program:

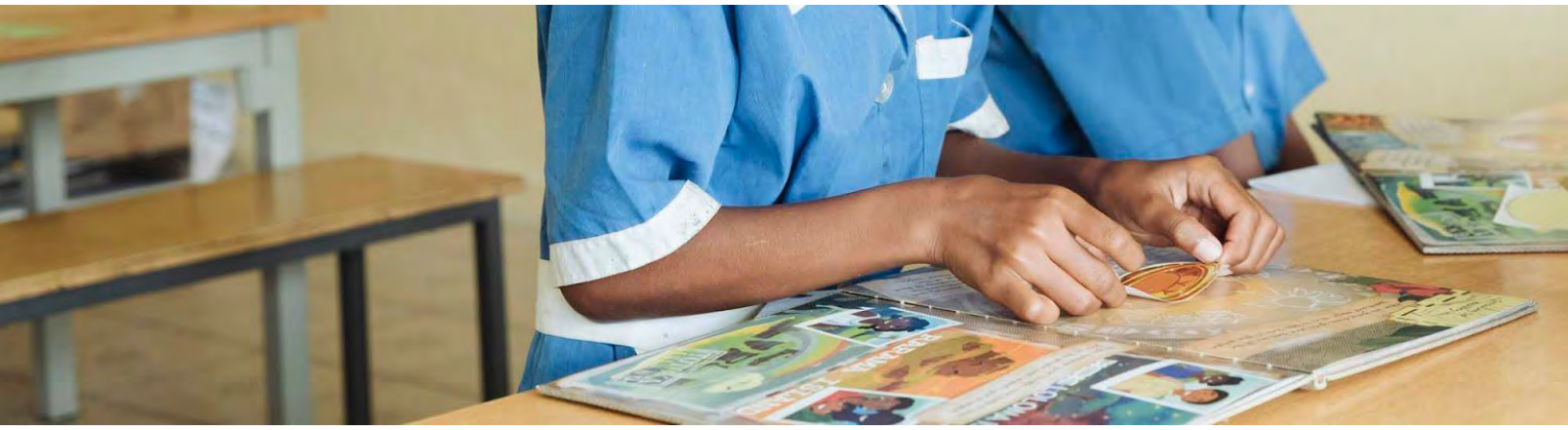
- *"I think Beyond The Stars has really impacted them in choosing the right food."*

  - Participating teacher

Parents in particular were extremely positive in their characterisation of the attitudinal change they observed in their children. Every parent who participated in face-to-face interviews and conversations with the BTS team during the evaluation period expressed how they thought that the change experienced by their children would have a positive affect into the future:

- *"It's just amazing to see how she's coming up with all those ideas and I know that it's cause she's gonna be someone who will be very, someone who's going to be very alert, always with her health."*

  - Participating parent



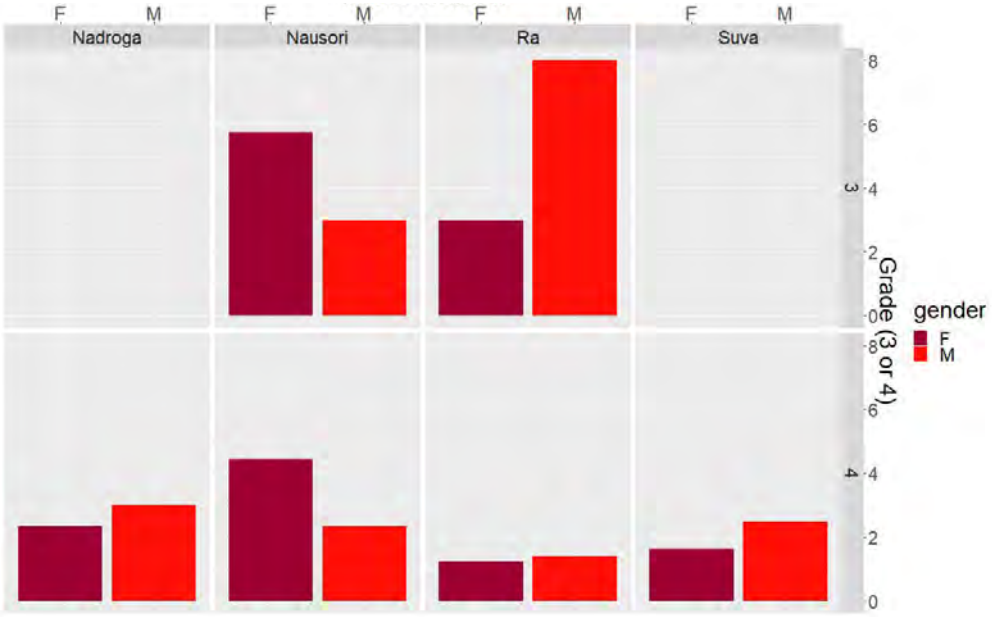
Children complete the BTS educational storybook

4.1.4 Were there any unexpected outcomes for children or did the outcomes vary for different groups?

Outcomes did not appear to vary significantly for different demographic groups, with all major sub-groups demonstrating improvement after participating in the program.

After completing the BTS program, participating children on average demonstrated increased knowledge about and preference for healthy foods.[29] While the relatively small sample size meant that it wasn't statistically viable to examine and compare results across sub-groups, these outcomes were, in general, observed across gender, class year and school location (see **Figure 3**).[30]

Figure 3: Average change in marks pre-pilot versus post-pilot by location, gender and grade.



The program appeared to have an unexpected level of positive change on children's health behaviours in line with their attitude shift towards dietary preferences.

Although it was expected that the BTS program would change the way participating children thought about healthy eating, the program also appeared to have a positive effect on children's actual behaviour over the period of time the pilot was assessed. While quantitative evaluation activities didn't specifically measure the program's behavioural impact, this was a significant theme in the qualitative responses of both teachers and parents.

[29] Phoensight. 2019. *Beyond the Stars (Fiji Pilot): Program Evaluation*. p. 7. See **Appendix 19**.
[30] Phoensight. 2019. *Beyond the Stars (Fiji Pilot): Program Evaluation*. p. 7. See **Appendix 19**.

Given the shortened duration of the pilot, it was uncertain how much behaviour change the nutritional learnings taught throughout the program would have on children. However, as teachers continually noted in post-pilot interviews, children were extremely receptive to the educational aspect of the program:

- ***"I could see the improvement noted that some are just bringing boiled fish and cassava like that, apart from fried fish and sauce and all that… It was not just for the sake of it, that they play the game and they forget about it, but they actually learned a lot from the program."***

  - Participating teacher

Parents also overwhelmingly observed this kind of behavioural change in their children. According to many parents, the program caused their child to not only be more willing to eat healthy foods when given the opportunity, but also led to children asking for healthy foods of their own volition:

- ***"My son, even his behavior at home has changed and I've seen a behavior in his thinking, in his memory, it is changed… His fruits, his water, he wants all these things… He does not want us to get Bongos and junk food for him and he's telling us, 'Get fruits, get fruits. Please just cook boiled food for me'."***

  - Participating parent

A number of parents also noted that children's increased knowledge about healthy eating had led to them taking an increased interest in the processes surrounding food sourcing and preparation:

- ***"Before, he will just pass by, 'Oh, what's for dinner? What's for lunch?'… But now he wants to take part in cutting the carrots and cutting the veggies, cucumbers. He wants to take part in that. And that's a change I've seen in him."***

  - Participating parent

Small groups of parents and teachers also mentioned noticing additional, unsubstantiated benefits of the BTS program including: enhanced academic performance, an increased focus on hygiene, changes in their child's appearance, improved relationships within the family home and a more mindful approach to the environment and local foods among others:

- **"Her attitude change. Her lifestyle change. Appearance change. She makes the parents happy. Her school work and helping the parents at home are so progressive."**

  - Participating parent

4.2 Effectiveness (teachers)

How has the pilot influenced teacher attitudes towards the use of transmedia storytelling through innovative technology in teaching?

