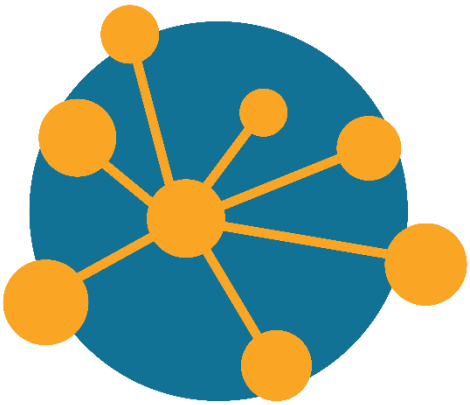
Digital Technologies in focus:
Supporting implementation of Digital Technologies



Bethany Christian School
South Australia
Final project report

acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

Initiative of and funded by the Australian Government Department of Education and Training

Project title: The Future of Work … Finding solutions with robotics and automation	
School name	**Bethany Christian School**
School team members	Principal ICT Manager/coordinator Upper Primary DT Year 3 Teacher
School profile	Number of students <600 Location Metropolitan Sector Independent School type Co-educational Year range F–6 Proportion of students who are Indigenous 1.6% Proportion of students with disability 32% Proportion of students who have EAL/D 48%
Year level(s) involved in project and reason for choice	2018 – **Year 3**. We would like to involve our Year 3 staff and classes in the project. This allows [teacher] to be a support to the Year 3 staff involved. Also, [teacher] takes these students for a lesson a week and will allow us to work together to teach Digital Technologies as a team. Year 3 haven't had a large focus in the area of Digital Technologies. Year 5–6 have had more exposure through our BYOD program, and R–2 have been working with IT Coordinator developing a Digital Tech curriculum in 2017. 2019 – **Years 3 & 4**. We introduced the Year 4 Professional Learning Team (PLT) to the project with a topic on waste. Year 4 was the other year level that didn't have a big focus on Digital Technologies. We also utilised the time we had with Steve Grant to do some professional development with our teachers **Levels R–2**.
No. of students involved	2018 – 78 2019 – 156 2020 – 390
No. of teachers involved	2018 – 4 2019 – 13 2020 – 13

INVESTIGATING AND DEFINING

Research question

How can we develop our teachers' TPACK in Digital Technologies and their capability in using design thinking to better prepare a curriculum that challenges students to think for themselves and solve real-world problems in their local and global communities?

How has the research question evolved over time?

The question hasn't changed too much; the original question had a dual focus on Digital Technologies and design thinking. This was the case for the Year 3 Future of Work and Innovations projects and the Year 4 Waste Project. For the Reception to Year 2 teachers, the focus areas for professional development sessions with Steve Grant were on understanding the ACARA Digital Technologies content and terminology, and working towards producing better implementation of Digital Technologies.

How has your understanding of the question evolved over time?

We found that the teachers needed to understand the ACARA Digital Technologies content and terminology well before they could effectively implement Digital Technologies. This was mainly due to our teachers having previously had a Digital Technologies specialist teaching Digital Technologies rather than themselves integrating Digital Technologies across the curriculum.

We found that some of the Digital Technologies content was foreign to our teachers, with a lot of new terminologies to understand. This took time to unpack but then gave more meaning to why we need to implement Digital Technologies across the curriculum, not just see it as a subject to be taught in isolation.

Aims: Reflection

Have the aims changed? If so, how and why?

The original aims were focused on the first year. As the project evolved the new aims became broader and included a way for the whole school to move forward, rather than a small group of teachers.

Updated aims:

- To provide opportunities for training and development for all teachers, to develop their TPACK to help implement the ACARA Digital Technologies subject.
- To give opportunities for teachers to reflect and share what Digital Technologies they are implementing in their curriculum and what success stories, challenges and learning they are experiencing.
- Students to engage with a rich Digital Technologies curriculum that is integrated across learning areas.

Research

If you conducted research describe it.

We worked with a professional development group called NOTOSH on understanding design thinking as a school in 2018–19. As a school we were challenged to rethink the traditional methods for teaching curriculum as content and instead focus on the students as individual learners, providing authentic learning experiences for students. Our teachers were able to develop skills in using design thinking as a process to have empathy, define problems worth solving, ideate, prototype and test a product.

