My Context

• eLearning Teacher/ Coach at Talara Primary College on the Sunshine Coast
  • NAPLAN Online
  • Digital Technologies Teacher and Mentor
  • Mentoring teachers in innovative 21st Century practice
  • STEM Improvement Agenda
  • Robotics and Makers Clubs
  • eLearning Coalition Chair

• Sessional tutoring in EDU204 at the University of the Sunshine Coast

• 2016 – Year 6 Teacher and eLearning Coordinator at Brightwater State School
Design Thinking and the Australian Curriculum: Developing Preferred Futures

• In Design and Technologies, process and production skills that typically involves the following steps:
  - investigating and defining
  - generating and designing
  - producing and implementing
  - evaluating
  - collaborating and managing to create a designed solution.

• Technologies Context –
  - Engineering Principles
  - Food and Fibre Productions
  - Food Specialisations
  - Material and technologies specialisation

[Diagram showing the process from Investigating and defining to Collaborating and Managing, labeled as "Designing a solution"]
Digital Technologies and the Australian Curriculum: Developing Preferred Futures

- In Digital Technologies, one step in a four-stage process of defining, designing, implementing and evaluating to create a digital solution.

# Talara Primary College Roadmap

## STEM Roadmap – Talara Primary College DRAFT 2017

<table>
<thead>
<tr>
<th>Year</th>
<th>Supporting Resources</th>
<th>Robotics</th>
<th>Data / Digital Systems</th>
<th>Digital Technologies Focus Concept</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Code a - pill app</td>
<td>Code a pill</td>
<td>+ Blocky</td>
<td>+ Videoconferencing</td>
</tr>
<tr>
<td></td>
<td>bee bot app</td>
<td>bee bot</td>
<td>+ Scratch</td>
<td>+ Videoconferencing</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>+ CODE.org</td>
<td>+ Videoconferencing</td>
</tr>
</tbody>
</table>

1. **Apps – bee bot**

## Year 2

<table>
<thead>
<tr>
<th>2</th>
<th>Scratch Break</th>
<th>Data App</th>
<th>Orbit 1</th>
<th>+ STEM Pads (scratch)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>The Orbiter</td>
<td></td>
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</tbody>
</table>

## Year 3

<table>
<thead>
<tr>
<th>3</th>
<th>Scratch – Bee</th>
<th>Skills Baby</th>
<th>Sphero Robots – (possibly link with Design, Forces, angles)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>+ STEAM Pads (scratch)</td>
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</tbody>
</table>

## Year 4

<table>
<thead>
<tr>
<th>4</th>
<th>EduChoice Software</th>
<th>Edison Robots</th>
<th>Microsoft Excel</th>
<th>+ Excel spreadsheets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>+ P2S</td>
<td>+ Performance Assessment</td>
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</tbody>
</table>

## Year 5

<table>
<thead>
<tr>
<th>5</th>
<th>Scratch – Free</th>
<th>Lego Mindstorms EV 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>+ Netball</td>
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</tbody>
</table>

## Year 6

<table>
<thead>
<tr>
<th>6</th>
<th>Arduino (links to circuits)</th>
<th>Extension only at present</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>*build on from Malkey Yakey</td>
<td></td>
</tr>
</tbody>
</table>

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**What's your mind designed?**

- Data collection and representation
- Spreadsheets
- Algorithms
- Developing solutions

**Data changing our world?**

- Collect, manage and analyse data
- Spreadsheets
- Implement a digital solution that automates user input and presentation of information

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**CS Unplugged**

- [http://csunplugged.org/activities/](http://csunplugged.org/activities/)

- [https://www.digitaltechnologieshub.edu.au/](https://www.digitaltechnologieshub.edu.au/)

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**P-6**

- Hour of code / Code.org
What is a Makey Makey?

A Makey Makey is a circuit board that allows users to connect everyday objects to computer programs using alligator clips and a USB cable. The board uses closed loop electrical signals to send the computer either a keyboard stroke or mouse click signal.

How does it work?

• To make it work you need:
  • A connection to a Makey Makey or input (use alligator clips or jumper wires to connect the inputs on the front or back to conductive object)

  • Earth — A Makey Makey needs a closed circuit so you will need a connection to Earth (found on the bottom of the Makey Makey board)

  • Conductive Material — Plasticine, fruit, foil, lead pencil etc

  • Something to activate the key eg. Your fingers
Where do I start?

**Lesson 1 – Introduce the Makey Makey**
- Discuss what a Makey Makey is and how it works (refer to the useful guide on the Digital Technologies Hub)
- Use plasticine to play the online Piano [http://makeymakey.com/piano/](http://makeymakey.com/piano/)
- Draw a circuit on the board and explain how a circuit works and how this relates to a Makey Makey board
- Create a circuit in the classroom by holding hands and controlling the Makey Makey board – explore what happens when you let go of your hands

**Lesson 2 – Makey Makey and Conductivity**
- Test out different material for conductivity
  - Explore what materials work with a Makey Makey and what don’t

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**Follow Up Lesson**

Create a simple game in Scratch and create a hand held controller or arrow mat

*Tip: Use the online Scratch tutorials if students are not familiar with Scratch*

Question: What could you do with a Makey Makey? Is their a problem you could solve?