All teachers who participated in the BTS pilot were found to strongly value the program's use of transmedia storytelling through innovative technology in an educational context. During both pre- and post-pilot evaluation activities, all teachers expressed their support of the program's innovative educational approach. Teachers spoke about the benefits of both transmedia storytelling (79%) and innovative technologies (78%), with 6 out of 9 (67%) implementing teachers interviewed specifically stating how the approach had created a more meaningful learning experience for participating children.

Additionally, the evaluation found that the BTS pilot had an impact on the broader teaching style of participating teachers, with 7 (78%) saying the program inspired them to make positive changes to the way they delivered educational content in the classroom even beyond delivery of the BTS program. Meanwhile, 6 out of 9 (67%) teachers further suggested that the pilot had the unexpected outcome of changing their own attitudes or behaviours around healthy foods.

The above findings rely on the analysis conducted with regards to the following evaluation sub-questions, which serve to answer the enabling outcome of the program's Theory of Change.

Classroom decorations of a teacher proud to participate in the BTS program

4.2.1 Who were the teachers reached in the pilot?

Program participation

Throughout the BTS pilot, at least 44 teachers were involved in the program in some way (see **Table 8**). 20 (45.5%) of those teachers participated through program briefings only, 13 (29.5%) were Head Teachers involved in supervising the program and 11 (25.0%) were Year 4 teachers with the responsibility of implementing the program. While the gender split among different groups of teachers was less even, the overall gender split of participation of teachers was 22 (50.0%) female and 22 (50.0%) male.

Table 8: Teachers who engaged with the program according to engagement type (disaggregated by gender).

	Total	Female	Male
Teachers who were (only) briefed about the program	20	12	8
Teachers who supervised the program	13	2	11
Teachers who implemented the program	11	8	3
Total teachers who engaged with the program	44	22	22

Evaluation participation

With regard to evaluation activities, 17 of the 44 teachers involved in the program (36.4%) participated in feedback sessions during the pilot, with a gender split of 9 (52.9%) female and 8 (47.0%) male (see **Table 9**). This included 16 teachers participating in pre-pilot interviews, and 11 participating in post-pilot interviews. Due to the live environment of the evaluation, there was some variation in the specific questions answered by each teacher interviewed. This has been noted where necessary in the subsequent analysis.

Table 9: Teachers who participated in evaluation activities (disaggregated by gender).

	Total	Female	Male
Teachers who participated in pre-pilot interviews	16	10	6
Teachers who participated in post-pilot interviews	11	7	4
Total teachers who participated in evaluation activities	17	9	8

4.2.2 To what extent do teachers value transmedia storytelling through innovative technology in teaching?

All participating teachers were supportive of using innovative storytelling and technology in teaching, with 67% suggesting this approach was more effective than traditional methods.

Thematic analysis of pre- and post-pilot interviews conducted with participating teachers found that both in the lead up to and after the conclusion of the BTS program all teachers were supportive of using innovative storytelling technologies in the classroom:

- *"I believe that the using technology and stories together, hand-in-hand, they will really help the children learn and improve their learning in this aspect of this new age and era."*
  - Participating teacher

When asked to explain their responses, 11 of 14 (79%) teachers asked expressed optimism about the program's use of transmedia storytelling. Many of these teachers noted that the program's use of storytelling would be engaging for children, especially within the Fijian school context:

- *"In Fiji particularly, our means of learning is social. We learn better in a social setting. Most of our history, including the mythologies, are passed to us through stories... Beyond the Stars program has captured that element."*
  - Participating teacher

These teachers also noted how transmedia storytelling would be an effective way of teaching the more practical knowledge related to health and nutrition, with the approach making it easy for children to understand and apply new knowledge in their own lives:

- *"From as young as children are to as old as I am, we like stories. Stories help us in different ways. They help us learn. I think they help us to learn about other aspects of life. And that makes us good people, better people. That mostly comes through stories."*

  - Participating teacher

7 of 9 (78%) teachers asked about this topic in post-pilot interviews also noted that technology was a key driver of the program's success, even despite the issues that some experienced with the classroom-based technologies.

Teachers noted that the use of technology improved children's digital literacy skills while being a new and engaging method of teaching:

- *"It's a very beautiful and a very new way of presenting. Most of the time when we do story, story readings, you read the story and then they summarise through writing. But this is a new way, they listen to the story and then they summarise through using technologies."*

  - Participating teacher

Teachers overwhelmingly spoke about how the program's interactive approach and use of story-based technology improved children's learning outcomes and digital literacy in the classroom. 6 of 9 (66.7%) implementing teachers who participated in post-pilot interviews specifically noted how this approach was especially effective at fostering a more meaningful learning experience for children:

- *"Engaging students in learning is the best part because if they do it themselves they will learn better and for lifelong. And if we just told them two examples of healthy food, they will just know two examples for the rest of their life. But but if they explore it will be really helpful."*

  - Participating teacher

Interestingly, a number of teachers also commented on how the program's interactive and integrated use of both low-fi and hi-fi materials allowed allowed them to better cater to the educational needs of all children, especially those who struggled with traditional learning:

- ***"Because some of the children, they have their own ways of learning. Some of them are weak, academically they are very weak... it really brought them closer to us as a group."***

  - Participating teacher

Classroom teacher proudly displaying children's engagement with the BTS program

4.2.3 Were there any unexpected outcomes for teachers or did the outcomes vary for different groups?

The outcomes experienced by participating teachers did not appear to differ between sub-groups.

Thematic analysis of teacher interviews did not find any notable variation in outcomes based on gender or location. Due to the small sample size and non-random selection of participants, it was determined that analysing results for individual sub-groups would not prove statistically relevant.

Participating teachers experienced a number of unexpected outcomes in relation to their willingness to actively promote the program and alterations to their teaching style.