As we worked through this process, we found direct links to the way ACARA's Digital Technologies curriculum has been developed and helped teachers understand the Digital Technologies terminology better.

In the same way that design thinking helps students to find and solve real-world problems, the ACARA Digital Technologies curriculum is designed to help students become developers of digital solutions. It was great to see our students and teachers engage in the Future of Work Expo, where this realisation was shown in the students' innovations. Students came up with solutions for problems that may occur in the workplace using robotic and automation solutions.

How has your project improved implementation of the Australian Curriculum: Digital Technologies?

Before the DTiF Project our teachers expected the specialist computer room teacher to cover the Digital Technologies curriculum in a 40-minute lesson a week. As teachers better understand the ACARA Technologies learning area, they now acknowledge that Digital Technologies is better integrated throughout the curriculum, providing a greater learning experience for the students.

It was also really helpful for teachers to understand the differences between Digital Technologies and ICT capability. There was a realisation that Digital Technologies wasn't just using a computer to do school work; Digital Technologies helps students to become developers of digital solutions.

Criteria for success: Evaluating

Comment on progress against each criterion for success.

- Teaching staff demonstrate a better understanding of the future of education, employment and lifestyle and how design thinking and digital technologies play a pivotal role in equipping our students for a future of innovation and technology.
    - After completing the Future of Work Project, the Year 3 staff had a good understanding of the importance of innovation and technology and that our students will be living in a different world to us.
- Year 3 teachers and Digital Technologies teacher will have integrated robotics, automation and programming through their design thinking projects and curriculum.
    - The Year 3 teachers are far more open to using robotics in their classroom, although they still need support with more complex programming tasks or troubleshooting more complex issues.
- Students showing a deeper level of thinking and comprehension of Digital Technologies in their Work of the Future project. They will use digital literacy to design a solution to a problem and code and solve problems in their algorithms.
    - This was evident in the innovations and designs that students came up with for the

Future of Work Expo. Students came up with solutions for problems that may occur in the workplace using robotic and automation solutions.

- Year 3 PLT show a deeper understanding of the ACARA Digital Technologies when giving feedback through evaluation of their learning and curriculum planning.
    - Our Year 3s and especially our Digital Tech Specialist teacher have a greater understanding of ACARA Digital Technologies and are now implementing with a greater level of confidence.
- Students sharing their learning through what's happening in the project in their exhibition projects.
    - This was evident in the innovations and designs that students came up with for the Future of Work Expo when students gave their pitch to convince the audience that their innovation would solve problems in the future of work.
    - Teachers' skill and capacity to embed and build upon the integration of Digital Technologies in their design thinking project.
    - This was a challenge at times as we were learning design thinking and Digital Technologies at the same time. Fortunately, the project was set up around a digital solution so the integration was inevitable.
- See application of ACARA Digital Technologies across multiple curriculum areas.
    - The Future of Work project incorporated literacy, numeracy, Design and Technologies, and some science concepts.

GENERATING AND DESIGNING

What actions/steps were undertaken?

- 2018 Term 1 – Week 5: Whole school dialogue around the future of education, employment and lifestyle and how design thinking and digital technologies play a pivotal role in equipping our students for a future of innovation and technology
- 2018 Term 1 – Week 3: Training and development for Year 3 teachers and Digital Technologies teacher to develop understanding of robotics, automation and programming
- 2018 Term 2 – Year 3: teachers to integrate ACARA Digital Technologies into their design thinking projects with a focus on algorithms and programming. Discuss what involvement and connection we will have with community businesses and possible mentors/resources in the Digital Technologies world.
- 2018 Term 2:Students to begin a Digital Technologies–rich design thinking project around the topic: Work of the Future – Finding solutions with robotics and automation
- 2018 Term 2 – Week 9: Year 3 PLT feedback to staff what Digital Technologies they are implementing and what success stories and learning they are experiencing
- 2018 Term 3: Student Exhibition showing their learning to a larger audience
- 2018 Term 4 – Year 4: teachers have a planning day for integration of ACARA Digital Technologies in 2019
- 2018 Term 4: R–2 half-day training and planning x 2 – understanding and implementing Digital Technologies
- 2019 Term 1 – Year 4: teachers to integrate ACARA Digital Technologies into their design thinking projects with a focus on Digital Technologies
- 2019 Term 2 – Year 4: Waste unit with Digital Technologies integration – collecting and representing data
- 2019 Term 3: R–2 half-day training and planning x 2 – understanding and implementing Digital Technologies

To what extent have the proposed actions been implemented?

