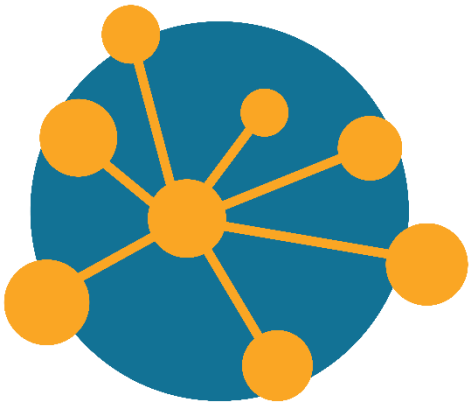
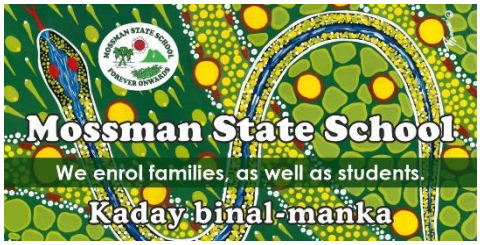
Digital Technologies in focus:

Supporting implementation of Digital Technologies





Mossman State School
Far North Queensland
Final project report

acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

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

How can we create a whole-school and school community approach to STEAM education?	
School name	Mossman State School
School team members	Tech/Arts teacher HOC/Japanese teacher Principal STEAM/teacher aide (TA)
School profile	Number of students <600 Location Remote Sector Government School type Co-educational Year range F–6 Proportion of students who are Indigenous 50% Proportion of students with disability 10% Proportion of students who have EAL/D 5%
Year level(s) involved in project and reason for choice	1. Prep – Grade 6 2. Whole school approach 3. Designated Technologies lessons with Mrs Craven each week + voluntary STEAM support with Mr David (TA)
No. of students involved	approx. 270
No. of teachers involved	1 x specialist 12 x classroom teachers

INVESTIGATING AND DEFINING

Research question

Our challenge is to develop STEAM curriculum awareness and implement it into our school (and furthermore into our community).

Can we, as a school community, become more competent with cross-curricular teaching of ICT and Technologies in our day-to-day teaching?

How can we create a whole-school and school community approach to STEAM education?

How has the research question evolved over time?

We are still working towards the same question, with some broadening of goals along the way such as having students participate in extra-curricular programs through universities, using various platforms of learning including iSee and Microsoft Teams. Not only are we working towards ensuring our school is supporting staff and students with STEAM, but we are working with other staff and schools within our cluster; creating a whole-cluster STEAM initiative to allow us to collaborate, build learning opportunities together, finance and share resources, and support each other in our own journeys. We are also building relationships with people who work for Microsoft, ACARA, Australian Power Institute (API), CSIRO and GBR Legacy, who we are working alongside within other projects or activities.

Our connections across the school and community (public and schools) has developed, with relationships started or strengthened. For example, the town library, cluster schools, school of distance ed (Cairns), ACARA (DTiF), Reef Guardian Schools, Microsoft (M:EE and TEAMS), CompNow and Apple.

How has your understanding of the question evolved over time?

I have an improved understanding of:

- the needs and capabilities of my school staff and being able to support them each in appropriate ways to help them grow professionally.
- the needs of our cluster schools – where we can support each other and work together to achieve great things, instead of working independently, so we can foster that community approach.
- my role – I need to continue to diversify my skill set and continue to develop ahead of or with the students.

Our staff, particularly the experienced teachers, have realised that STEAM is a not a new style of teaching and learning; however, they now better understand how this approach aligns with the cross-curricular teaching they have utilised in the past.

Aims: Reflection

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

The three aims below have been constant throughout this whole project, with no changes, just bigger goals set as we approach the original ones. We have achieved and improved across all three aims.