In the reflections completed by the BTS team after both the pre- and post-pilot in-country visits, team members noted that some teachers were independently going to great lengths to actively support and promote the program in their schools and communities:

- *"This willingness to share the program with others was seen time and again, with teachers holding professional development sessions with other teachers, including the program in their end-of-year address, and sharing resources with other classes through photocopies of sample materials."*

  - BTS team member

This expression of the program's value to teachers was mirrored in teacher responses during post-pilot interviews, when 7 of 9 (78%) implementing teachers interviewed reporting that their experience with the BTS program positively changed their approach to teaching. These teachers further expressed how integrating the program's educational approach in other areas was inspiring more meaningful engagement from children:

- *"Now they are really lively and they're really participating actively, actively in class discussions and they are very active."*

  - Participating teacher


Teachers and children interact with BTS program materials

Overall, 3 of those 9 (33.3%) implementing teachers credited the BTS program with giving them the skills to more simply and effectively communicate educational concepts to children:

- ***"It has really improved with the explanations and understanding of the children. It was just like a brainstorming session for me."***

  - Participating teacher

Meanwhile, 4 (44.4%) teachers reported having begun to include more interactive, activity-based learning in other subject areas. After participating in the BTS pilot, these teachers felt more confident in adopting a more flexible, interactive teaching approach in order to better address the individual needs of children:

- ***"When it comes to group working, and having them have a go at each activity one by one, overall it has made me change my sort of way of teaching too. To be specifically have, going around having a one on one for those who really needed assistance. That is a positive change."***

  - Participating teacher

The program appeared to have had an unanticipated level of influence over the dietary attitudes and behaviours of participating teachers and their families.

Teachers spoke about how their participation in the pilot had significantly altered their attitude towards the use of technology in the classroom:

- ***"Initially, I had a very strong resistance for technology to lead a healthy lifestyle, so [now] I see it as a tool... It has given me another window of opportunity to consider it as a tool in the fight against NCDs."***

  - Participating teacher

Interestingly, 6 out of 9 (66.7%) teachers also reported that the BTS program had inspired some level of change in their own personal attitudes and behaviours around healthy eating. For one teacher, these changes arose from a newfound recognition of their own impact on children, and from a desire to be a better role model for those he taught:

- ***"For me, I'm trying my best also to cut down on my fatty food like I'm very mindful of what I'm eating now... I'm trying my best to also, to do away with most of the processed food and to try to eat as many locally green fruit and vegetables where possible."***

  - Participating teacher

Other teachers noted that the improved knowledge that they gained from participating in the BTS program had changed the way they sourced and prepared food for their own families:

- ***"Even at my place, sometimes I was always giving whatever they want to eat, my two kids, mostly Bongos like that. [Now] I have gone away from that. I'm just buying fruits for them, so we have no option but to have fruits... and I'm going to keep up with that."***

  - Participating teacher

While findings relating to these unexpected outcomes weren't extensively or quantitatively measured during this evaluation, they are further evidence for the value that teachers placed on the program's approach, and serve to support the program's long-term goal of inspiring wider changes in health behaviours.

Classroom teacher who engaged with and participated in the BTS program

4.3 Effectiveness (parents)

How has the pilot influenced parent attitudes towards the use of transmedia storytelling through innovative technology in teaching?

Parents demonstrated an overwhelmingly positive response to the use of transmedia storytelling and innovative technology in teaching. In addition, despite limitations in measuring activities, the evaluation found there was evidence to suggest that parent attitudes and behaviours could, to some degree, be affected by their child's engagement with the BTS program.

All parents who participated in evaluation activities were found to be supportive of the program's innovative educational approach, with 20 out of 43 (47%) parents interviewed specifically noting the educational effectiveness of using transmedia storytelling through innovative technologies.

In addition, the evaluation found that the BTS program had an unanticipated level of influence over the education and behaviours of parents whose children participated in the pilot. For example, 10 (23%) parents noted that they had learnt more about healthy eating through the program, while 38 (88%) parents spoke about making active changes to their family's eating or purchasing habits as a result of their child's participation.

These results were derived from a series of evaluation sub-questions described below with the intention of addressing the enabling outcome outlined in the program's Theory of Change.

A family participating in the BTS program

4.3.1 Who were the parents reached in the pilot?

Program participation

Parent participation was not a compulsory part of the program, however parents and families were encouraged to interact with their children in various ways (see **Table 10**). The return of program consent forms was taken to be indicative of a baseline for parent support of the program, with 237 (75.7%) parents giving their written consent. Parents were also invited to assist children with "At Home Activities" included in the activity books, which parents would then sign when completed. Of the 148 activity books analysed during post-pilot visits, 68 (45.9%) parents signed at least once.

Table 10: Parent participation in program according to engagement type.

	Number	Percentage
Parents who returned consent forms	237	75.7%
Parents who signed activity books	68	45.9%

**Gender data was not collected on consent forms or activity books.*

Evaluation participation

In terms of evaluation, parental involvement was again considered voluntary, which led to lower than anticipated participation rates (see **Table 11**). 39 (15.8%) parents of children who actively participated in the program gave some form of feedback, with 36 (14.3%) parents returning post-pilot surveys and 6 (2.2%) participating in post-pilot interviews. It should be noted that the voluntary nature of evaluation participation among parents may have led to an uneven gender distribution, with 31 (72.1%) participants being female and 12 (27.9%) being male. Given these engagement rates, findings related to parents should be considered anecdotal rather than indicative of the wider group.

Table 11: Parent participation in evaluation according to engagement type (disaggregated by gender).

	Total	Female	Male
Parents who returned post-pilot surveys	39	25	11
Parents who participated in post-pilot interviews	6	4	2
Total parents who participated in evaluation activities	43	31	12

4.3.2 To what extent do parents value transmedia storytelling through innovative technology in teaching?

All parents who engaged in pilot evaluation activities were supportive of using innovative storytelling in teaching, with 47% specifically noting its effectiveness in an educational context.

Thematic analysis of the parent interviews and surveys conducted at the end of the BTS pilot found that parents were very supportive of using innovative storytelling and technologies in the classroom, with all participating parents responding positively to questions about the approach:

- *"It's a really great approach that you have made, and we just hope that it continues."*

  - Participating parent

Many parents mentioned how the framing of educational content as a simple yet engaging story made it more relevant and understandable for children. 11 (25.6%) parents went on to specifically note how they appreciated that the program was exposing their children to new and emerging technologies:

- *"We are very happy in the use of digital literacy to teach and prepare the child."*

  - Participating parent

A child using the BTS virtual reality experience

Importantly, the majority of parents who noticed substantial changes in their children gave unprompted feedback that specifically identified the BTS program as the reason behind these changes. For many parents, this approach of using transmedia storytelling through innovative technology had proven more effective at inspiring real change than other health-related initiatives:

- *"It really helped them. For example my son wanted me to change his lunch that I prepared everyday to be balanced or to eat healthy food everyday."*

  - Participating parent

4.3.3 Were there any unexpected outcomes for parents or did the outcomes vary for different groups?

No significant differences were observed in the outcomes experienced by parents.

While the voluntary nature of parent participation in measurement activities resulted in lower levels of engagement, some form of evaluation participation was recorded across all relevant sub-groups. And, once participation levels were accounted for, analysis of the interviews and surveys revealed no significant differences in the kinds of responses being given based on gender or school location.

The program demonstrated a number of unexpected outcomes with regards to its positive effect on the education, attitude and behaviour of the parents and families of participating children.