We were able to complete all of the actions that we originally planned. We found that we had some extra time available with Steve Grant, so we brought the R–2 teachers into the project for some half-day training and planning sessions. This was a great way to continue upskilling our teachers' TPACK and widen the effectiveness of the project while the ACARA DTiF resources were available.

What are the effects of these actions?

- Teachers have developed their TPACK
- Greater integration of Digital Technologies and ICT capabilities across the school
- More integration of Digital Technologies across different learning areas
- More effective use of robotics and programming across the school

Were there any challenges which arose in negotiating actions with others, or in negotiating time and resources?

- We had just started a school-wide project on design thinking, so adding Digital Technologies at the same presented some challenges. At times, the design thinking took the main focus but we still found a reasonable balance.
- Resourcing teachers with robotics and devices was fine, but it was a challenge to help them become confident and be at a level where they didn't need support.
- With the waste unit we found that even though the data they were collecting was meaningful, the students found it difficult to comprehend the actual data they had collected, so the challenge was then presenting the data in a meaningful way.

What were the intended and unintended effects of your actions? Explain why they may have occurred.

- Students took hold of the robotics and programming with great enjoyment and as they played with a range of robots they were able to transfer their programming surprisingly well. We believe this was due to the amount of time we spent on explicit teaching and then exploration in a short space of time.
- The Future of Work Expo took all the teachers by surprise for a few reasons:
  - Almost all of the students' parents turned up for the expo and participated with enthusiasm.
  - All students had a prototype and a promotional pitch to share at the expo.
  - Professionals got involved and helped judge the expo.
- I believe these outcomes were due to setting up a challenge beyond the students', teachers' and parents' expectations, with a level of excitement and commitment that they had not experienced before.
- The waste project fizzled out a bit at the end. Perhaps the project was scaled too big; the Digital Technologies integration took a bit of a back seat at times. The waste project did not receive as much support as the Future of Work the following year.

Explain why they may have occurred.

As above

Data collection: Evaluating

What strategies are being used to collect data and monitor progress?

- Teacher self-assessment (early 2017 and 2020)
  - Teachers Self-Assessment Matrix – ICT Proficiency Interactive
  - Teachers Self-Assessment Matrix – DT Interactive
- Checkpoints – Year 3 staff development presentations each term
- Portfolio – teacher research paper, goals, developments made, achievements
- Review process – observe each other's lessons, Steve Grant observations, self-reflection, staff surveys
- Student Exhibition (live, video, other) – as an assessment piece along with the use of a rubric designed with students and teachers

Were there any ethical problems which arose in negotiating access to, and release of, information? How was this resolved?

It was difficult to get release forms back from parents to share photos and student work publicly.

COLLABORATING AND MANAGING

Resources

Identify the resources used in the implementation of the project.

- ACARA Curriculum Officers – Steve Grant and Deanne Poole
- ACARA curriculum, Digital Technologies Hub
- iPads, desktop computers
- Robots – Sphero, Edison, Ozobot, Cozmo, micro:bit
- Software – Scratch, Code.org, MS Office

Challenges

If there were challenges, what were they and what were the causes?

- We found that you need to be intentional to keep pushing the project or it becomes stagnant.
- It is easy to lose energy with a long three-year project. It's important to refocus regularly and stay on track.
- The COVID-19 pandemic put a hold on this year's project [2020] but we experienced some interesting learning with adjustments in students' self-directed learning via the use of technology.

How have you handled these implementation challenges?