- Poll – What ideas can you come up with?
Year 5 Ideas

• Create a floor mat that can be controlled with your feet to play a game with a child with limited hand movement or missing limbs
• Use a Makey Makey to control a story or a book—choose a path adventure to inform students about safety choices
• Create a controller that could be touched with your nose and face for people in a wheel chair
• Create a game that teaches you to surf and use Makey Makey to connect a surf board
• Create a board game that teaches about a topic

Extra Ideas
• Create a virtual world using glasses and a Makey Makey

How do I apply the Makey Makey to the curriculum?

• Science – Explore circuits and conductive materials
• Maths – Create a game in maths to teach a skill identified by the class
• English – Create an animation in Scratch and control using a Makey Makey Controller
• Create a board game using Makey Makey
• Science Game – Create plasticine planets with quiz questions cards
Years 5 – 6
Game Creation

Students created and designed a game for other students to ski. Designed for other year 6 students that could not attend school ski trip.

Design, modify and follow simple algorithms involving sequences of steps, branching, and iteration (repetition) (ACTDIP019)

Makey Makey and Ozobot

Use ‘Switches’ to create digital stories with Ozobots.
Makey Makey and Ozobot

**Curriculum Application**
- Sequencing stories (literacy)
- Creating multimodal texts
- Programming
- Space Game Board
- Informative Text providing information as Ozobot moves over switches

**Science Week Project: Future Earth**
Students will read the book "What does it mean to be green?" and complete the online Eco footprint quiz in small groups. They will then collaboratively plan ways they can improve their footprint and be green. Using butchers paper they will create a story map of ways to be green and program Ozobots to proceed around the mat (making best choices using coloured codes). Students will also include a 'switch' on their map with a sprite talking about Future Earth using Scratch and Makey Makey’s.

Science Space Game

Create a game about planets with plasticine. Connect to Makey Makey and create an interactive quiz that requires user input. Have players select the correct plastine planets to answer questions.
Creating a Solution – Recycling Buddy

Students decided that the school needed a recycling buddy to help students in the younger grades understand what could and could not be recycled after analysing the school rubbish collection. Using the data they created a ‘Recycling Buddy’ that was put on display in the resource centre for students in younger grades. Using Scratch a face was used to talk when objects connected to the Makey Makey were touched information the class of information about recyclable objects.

Year 4 Extension
Entrepreneurs Project

The Project
• Students analysed previous year NAPLAN data and identified areas of weakness across the school based on low percentage of correct responses and questions answered lower than the national average
• Students looked at the questions and discussed possible misconceptions
• Students worked collaboratively to break each question down in to manageable steps to solve
• Students then learnt basic algorithm and coding skills and planned to create a game using Scratch that would teach the concept
• Students debugged their game and presented to the school for use in Numeracy NAPLAN preparations the following year

Reflections
• Connect a Makey Makey and use as a handheld controller to play the game or add in elements such as question cards within the game, interactive game boards etc
• Idea could be used for any grade including high school – advance to C++ coding or python
Year 2 – Scratch Jnr
Introduce Scratch in the Early Years

P-2
Follow, describe and represent a sequence of steps and decisions (algorithms) needed to solve simple problems (ACTDIP004)

3-4
Define simple problems, and describe and follow a sequence of steps and decisions (algorithms) needed to solve them (ACTDIP010)

Implement simple digital solutions as visual programs with algorithms involving branching (decisions) and user input (ACTDIP011)

Students creating stories and animations in Scratch Jnr to prepare them for game creation in years 3 and 5.

Question: What other ideas do you have for integrating Makey Makey into the curriculum?
Going further with Arduino....

Where to start – Visit the Digital Technologies Hub for a ½ hour video tutorial

**Description**
- The four videos include a DIY Start Arduino Kit, Introducing Arduino and an Intro to Arduino software (takes approx. ½ hour)

Try the project electro whoopie cushion and other projects.


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Going further with Arduino....

A Makey Makey is a simple Arduino board. To go further using an Arduino board install the Arduino Web Editor software and Arduino add on. Students then use C++ coding.

Visit Sparkfun for a how to advanced guide. The addon you installed will add a “MaKey MaKey” option to the **Tools > Board** menu within the Arduino IDE.

**Where to for more information:**
- [https://create.arduino.cc/projecthub](https://create.arduino.cc/projecthub)
- [https://www.arduino.cc/en/Main/Software](https://www.arduino.cc/en/Main/Software)
Going further....

**Scratch for Arduino**

http://s4a.cat/

S4A is a Scratch like interface that allows for simple programming of the Arduino open source hardware platform to provide new blocks for managing sensors connected to Arduino board.

**Kittenbot**

http://www.kittenbot.cc/kittenblock/

- Uses 3.0 version of Scratch
- Just snap the blocks to create your Arduino/Raspberry Pi/Robot projects
- Control the Arduino online and its sensors and actuators.
- Translate the graphical code into Arduino IDE required C++ and burn to Arduino mainboard, you can run the code offline.
- Create your Arduino/Raspberry Pi projects and program the robot by drag-and-drop way.

Key Learnings

- A Makey Makey is a fantastic tool to begin designing solutions
- A whole school approach is important to successfully embed Design Thinking, Digital Technologies and STEM!
- Think big – start small!
- Allow students the opportunity to explore, think critically and creatively and collaborate with each other to design solutions
- You don’t need to be the expert – be the guide, learn with students and allow them to be the teacher
- Create a ‘Makers’ environment – doesn’t need to be a physical space but a culture of solving problems and designing solutions
- Makerspaces don’t need a lot of money but do need creativity