During the post-pilot surveys and interviews, at least 10 (23.3%) parents spoke specifically about the educational benefit of BTS for the families of participating children. Many noted that their child's participation in the pilot had given them, as parents, an opportunity to improve their own health knowledge.

- *"Yes. My child has really taught me a lot about the choice of food we eat."*

  - Participating parent

For many parents, what was particularly special about the BTS program was how it encouraged a shared learning experience between children and their families. These parents often told stories about their child taking the time to share what they'd learnt in debates with siblings or over dinner with their parents:

- *"When she comes with her books and when she sits with us to share, I sit and listen and I try and get feedback and I sit and question her. I try, and get feedback from her and then, she teaches me about the stories, storytelling and the games."*

  - Participating parent

A majority of parents - 38 out of 43 (88.3%) - also made a point to share how their child's participation in BTS had prompted a change in their family. 20 (46.5%) parents noted a change in their family's eating habits, while 18 (41.8%) spoke of making changes to their purchasing behaviours.

Many parents discussed how they had been encouraged to make wider changes to what their family ate as a result of their and their child's participation in the program:

- *"[Before] most of the time we eat fried foods, now we are eating less of fried foods."*

  - Participating parent

In terms of purchasing habits, many parents reported taking an increased amount of care when preparing meals for their children, with the knowledge they gained from the BTS program prompting them to source food locally and focus on fresh ingredients over processed meals:

- *"We are being reminded as parents to be mindful when buying food, to prepare balanced meals."*

  - Participating parent

While these shifts in parent education, attitude and behaviour weren't measured extensively during this evaluation, the findings point to the program's potential to affect change beyond the child, in the family and wider community.

4.4 Appropriateness

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

This evaluation found that the BTS pilot program had been appropriately designed and delivered for the Fijian school context. The approach of using transmedia storytelling and innovative technology was found to be effective at encouraging a child-driven learning process, and was additionally found to be beneficial in assisting teachers in delivering curriculum content.

The evaluation did, however, reveal several areas for improvement, including further simplification of resources, improved robustness of technology materials, and provision of more extensive teacher training. A number of strengths and weaknesses were also identified with regards to the pilot delivery, with a view towards informing and improving future iterations of this and other innovation projects.

It should also be noted that responses from teachers and parents regarding the program's success may have been influenced by the fact that data collection was facilitated by the implementation team. While efforts were made to ensure feedback was given honestly and freely, these groups were potentially more likely to provide positive than negative feedback given their overall support of the program.

These findings are explored in greater detail in the following evaluation sub-questions.

A group of children play the BTS interactive game

4.4.1 To what extent was learning through transmedia storytelling and innovative technology important for engaging children?

The use of transmedia storytelling and innovative technology was important for engaging children, serving to motivate them in pursuing a more meaningful, self-directed learning journey.

The importance of storytelling and technology to the learning outcomes of children is most clearly demonstrated in the fact that all participating teachers specifically identified the program as the driving force behind changes in children's learning, attitude and behaviour:

- *"Beyond the Stars is the cause of change. [If] the books, and the gadgets, and all those things hadn't been there then I don't think there would be any change in the students. No matter how much we tell them to bring fruits to school, balanced diet, it wouldn't have any difference on them until and unless this program was implemented in our school."*

  - Participating teacher

While more extensive testing would be required to be able to definitively assign any outcomes to the BTS program specifically, in their after action review, the implementation team similarly echoed the belief that the program's story-based and multi-platform approach would be important in engaging children of all abilities in health education:

- *"We are delivering something new and inherently interesting, it also engages multiple modes of learning which will speak to different students in different ways with different levels of efficiency."*

  - BTS team member

The evaluation also found that teachers and parents overwhelmingly believed that the program's approach was appealing to children, and thus was able to not only encourage deeper engagement, but also inspire children to recognise the potential for them to apply what they learned to their own lives:

- *"It captivated their interest and really helped them in living a healthy lifestyle."*

  - Participating parent

This idea that the program's unique approach to teaching was exciting for children was mirrored in the BTS team's reflections, with team members highlighting the fact that the program appeared to be significantly more engaging for children than other, more traditional initiatives:

- ***"[It links] in with what kids are already interested in and fascinated by, which makes the program far more engaging than a normal education program… I had the strong sense this program would be very memorable for the children in the future."***

  - BTS team member

The evaluation also noted that the program's use of technology appeared to be a big motivator for children. The active participation in learning that the technological aspects of BTS fostered, not only captured children's attention, but also empowered them to create change in their own lives:

- ***"But having the children teach themselves, through working through the books and the games. I've watched them, and how engrossed they've been. I think [its] good. I only hope that it will be taught to more students to cover all the students in Fiji."***

  - Participating teacher

The fact that children were able to recognise themselves and the world around them within the story of BTS was also a significant factor in its success. It appears that engaging with a world that included people and environments that closely resembled those they were familiar with helped children to see the connection between what they learnt in the narrative and how they could use those learnings in their own lives:

- ***"Make it more local to them… Because it's making it more realistic then. And then, living it out is one thing, and when the story is more realistic, they will fully practice it. And it will really dawn on them as well, what's happening in Fiji."***

  - Participating teacher

The program's effectiveness could be improved by simplifying the core story and integrating the technological aspects more fully into classroom teaching.

In post-pilot interviews, some teachers did note that the complexity of the program's story, and its reliance on English explanations, were a potential hindrance to the effectiveness of the program. For example, some teachers noted that children with weaker English skills struggled to understand:

- ***"The story, the story part where we do the storytelling, that's a bit, just needs a little bit of clarification to the children, the understanding of the stories, the activities."***

  - Participating teacher

This concern was mirrored by the implementation team, who often noticed that children with lower English or digital literacy skills were less likely to understand the complexities of the story:

- ***"I have my reservations as to if all children understood the story or its message as I don't know to what extent they were listening to the storytelling in the VR or if they even understood the language being used."***

  - BTS team member

Additionally, while teachers and children were clearly very supportive of using technology in the classroom, this aspect of the program was also the most unreliable, with some teachers reporting instances where the tablet was unable to be used effectively due to technical errors:

- ***"They were very interested in using the tablets that was available, but due to some unforeseen circumstances they were unable to. That was the only part that they missed out, which was the most interesting part... where the children would have been able to use the tablets to learn better."***

  - Participating teacher

4.4.2 To what extent have teachers found transmedia storytelling through innovative technology engaging for child learning?

A majority of teachers reported that the use of transmedia storytelling and innovative technology was not only engaging for children, but also helpful to teachers in delivering educational content.