- We found that the curriculum officers were good at helping us stay on track. We will need to be intentional to do this ourselves after the project. Continue to set aside training and planning days for our staff to intentionally integrate Digital Technologies.
- We will continue to give opportunities for staff to share with each other the progress they are making with Digital Technologies, sharing wins and challenges with the intention of inspiring each other to continue the journey together.

Milestones and deliverables

Provide revised milestones and deliverables for the sustainable implementation of Digital Technologies in your school.

Stage 1 Whole school dialogue: 2017 Term 1 – Week 2

Stage 2 Training and development: 2017 Term 1 – Week 2

Stage 3 Year 3 teachers to integrate ACARA Digital Technologies: 2017 Term 2

Stage 4 Students to begin a Digital Technologies–rich design thinking project: 2017 Term 2

Stage 5 Year 3 PLT report back their experience: 2017 Term 2 – Week 9

Stage 6 Student Exhibition: 2017 Term 3 – Week 8 or 9

Stage 7 Year 4 Teachers introduced to the Digital Technologies project: 2017 Term 3 – Week 7

Stage 8 Year 4 teachers have a planning day: 2017 Term 4 – Week 2

Stage 9 Year 4 teachers to integrate ACARA Digital Technologies: 2018 Term 1

Stage 10 R–2 half-day training and planning x 2 – understanding and implementing Digital Technologies: 2018 Term 4

Stage 11 Year 4 Waste unit with Digital Technologies integration – collecting and representing data: 2019 Term 2

Stage 12 R–2 half-day training and planning x 2 – understanding and implementing Digital Technologies: 2019 Term 3

PRODUCING AND IMPLEMENTING

Describe how Digital Technologies is being implemented in your school.

- R–2 teachers are incorporating Digital Technologies into their curriculum without a specialist teacher.
- Year 3–6 have a Digital Technologies Specialist teacher as part of their NIT release time. Teachers are integrating Digital Technologies across the curriculum with the specialist focusing on the more complex learning outcomes.
- All year levels are supported with an IT Support Officer who is in the classroom for one lesson a week to support any Digital Technologies–rich lessons and to help implement new technologies and software.
- All year levels have access to the IT manager, who can offer teachers professional development, research and test new technologies and help implement new technologies and learning into the classroom.

How does this differ from your original plans? What contributed to this change?

- The implementation has not changed from the original plans.