1. To create a learning space that all students and staff can access during class time as well as at lunchtime
   During 2020 we set up a classroom but unfortunately, at the end of term 2, we had to create an extra class due to the school's population growing 260+ enrolments. So for now the STEAM room has relocated back to the library meeting rooms, where we were temporarily located in 2019. However, this time it is more established and not a shared space for other purposes as before.
2. Develop a supportive whole-school ethos that encourages working with staff, students and parents to establish a shared understanding of STEM (ACARA report)
   This year we have moved Mr David to a supporting STEAM TA role, to work across all classes with teachers at their request.
3. Enrich student education and skills in preparation for their move to high school (HS)
   Our relationship is still strong and feedback from the HS has been positive with each new year.

Research

If you conducted research, describe it.

We have not conducted any official research; however, feedback and observation over the past few years has been positive. Student capability and confidence is noted through feedback from staff, classroom guests and general observations during lessons. Students and staff have embraced the STEAM approach within their classrooms, expanding and diversifying their teaching styles across curriculum areas.

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

Students are accessing the curriculum through Technologies and Arts lessons each week. Staff are creating cross-curricular activities to incorporate the Technologies curriculum into the four main learning areas of English, Mathematics, Science and HASS. One example is that one of our Year 5 teachers has adapted the C2C HASS Unit assessment from paper based to digital based.

Students are learning in ways that they may have never learned before – or without even realising, they are ticking off elements of the Australian Curriculum. Within my Technologies lessons, I try to find topics/subjects/themes that capture my students' interests and apply hands-on learning experiences, or interactive activities to cater for all learning types and levels, whether it be redesigning or building something for purpose.

Using a problem-based or inquiry learning style, compared to direct instruction, we spent a few weeks exploring paper planes and testing designs to see which was the best for flying the furthest or the highest. We used PowerPoint (inc. lots of hyperlinking) to design and demonstrate a working information app. One of our upper classes last year took their English unit to a completely new level where the students had to design and build a home using computer software for characters, which was then listed in their own real-estate classroom window. One of my lower grade classes took their animal creations off the paper and into 3D models, using coloured clay to mould and bring their 'unique' animals to life.

Criteria for success: Evaluating

Comment on progress against each criteria for success.

1. Have a physical space, designated to STEAM education
   We have a STEAM Space, accessible for all our Arts and Technologies lessons.
2. Students will demonstrate improvement in problem solving skills (NAPLAN, Maths, Science)
   Students are taking on more challenges and demonstrating an improvement in skill sets – whether it be assessment related or demonstrating working towards.
3. Teachers will be more confident in delivering STEAM education
   Staff are accessing and utilising myself and Mr David for support and our resources (e.g. Blue-Bots and dash robots) for use in other learning areas.

GENERATING AND DESIGNING

What actions/steps were undertaken?

1. A classroom became available this year, due to our school returning to 10 classes – which gave us a permanent space to work, teach and learn in.
2. Technologies (Digital Technologies and Design and Technologies) lessons are still once a week (45 or 60 minutes) along with Arts lessons once a week (45 or 60 minutes). Students work on projects to meet the needs of the Technologies and Arts curriculum, with a project-based learning or cross-curricular approach.
3. Classroom teachers are also implementing STEAM into their daily tasks, with support from myself, Mr David or peers – creating a more holistic, cross-curricular approach. Teachers have had access to Mr David (2020 has him in STEAM TA support role).

To what extent have the proposed actions been implemented?

The 2020 school year began with some renovations and improvements to existing buildings, giving us a classroom space that was to be the STEAM room. Despite using this space for a very short time, it was a great space that could be utilised for our Technologies and Arts lessons 4 days each week, with classroom teachers using it on Fridays for their own lessons and learning activities. With the growth of our school population, our classroom has been relocated to a room in the library.

Mr David's role became more consistent in 2020, being a STEAM TA support person for teachers to access within their own classroom timetables across 3 days each week.

What are the effects of these actions?

1. We had a classroom this year, which was accessible for all my classes, lunchtime activities and for teachers to use. Unfortunately, this space was lost and the room relocated to a smaller, yet still usable space.