Teachers expressed an overwhelming view that the approach of using transmedia storytelling and innovative technology was effective at engaging children in learning. The extent to which teachers valued this approach can be seen most strongly in their enthusiasm for delivering the program in future years:

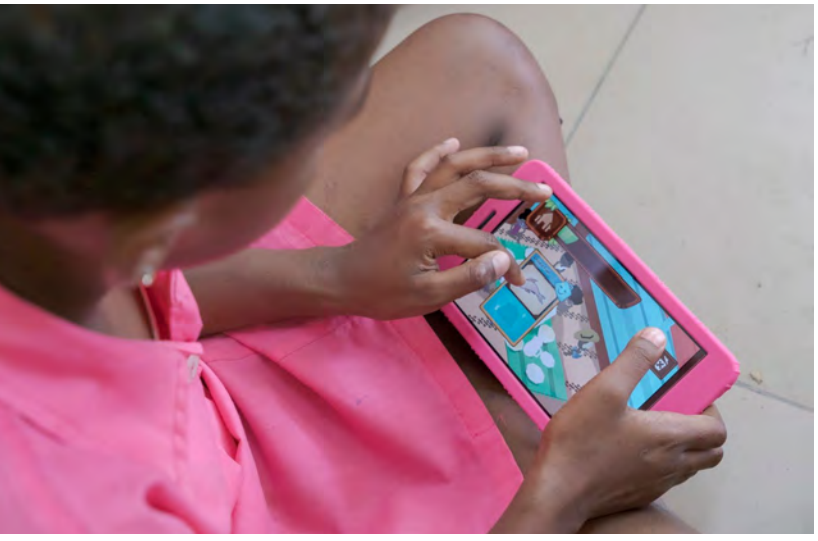
- *"We hope that we will continue this program for next year and upcoming years, for the betterment of our students."*

  - Participating teacher

The combination of low-fi and hi-fi resources included in the BTS pilot seemed to be an important factor in how engaging the lessons were for children, and how helpful teachers found the program for delivering educational content:

- *"This Beyond the Star with the teaching, with the story book and videos and tablet, I think it has really uplifted their, what do you call, their understanding or what do you call, the interest, uplifted their interest in learning that aspect of teaching."*

  - Participating teacher



Hi-fi and low-fi materials from the BTS program

It's important to note that teachers' belief in the program's educational approach was supported by a pre-existing conviction that technology was becoming increasingly important to education and life in Fiji:

- *"We want to let children make use of technology... So I think it is a very good initiative and this modern technology is used in the classrooms as we are stepping into the new era."*

  - Participating teacher

That said, teachers seemed to particularly value the BTS program's integrated approach, with many commenting that the use of story and narrative gave meaning to the technological aspects of the program, and guided children towards having a more educational experience of technology:

- *"For them I think it's just the way that we introduce it. For some of the kids, some of them were introduced to it in a negative way, say Facebook or YouTube and other things they watch. But if they get to be educated about the use of technology to help with their education, I think it'll help them yes."*

  - Participating teacher

The program's approach could be made more effective for both teachers and children by delivering a more robust technological solution and providing more extensive training about its use in the classroom.

While the program's use of innovative storytelling technologies was clearly supported by teachers, many did experience challenges in implementing the technology. These difficulties demonstrate that there is room for improvement in the usability of new technology in classroom environments. As noted by the BTS implementation team, prioritising stability over extensive features and providing more in-depth teacher training on how to diagnose technology-related issues would potentially help to solve these challenges:

- *"The fact that the game functionality was unreliable and the limited scope of teacher training on how to actually use this kind of technology in the classroom did impact its usage."*

  - BTS team member

The evaluation also found that, while teachers did recognise the educational value of the provided technology, many teachers used the interactive game as a motivator and reward for completing other work, rather than as an educational tool in its own right:

- *"As soon as the program starts, they know that the digital one is towards the end of the, where they do the games, and they really do the activities as per required. So you know, you have to complete this one in order to do this one, and they all look forward to go into the games."*

  - Participating teacher

As the BTS implementation team noted, providing teachers with more training on how to use technology effectively in the classroom would empower them to make better use of the educational (as well as motivational) value of these resources:

- ***"I also believe that the program could benefit from more teacher training on how to use storytelling as a tool in the classroom in order to capitalise on and enhance the teaching methodology championed by the program."***

  - BTS team member

4.4.3 To what extent were the Principles outlined in the Theory of Change applied across program development and delivery? How did they influence the program's success?

The principles outlined in the pilot's Theory of Change were applied extensively across development and delivery, forming a critical component of the program's success. Furthermore, as a testing ground for these principles, the pilot demonstrates how this approach could be used and adapted in the future.

Great care was taken to create a compelling story that would help children internalise educational outcomes and realise the personal significance of their learning.

The BTS program's design and development was largely driven by the idea that storytelling is the best method for communication and learning. This had a significant impact on the resources delivered during the pilot, all of which positioned story as an educational tool, rather than an additional novelty.

The significance of this principle on the program's results was noted throughout the evaluation, often credited as a key reason why children appeared to be so willing and able to transfer what they learnt during program lessons to their own lives:

- ***"When we tell stories they can imagine things and they can put it into their real life."***

  - Participating teacher

Teachers also commented on how the program's framing of educational content as a story gave children a more effective way to communicate with their peers and families about what they were learning and what kind of impact it could have on their lives:

- ***"Storytelling... that is how they will share it with other children. And in the sharing, learning, they will better understand will come."***

  - Participating teacher

Overall, adhering to this principle in the pilot's design and delivery allowed BTS to capitalise on the tradition of storytelling evident in Fijian culture, ultimately providing enjoyable entry points into educational content for children:

- ***"But over here, we learn from people around us. Beyond the Stars program tries to capture that to bring about changes in behavior as far as eating and living habits."***

  - Participating teacher

That said, the language used in the story was, at times, too complex for the target audience of Year 4 children across Fiji, especially given the significantly differing levels of English comprehension across urban, rural and remote areas. Simplifying the story and the language used to tell it may assist children in better understanding the narrative and its underlying messaging.

Experiencing stories through innovative technologies could provide children with a sense of immersion and agency that enriches the learning process.

The BTS team noted that children seemed to be more engaged in the overall program if they experienced either the VR or the interactive game. The positive impression of innovative technology used during the pilot seems to be due to its ability to create a more memorable experience for children:

- ***"I do believe this approach is an effective way to engage children in learning. I believe the VR experience was an exciting experience that most children will remember for a long time."***

  - BTS team member

A child shows their favourite page in the BTS educational storybook

It does appear that the immersion and agency offered by the interactive design of technologies was beneficial, in that it gave children an experience that was highly personalised. Participants from all evaluation groups noted how children were likely to not only remember the experiences they had with the VR and interactive game, but also connect the experience to the desired learnings surrounding health and nutrition:

- ***"But the VR and the tablet, it was for them to really experience themselves, really look and see… it was really, it was really effective, very effective for them."***

  - Participating teacher

However, it is worth considering that the benefits of an emerging technology such as VR should be further assessed against the cost of its development and implementation in a classroom context. This memorable experience could potentially be offered to children through expanding other elements of the program:

- ***"The VR, while fantastic for setting up the story, is difficult to use in all Fijian classrooms… The story could be effectively told through reading a book as a class or an experience in the game."***

  - BTS team member

It should also be noted that limitations in this evaluation's ability to test the effect of individual components on participating children (due to the small sample size and non-random selection of participants) means that the actual effect of innovative technology on learning cannot be quantifiably determined in isolation of the entire program.