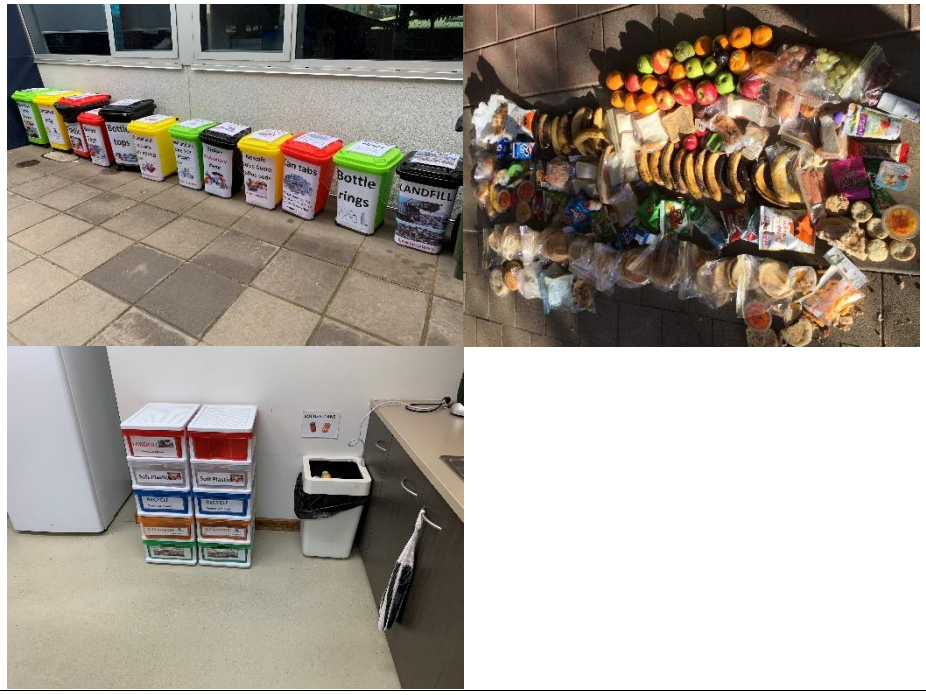
EVALUATING

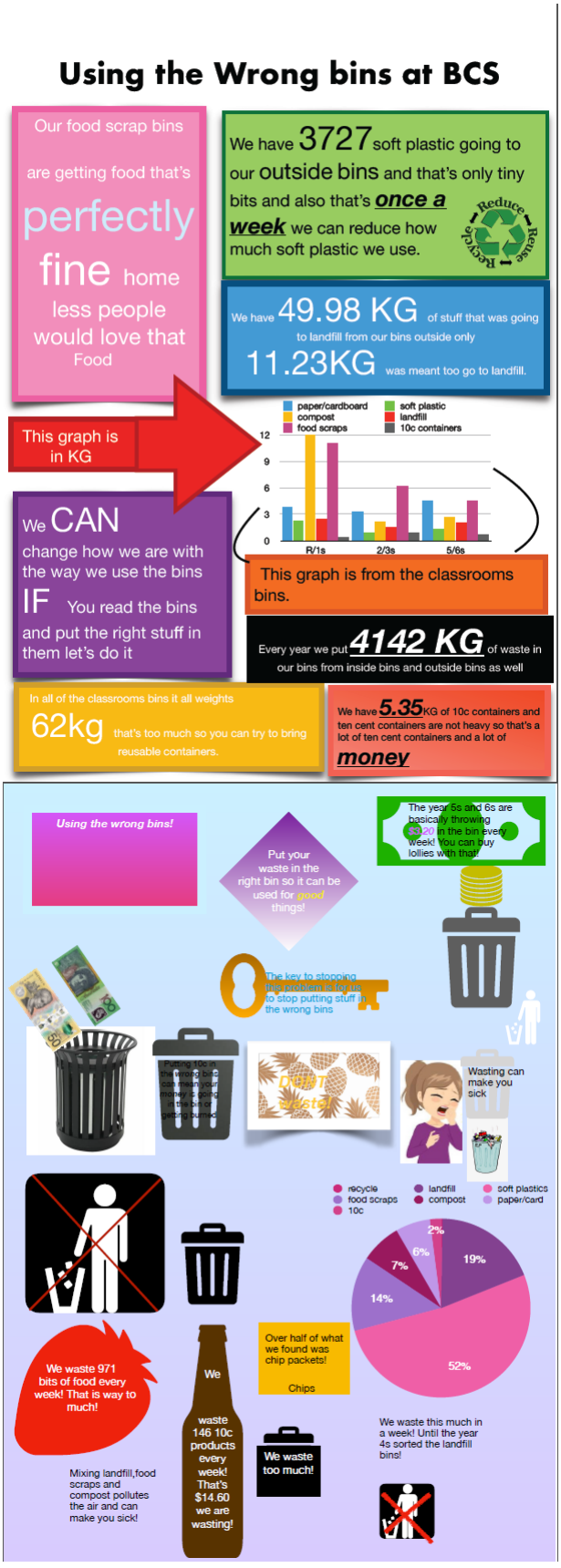
Evidence of student engagement

Work samples of the IMPLEMENTING DTiF Project:

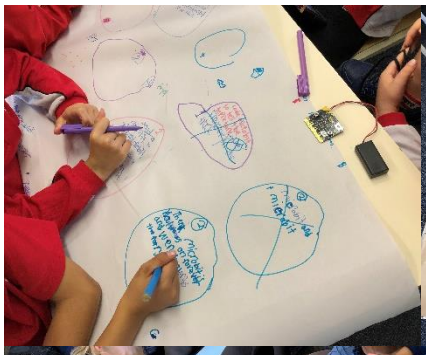
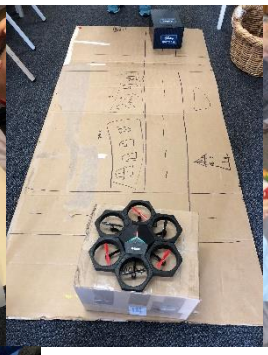
- Photos of the Future of *Work Expo*