2. Our upper classes have been demonstrating great skills within Technologies and other learning areas, using computational thinking (acquired through projects and Technologies lessons) to work their way through set tasks. Students' skill sets have developed as they build layers upon layers of learning throughout various projects each year, with a more hands-on and interactive approach to learning.

3. Teachers are implementing more STEAM activities into their daily planning, exploring and challenging themselves and their students. Our junior classes have been using the Blue-Bots in Literacy and Numeracy activities to consolidate and enhance their learning opportunities. Our senior classes have been using the iPads and joining online learning programs to enhance Literacy, Numeracy and Science curriculum.

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

1. Resourcing is always a challenge alongside timetabling. As we now have Mr David working with classroom teachers, the iPads are timetabled for use Tuesday to Thursday, limiting use of them in my lessons Monday to Thursday.
2. Resourcing for 270+ students can be quite expensive and problematic for storing work, having consumables for projects and adequate working space for large classes.
3. Timetabling Technologies and Arts lessons around Health, Physical Education, Language classes and reading groups is very challenging; however, we (our amazing HOC) make it work, even when it feels like a juggling act.

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

When this project began, we were in the early stages of having a specialist teaching role to cover the Technologies curriculum (only two in our cluster). Having Technologies covered by a specialist role allows classroom teachers to focus on the other learning areas (LAs) and create those STEAM learning opportunities within those LAs. Having individual teachers being responsible for each subject allows us to support all our staff, but also focus on the subject, which in turn benefits each student with skills to use in other LAs.

Throughout the project, we have been working with a few teachers across the cluster, to support each other and build our own knowledge. For example, we participated in a pilot program, which allowed us to collaborate with one another's school, bringing our students together for a day of learning activities. We have been sharing old/broken computers for learning about computer parts. We have shared our Dash robots. We have borrowed Spheros, make-bots and drones from Cairns School of Distance Education. Sharing with teachers in each school within our cluster opens up the doors to work together with resource sharing, professional development within our schools and in the future purchasing new resources for the cluster.

The funding support from the Digital Technologies in focus project has allowed us to make a few resource purchases, throughout the project, that we may not have been able to afford at the time otherwise. We have funded an incursion from 'Games and Gadgets', incursion and community program 'Bamboo Connect', purchased 12 Blue-Bots when (previously we had 1 car-bot or had to borrow Bee-Bots) and 3 small drones. With the last round of funding, a set of Makey-Makeys and webcams on all our computer lab desktops are on our wish list, which will allow us to maximise the use of our computer lab computers.

Understanding the curriculum and using unplugged resources to teach and learn with has been successful and made many learning experiences affordable and possible. With access to the town, state and university libraries, we have also been able to plan lessons with resources on loan. Unplugged resources were found through the Digital Technologies Hub, professional development days with Australian Computing Academy (ACA) and internet searches to find ideas that other teachers across the country (and internationally) have used. One activity for our Prep students is to take them to the snakes and ladders game board painted on the concrete in the undercover area, to introduce directions and algorithms for use with Blue-Bots or code.org/kodable.

Students in P–2 have participated in an API pilot program in 2019 and again in 2020 about STEM careers, opening their future prospects through a range of learning opportunities. Our Year 5 and 6 students have this year (2020) participated in courses with Queensland Virtual STEM Academy (QVSA) using iSee platform for learning. Mr David has been working alongside the students during these sessions.

Explain why they may have occurred.

Throughout the project, I have attempted to make use of all the human and non-human resources we have had access to, to ensure the success and continuation of our hard work after the project is completed. This has given our students as many wonderful learning experiences as possible to ensure they can make exciting decisions regarding their own futures.

Working within a specialist role has also allowed for some flexibility and opportunities to build relationships within and outside of our community.