A child shares the BTS educational storybook with her sibling

Tangential learning tools appeared to foster more engaging and effective learning for children, with active participation encouraging meaningful, child-directed exploration of educational materials.

It does appear that adopting a tangential approach to learning (across both the low- and hi-fi aspects of the program) was effective for the education of participating children. Participating teachers and parents both noted how children appeared to be more active in their learning because of their increased agency:

- ***"Children learn better with that because they actually see what is there, in the handbook, they were able to practice it. Children learn better with that, that hands on activity, the learning that they do."***

  - Participating teacher

Teachers in particular were incredibly supportive of this approach, with their belief in its effectiveness demonstrated in the fact that 63.6% of implementing teachers reported having changed their own teaching methods in order to incorporate an increased focus on tangential learning by the end of the pilot:

- ***"It has changed myself as well because instead of that boring blackboard teaching, the Beyond the Stars have come to meeting the students needs in a way they want to be taught. Because now I feel that students are getting bored with the chalk and the blackboard."***

  - Participating teacher

It also appears that tangential learning tools were successful not only in empowering children to explore the provided educational materials, but also encouraging them to use what they learned to more meaningfully engage the world around them. Indeed, both teachers and parents reported that children had begun using BTS activities as frameworks through which to discuss health and nutrition in their own lives:

- ***"If we are having dinner, he has an elder sister, so he'll be asking the elder sister, 'Which food group does this belong to?'"***

  - Participating parent

Creating socially and culturally inclusive stories was found to make learnings more personal and engaging for children, inspiring them to begin applying these learnings in their own lives.

By inclusively representing the social and cultural diversity of Fiji, the program aimed to create a world that was fictional yet familiar to participating children. This choice appeared to heighten children's ability to recognise the connection between what they were learning in the story and their own lives in the real world, as demonstrated by one interaction witnessed by the BTS team during testing:

- ***"Children at one rural school quickly became engrossed in the character creation process. For a good 10 minutes, they experimented with changing the colours of their characters clothing and comparing these to the colours they saw around them in the real world - delightedly squealing whenever they found a new match."***

  - BTS team member

The importance of creating a socially and culturally inclusive story was evident in feedback from teachers and parents, who frequently noted how the extent to which the program materials represented the cultural context of Fiji had an impact on children's engagement with the underlying learnings:

- ***"Just make it more local to them... Because it's making it more realistic then. And then, living it out is one thing, and when the story is more realistic, they will fully practice it. And it will really dawn on them as well, what's happening in Fiji."***

  - Participating teacher

The BTS program's success at creating culturally appropriate materials was additionally demonstrated in the commitment shown by children and teachers towards the program. For example, children at one school showed such a high level of dedication to applying what they learnt in BTS that the school independently organised an end-of-year award to honour their hard work and achievement.

While the evaluation revealed that the visuals of the program were appropriate to the social and cultural environment in Fiji, the BTS team did note that, in future iterations of the program, including local dialects in addition to English may help the story more closely reflect the linguistic reality of Fijian children:

- ***"Our program is not trying to do the same thing as other educational materials; it's not trying to teach English, but to create a personal journey that students can relate to. When a large proportion of the students struggle to understand the language that the program is delivered in, this makes it much harder for students to feel comfortable and represented in the materials."***

  - BTS team member

4.4.4 What were the strengths and weaknesses of pilot delivery?

The design of program materials, dedication to building strong relationships with schools, and determination to roll out ambitious technology in challenging environments were all distinct strengths of program delivery that contributed significantly to the success of the pilot.

The depth and breadth of the materials designed and delivered during the BTS program were noted by all evaluation groups as a distinct strength of the pilot. In all pre-pilot and post-pilot interviews, teachers spoke about how the resources were appropriate for the target Year 4 age group in Fiji, often highlighting the highly visual and simple-to-understand design as important factors for children's learning:

- *"I really like the texts. It's colorful, easy reference for the kids. You know which page to turn to and where the answers are, and the explanations are really simple. Just simple. Easy for a young person to understand."*

  - Participating parent

Teachers and parents alike appreciated the highly creative, interactive nature of each of the program's resources, while also praising the child-centred approach as exciting and empowering for participating children:

- *"It's really inclusive, interesting... It's student-centered, because students will be the ones that are engaging and exploring and learning."*

  - Participating teacher

BTS materials decorating classrooms in Fiji

Furthermore, it appears that the training materials provided to teachers alongside child resources were an important factor to success. While the careful design of these materials gave teachers much-needed direction, even just the existence of these teacher-focused resources was key in driving teacher engagement:

- ***"They seem to really appreciate new, well-structured content and resources they can use in their class."***

  - BTS team member

The time that the BTS team dedicated to fostering strong relationships with schools and teachers was also a significant strength of pilot delivery. The team's repeated visits during the development and implementation phases of the pilot were invaluable in building trust, and were clearly appreciated by participants:

- ***"As long as you come and you love to come and teach the children, come and be with us, that is wonderful."***

  - Participating teacher

As one member of the BTS implementation team noted, the consistency of these visits was key to inspiring dedication in the program from participating teachers, which undoubtedly contributed to their overall willingness to implement the program even in the face of significant challenges:

- ***"You can't undervalue the benefit of having a consistent point of contact for the participating schools… Her dedication inspires dedication in the teachers to really give the pilot their best."***

  - BTS team member

Additionally, the BTS team noted that the inclusion of a local program coordinator strengthened the delivery team, allowing for culturally-informed interactions with participants and a level of validity and local ownership to be conferred onto the program as a whole:

- ***"Use of local fixers who were part of the project delivery was a great factor in creating local affiliation and ownership for the program. This localisation of implementation should probably be looked to be increased."***

  - BTS team member

Furthermore, the determination of the BTS program to roll out innovative technologies in low-resource classrooms within Fiji was a major strength. Despite technological issues during roll out, the team's commitment to delivering this kind of technology to children was praised by teachers and parents:

- ***"We love playing with the tablets and the new technology that you have brought will be an eye opener for the school."***

  - Participating teacher

It was repeatedly noted by all evaluation groups that the inclusion of emerging technologies in the program despite real and perceived challenges was hugely valuable, not only to children's learning through the program, but also their general experience and worldview:

- ***"It serves a great purpose as it broadens student's understandability and knowledge about the concepts."***

  - Participating parent

Several areas of improvement were noted with regards to pilot delivery, including the timing of the pilot period, the reduced amount of teacher and parent training, and issues with class-based technology.