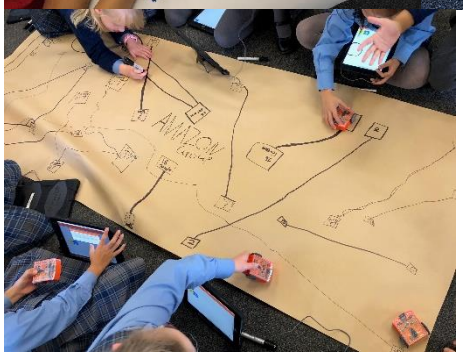
- Waste unit photos and work samples




Using the Wrong bins at BCS
Our food scrap bins are getting food that's perfectly fine home less people would love that Food
We have 3727 soft plastic going to our outside bins and that's only tiny bits and also that's once a week we can reduce how much soft plastic we use.
Reduce Reuse Recycle
We have 49.98 KG of stuff that was going to landfill from our bins outside only 11.23KG was meant too go to landfill.
This graph is in KG
paper/cardboard
compost
food scraps
soft plastic
landfill
10c containers
12
9
6
3
0
R/1s
2/3s
5/6s
We CAN change how we are with the way we use the bins IF You read the bins and put the right stuff in them let's do it
This graph is from the classrooms bins.
Every year we put 4142 KG of waste in our bins from inside bins and outside bins as well
In all of the classrooms bins it all weights 62kg that's too much so you can try to bring reusable containers.
We have 5.35KG of 10c containers and ten cent containers are not heavy so that's a lot of ten cent containers and a lot of money
Using the wrong bins!
Put your waste in the right bin so it can be used for good things!
The year 5s and 6s are basically throwing $5.20 in the bin every Week! You can buy lollies with that!
The key to stopping this problem is for us to stop putting stuff in the wrong bins
Wasting can make you sick
recycle
food scraps
10c
landfill
compost
soft plastics
paper/card
2%
6%
7%
19%
14%
52%
We waste 971 bits of food every week! That is way to much!
Mixing landfill,food scraps and compost pollutes the air and can make you sick!
We waste 146 10c products every week! That's $14.60 we are wasting!
Over half of what we found was chip packets!
Chips
We waste too much!
We waste this much in a week! Until the year 4s sorted the landfill bins!

- Classroom robotics activity photos



Evidence of action research achievements

Teacher and student survey results via link below:

- Student Survey Results
- Teacher Survey Results

https://drive.google.com/drive/folders/10-057Bawf4OssZc6KJ3TSaaChEu8RElq?usp=sharing

Our teachers have shown positive development in their TPACK and are developing well in implementing Digital Technologies across the curriculum.

Our students are developing in their skills and knowledge in Digital Technologies. We are seeing transfer of their Digital Technologies specific learning across other learning areas, which is really great.

Next steps

What goals do you need to set as the next step as you work towards achieving sustainable implementation of Digital Technologies in 2020–23?

	Action	Who?	When?	How?
Short term	Keep refining current Digital Technologies units of work	JP Teaching Staff	Each term before the next Digital Technologies unit begins	Planning days or PLT time
	Catch up new staff that have recently joined the school	[Teacher]	Term 3 Week 6	PD day with IT Manager
	Opportunities for reflection and sharing with wider staff	All teaching staff	Staff meeting and during PD days	Give opportunities for staff to share their Digital Technologies experiences
Mid term	Keep refining current Digital Technologies units of work	All teaching staff	Each term before the next Digital Technologies unit begins	Planning days or PLT time
	Opportunities for reflection and sharing with wider staff	All teaching staff	Staff meeting and during PD days	Give opportunities for staff to share their Digital Technologies experiences
Long term	As new staff join the school we need to share the learning we have experienced and support them	Any new teaching staff	Early in their employment	Provide support in the area of Digital Technologies according to their needs and experience

Thank you for your time and commitment to the Digital Technologies in focus project.