Data collection: Evaluating

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

There was no definite plan to collect data; however, a couple of opportunities for us to do so would be:

1. Teacher observation of confidence/thinking skills
2. Challenges, e.g. BEBRAS.

We also used the surveys with staff and 2 cohorts of students at the beginning of 2019 and will redo them again in Term 2 of 2020, for the finalising of this project.

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

Although we did not have any ethical problems arise, we endeavoured to be respectful when working with students and community during the project.

COLLABORATING AND MANAGING

Resources

Identify the resources used in the implementation of the project.

Throughout the project we have had access to loan libraries through University of SA alongside CSER MOOCs, our town and state library and Cairns School of Distance Education – for plugged and unplugged lessons. Resources loaned included – Spheros, Makey-Makeys and Ozobots, just to name a few.

We also used some of our grant money to purchase 12 Blue-Bots for use in all classrooms as well as my lessons, and small drones. Fortunately, we already had access to 20 school-owned iPads and 30 desktop computers in our LAB.

Human resources included: our ACARA and DTiF project support officers Beth Claydon and Melanie Hughes; staff across the cluster; incursions with guest speakers (API pilot program and Games and Gadgets); and websites including DTiF, Digital Technologies Hub, Australian Computing Academy and code.org.

Challenges

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

Sharing and access to resources for large classes (25+)
My lessons are 1 x week, for 45 or 60 minutes.

Sharing resources across the school – more so this year with Mr David using the iPads with his timetabled STEAM lessons.

Only having access to loaned resources for one term and/or when they were available

How have you handled these implementation challenges?

Teaching students that we do not need to use an iPad or computer for everything, and that challenges can still be achieved via different paths. For example, using computer software and cameras for animations when an app is unavailable.

Using a lot more unplugged activities to teach the concepts and skills – before utilising the technology – such as activities to create catapults and towers and coding, using everyday objects and people. Unplugged activities also have encouraged team or group work and conversations to work through problems.

Milestones and deliverables

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

We have secured our learning space, increased our on-site resources and loan providers, and up-skilled and supported our staff with their teaching of technologies in a cross-curricular way.

We have participated in progress reports, webinars, podcasts, final report and school stories, throughout the Digital Technologies in focus project.

PRODUCING AND IMPLEMENTING

Describe how Digital Technologies is being implemented in your school.

Mossman SS has been unique in having a classroom teacher take on a specialist timetable for both the Arts and Technologies curriculum. Each class attends one lesson for each learning area, each week. Each class's TA also attends these lessons with their students – enabling some staff up-skilling and allowing them to support the classroom teacher and students when they leave the lesson.

In 2020, Mr David was appointed to a specialist TA role, where he works with classes, supporting teachers who are wanting to add the element of STEAM in other learning areas.

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

When this project began, it was at the same time as the Technologies and Arts timetable began – so they have both been working well side by side for the entire period.

During this time, we have had classroom TAs attend lessons with their students. Mr David was the Technology TA for 12 months (2 days per week) and our whole school's adoption of STEAM education has developed.

If you intend making further changes to your implementation plans, please describe.

Looking forward, we are looking at also using our HPE teacher in the area of Media Arts, as he is also a talented filmmaker and musician.

We have 12 students from Years 5 and 6 participating in an online STEM learning program for 10 weeks. We hope to continue to participate in these opportunities as they arise and to include more students in this style of learning. This is run through QVSA, using iSee platform and physical kits mailed to the school for the program.

Re-imaging our STEAM space, moving to another room for second half of 2020 – with the hope that we can secure a larger space within the next 3–5 years as the value of STEAM education grows within education.