The timing of the BTS program was a significant weakness of pilot delivery, both in terms of when it was implemented (mid way through the final term) and the length of time it was available to schools (reduced from 10 weeks to 5). This weakness however could not be entirely mitigated as it relied on external, uncontrollable factors:

- ***"I think the program will have more of an impact on the teachers than the students in the amount of time available... it will be harder for kids to understand the themes of BTS in just 5 weeks in a way that they actually learn from it."***

  - BTS team member

The issue of pilot timing was also a recurring theme in both pre- and post-pilot interviews with teachers. While teachers did maintain that the program had been beneficial to children, having the program begin earlier and run for the whole school year was the most common piece of feedback given:

- ***"Timing was a big challenge. It was, I wanted to teach more to these children. Yes. They need time."***

  - Participating teacher

The request for more extensive teacher training was consistent among teachers. While the provided training materials did ease program adoption, both teachers and the BTS implementation team felt that additional, in-depth training would have provided teachers with more confidence and an increased ability to effectively utilise and troubleshoot technology in the classroom:

- ***"The addition of teacher training workshops would allow us to more comprehensively train teachers on our approach, and potentially adopt a more scalable approach to socialising the program."***

  - BTS team member

It's also clear that the relative lack of direct parental engagement was a distinct weakness in the pilot. Many teachers and parents noted how the program could have been more effective if more consideration had been given to how to engage with parents:

- *"Visit the villages, talk with them about healthy food, diet. Maybe they'll get a change, and they'll change their perspective on preparation of meals. That would surely inspire change in the villagers. Talking to them, maybe hearing it from you people, experts on that. They might get a change."*

  - Participating parent

The BTS team also noted, in both pre- and post-pilot reflections, the need to give more consideration to parent involvement in future:

- *"To make the program more effective, we should consider ways to engage parents into the program. Maybe a teachers/parents training a couple of days before our team visit the schools."*

  - BTS team member

An additional weakness in delivery was the stability of the technology provided to classrooms. At some schools, problems with the game build meant that children were unable to interact with this aspect of the program for some or all of the pilot period:

- *"No, the only challenge was that my student can't access themselves with the game. That's the only one. But they were looking forward to it."*

  - Participating teacher

BTS implemented a variety of technologies in Fijian classrooms

4.5 Learning

What has been learnt about doing innovation around health in the Pacific?

Based on the evaluation of the program, a number of learnings have been identified that could be used to inform how innovation programs are conducted in both Fiji and the wider Pacific region in the future.

With regards to health innovations in Fiji, creating resources that integrate well into the existing environment and providing in-depth training on how to use these materials further serves to ensure program adoption. Furthermore, designing measurement activities in ways that are appropriate to child audiences helps foster genuine participation in the evaluation process.

Looking at innovation in both Fiji and the Pacific more generally, the evaluation noted that extensive in-country engagement can have a significant impact on the level of support that programs receive. The evaluation also found that technology-driven innovations have the potential to create impact in urban, rural and remote areas, provided each context is taken into consideration.

The above learnings have been derived from evidence gathered throughout the evaluation process and are discussed in more detail across the following sections.

4.5.1 What have we learnt about doing innovation in Fiji?

Having both low-fi and hi-fi resources that integrated into the existing Fijian curriculum made it easier for teachers to implement the program in classrooms.

This evaluation has found that providing teachers with resources that aligned with existing curriculum was crucial in ensuring they felt comfortable enough to use the program in classrooms:

- *"If everything is provided, I don't see the problem in running it in the school."*

  - Participating teacher

Importantly, this combination of supplementing hi-fi materials with low-fi resources also meant that, even when teachers experienced issues with the technology, the program could still be used.

Providing in-depth training for teachers and parents could create a more effective enabling environment for participating children and broaden the program's overall sphere of impact.

While teachers were proactive in implementing the BTS program in their classrooms during the pilot period, additional group-based teacher training may prove beneficial when expanding the program. The evaluation suggests that participating in communal, hands-on training would help teachers feel unified ownership over the program while also providing them with a peer support network to share learnings and experiences:

- ***"The addition of teacher training workshops would allow us to more comprehensively train teachers on our approach, and potentially adopt a more scalable approach to socialising the program ahead of its implementation in individual schools."***

  - BTS team member

The evaluation also found that there was a distinct desire, from both teachers and parents, to have the BTS team hold briefing sessions directly with parents and community members. Both these evaluation groups and the BTS implementation team agreed that it seemed likely parents would be more embracing of the program and supportive of their children's participation if they were given more information and guidance:

- ***"If we have proper training, teachers and parents... Because some parents, despite being reminded by the teacher, they won't take that into consideration."***

  - Participating teacher

BTS materials on display in a Year 4 classroom

Technology-based resources designed for the classroom should prioritise simplicity and stability over additional features in order to ensure they're used appropriately in schools.

The overwhelmingly positive response from teachers and parents regarding the use of technology in the classroom during the BTS pilot provides strong evidence that there is a desire for technologically-driven innovations in Fijian schools. That said, future programs should learn from this evaluation's finding that ambitious applications of emerging technology in a pilot context still require a minimum level of stability regardless of being a prototype in nature:

- ***"Simplifying the resources, mainly the VR and the tablets will be necessary for a whole-country rollout... The resources need to be something that can be picked up by schools after a simpler training session."***

  - BTS team member

The problems that some schools experienced with tablet connectivity demonstrate the need for innovations to be extensively tested in live environments before piloting, with consideration given to allow for less than ideal situations:

- ***"I would also strongly recommend that the game be able to function smoothly both online and offline. Internet access just isn't reliable enough to support a game that doesn't work when it's not connected, and I believe this was the biggest hindrance to engagement during the pilot."***

  - BTS team member

Alternative evaluation methodologies may need to be developed to suit specific participant groups.

During the evaluation process it was found that traditional measurement activities such as text-based surveys were not always appropriate across varying cultural and social contexts. Throughout the BTS pilot, children were often extremely hesitant in their verbal interactions, even with local team members:

- ***"Children seemed excited to see us, but that did not often translate into engaging interviews... We understood that there were some cultural challenges at play, in terms of kids not being used to communicating their thoughts."***

  - BTS team member

Future projects in both Fiji and the Pacific should ensure that monitoring and evaluation teams are both willing and able to adapt the way they deliver evaluation activities to better suit the specific needs of participants, and unique context of the environment.

4.5.2 What have we learnt about doing innovation that can be transferred to other Pacific contexts?

In-country engagement throughout the innovation process lowers barriers to program adoption, increasing the likelihood of program success.

Dedicating time to engaging with in-country stakeholders and pilot participants such as teachers and parents is invaluable for fostering trusting relationships, which in turn encourages participants to provide more genuine, considered feedback to inform the design process:

- *"[The lead educator of BTS] has clearly built up a strong relationship with the teachers and participating classes. They were happy to see her which, while not surprising, isn't a guarantee. That doesn't just happen and takes a lot of work to create such strong relationships."*

  - BTS team member

This was further reinforced in the pilot by the role that the Ministry of Education, Heritage and Arts, Fiji had in officially endorsing the program to schools through the ratification of a Memorandum of Understanding and subsequent Cabinet Paper with the Fijian Government. This added a level of authority to the BTS team's activities in schools and communities.

Additionally, cultivating authentic in-country relationships seems to have a significant impact on the attitude of teachers, and their willingness to make use of provided materials. Future innovations can learn from the fact that the level to which teachers felt personally invested in the program's success dictated the way they used - or didn't use - the program in their class:

- *"While one teacher didn't use the program at all (possibly due to the fact that the school experienced significant staffing changes in the lead up to the pilot), teachers at other schools were so dedicated to the program that they built their term around it."*

  - BTS team member

Child complete BTS evaluation activities

Culturally-appropriate innovations generate more support and foster an intimate learning experience.

The BTS pilot demonstrates how projects that are informed by, and strive to appropriately represent local lifestyles and culture, are able to generate high levels of engagement from audiences:

- ***"Children were always excited when we told them we had a game for them. But when they actually opened up the game, and saw the world, that excitement was taken to the next level. On multiple occasions I remember hearing children say 'Oh, they can look like me!' with relation to the character creation process. They loved that this was a story they could see themselves in."***

  - BTS team member

The perceived locality of the pilot was also decisive in helping children see themselves as a part of the story. This close connection between the fictional world and real life appears to have a positive effect on children's educational and behavioural outcomes, as they were able to understand the significance of what they were learning and further begin to act on this in their own lives:

- ***"Make it a local story... and it will really dawn on them as well, what's happening in Fiji."***

  - Participating teacher

While the pilot was designed to be culturally-appropriate for Fiji, it remains to be seen how relevant it is to other countries in the Pacific that have their own unique cultures. Therefore, future innovations will need to aspire toward creating a balance between being culturally-appropriate while scaleable.

Children learn about local foods in the BTS educational storybook

Designing for both target and enabling audiences can ensure innovations are delivered effectively.

Taking enabling audiences into consideration during the design phase helps ensure that those directly involved with the program's delivery are well prepared. This is especially relevant when teachers have the responsibility of delivering innovations, as they play a significant role in creating a safe and supportive environment within which children can effectively engage with program resources:

- ***"The level of prior engagement and training that teachers had received with the program seemed to have a significant impact on how on board and confident they felt at implementing the program in class."***

  - BTS team member

Future innovations targeted at children in the Pacific could also benefit from more deliberate consideration of the role parents play in reinforcing learnings and enabling longer-term change. While the BTS pilot shows that children's learnings can affect family attitudes and behaviours, future projects could take better advantage of this by providing parents with more guidance on how they can support their child's learning experience. Indeed, the findings of this evaluation suggest that greater emphasis on engaging multiple spheres of influence could lead to a more comprehensive intervention.

Technology-driven innovations are valued and valuable in urban, rural and remote environments.

The overwhelmingly positive response of children, teachers and parents towards the use of technology in the classroom throughout the BTS pilot demonstrates the desire for this kind of technology-based innovation across urban, rural and remote contexts:

- ***"The teacher and the students welcome this kind of technology and this kind of learning in their classrooms. They are excited to have it and, in time, will be proficient in using it... Other programs shouldn't be afraid to try this kind of thing too. Adapt it so it is doable with the electricity constraints etc. but don't avoid it because it's the Pacific, because the Pacific wants this."***

  - BTS team member

Indeed, the BTS pilot proves that technology-driven innovations are perhaps even more valuable and appreciated in areas that have less access to technology. In these contexts, this kind of innovation has the potential to have greater effects in terms of providing otherwise unavailable training in digital literacy and broadening the outlook of children and adults involved:

- ***"The use of technology and story really helped to brighten up the child's mind."***

  - Participating parent

CHAPTER 5: Recommendations

Based on the findings outlined in this report, a number of recommendations have been identified. These recommendations are given to guide future revision and expansion of the BTS program, as well as the development of other innovation programs across the wider Pacific region.

5.1 Program revisions

The below recommendations relate to further development of the BTS program, with a view to creating enhanced resources when transitioning to scale.

- **Adopt an approach to scalability that retains the program's contextual relevance.** BTS would benefit from additional research into how best to balance culturally-informed designs and curriculum integration with an ability to adapt to diverse contexts - both for different age groups in Fiji and for unique cultures across the Pacific. This would involve engaging with the enabling audiences (teachers and parents) and children both within Fiji and the wider Pacific Islands and giving them the opportunity to provide feedback prior to scaling.

- **Integrate additional subjects into the program's content to extend learning opportunities.** While BTS has already demonstrated a capacity to inspire meaningful learning in health and nutrition, future iterations of the program could benefit from extending its integrated approach to education by incorporating content from other relevant curriculums and topics. Such a holistic approach would not only assist the program in becoming a more comprehensive tool for schools, but would also help children to better contextualise and apply their learning.

- **Accentuate the relationship between low- and hi-fi program materials and the real world.** The transmedia story of BTS could be further enhanced by including more connections between low-fi and hi-fi materials, and providing greater opportunities for children to practice their learning in real life. For example, correlating virtual activities in the story to activities in real life such as school gardens, sports games and other popular culture content.

- **Simplify technology-based program resources and ensure time for extensive testing.** While the program's technology-driven approach is highly valued, future iterations of BTS should be guided by extensive in-country testing of each technological element within the school environment and with potential participants to determine how best to scale the program in classroom environments.

5.2 Program expansion

Suggestions for program expansion intended to inform the scalability and sustainability of the program both within Fiji and across the wider Pacific region.

- **Provide extensive, regional teacher training workshops that are attended communally.** Holding regional teaching workshops rather than individual school training could help the program provide more practical, hands-on training in a manner that is time and cost-effective, while fostering peer networks among participating teachers. This kind of training would also give teachers an opportunity to provide collaborative feedback that can inform the program's development and cultivate local ownership over the program's delivery and future improvement.

- **Improve parental involvement through direct engagement sessions and dedicated resources.** Finding more ways to engage directly with parents and providing additional practical activities that children and their families can complete collaboratively outside of the school environment could help generate parental support of the program across multiple spheres of influence, helping the program to affect sustained behaviour change.

- **Provide more reliable and intuitive technology solutions for school and home use.** Future iterations of the program should look to create a more intuitive technological application that can be rolled out beyond the devices supplied to schools on a diverse range of hardware with minimal training requirements. This would allow BTS to capitalise on existing hardware in schools, as well as those devices already owned by families and individuals, in order to make more aspects of the program accessible outside the school environment.

5.3 Evaluation improvements

The following suggestions are made with regard to the design of monitoring and evaluation activities for future iterations of the BTS program.

- **The program's effectiveness should be assessed against a comparable baseline.**
  Future implementations should consider evaluating a control group without access to the program, as well as a variety of groups provided with only some program materials in order to better understand the entire program's effectiveness and the relative success of individual components.

- **Program resources could be better used to evaluate and monitor effectiveness.**
  Both the interactive game and the activity book data represent rich potential sources for program monitoring and evaluation and invaluable data sets for mapping learning and health outcomes progressively. Future BTS iterations and other programs could incorporate more gamified methods of evaluation that seamlessly integrate enhanced data collection methods to eventually reduce the costs associated with data collection activities.

- **Post-program evaluation surveys should be conducted periodically.**
  While a relatively short time frame is not uncommon for pilot programs, it does limit the evaluation's ability to assess whether attitude shifts are reflective of longer term behaviour change. This could be addressed by delivering additional post-program surveys at longer intervals after the pilot is completed.

- **Monitoring activities should be extended to capture wider behavioural impact.**
  The evaluation of BTS and future programs should include pathways to measure the potential for participants to experience short- and long-term behaviour change as a result of the program. This could also be backed by more extensive monitoring of demographic data.

APPENDICES