EVALUATING

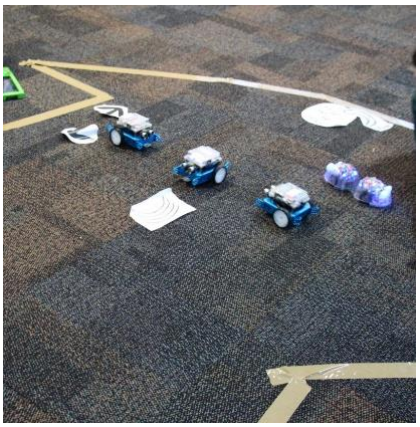
Evidence of student engagement

Year 5 and 6 students using iSee platform for STEM online learning programs with QVSA

Bamboo Connect incursion – 2019

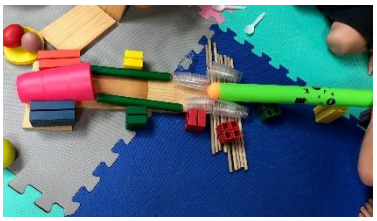
Blue-Bots and MBots going 'Walkabout' in Australia for NAIDOC Week celebrations

Gr1 free play with Blue-Bots

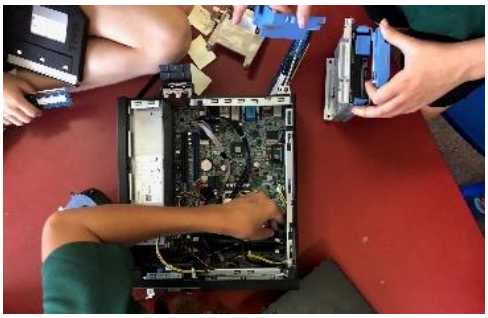


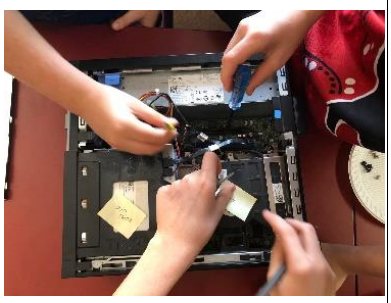
Rube Goldberg machines, P–2



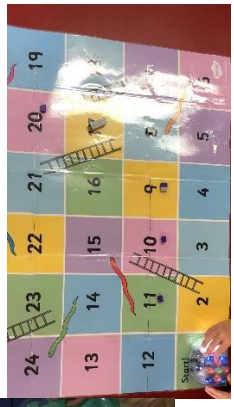


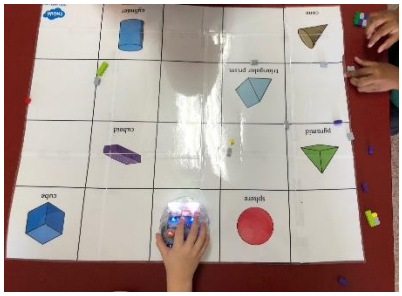
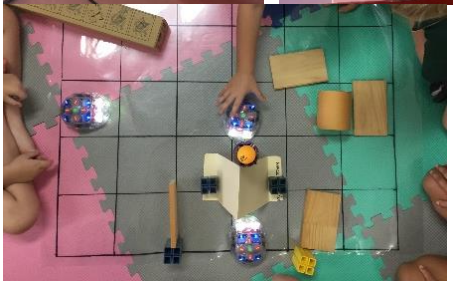

What is in a computer? 5–6





Direction, games and obstacle courses with Blue-Bots, P–2

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	Continued PD opportunities, e.g. M:EE	All staff	Availability	Face to face Via technology In-school and cluster
	Technologies taught as a subject area and in a cross-curricular approach	Technologies specialist teacher and classroom teachers	Each term – semester	45-min. specialist lessons; lessons with support from Mr David (TA) when requested
	School/Cluster STEAM fairs			
Mid term	Cluster STEAM Team	Staff from across the cluster	Now – 2021	Collaboration Moderation Resourcing
	Documentation Planning Book of units	Myself (Sonja) and staff	Now – 2025	Mapping and recording documents for future staff and teaching
Long term	Cluster STEAM Fair/Showcase	All 7 Douglas Cluster Schools inc. community groups	Annually	Collaborating and displaying work, while including interactive activities for participation