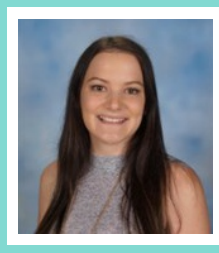
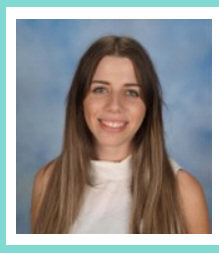
Inquiry into
DIGITAL TECHNOLOGIES IN THE EARLY YEARS





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Through the Technologies curriculum, we can provide students with cross curricular opportunities to consider digital technologies as solutions in their problem solving. Classrooms that offer inquiry, whether digital or not, allow students to develop critical thinking skills, deeper understandings and a stronger ability to apply learnt knowledge. It is imperative we don't dismiss or underestimate these skills in the early years and instead take advantage of their curiosities and excitement, especially when using digital technologies. When planning an inquiry unit into digital technologies, it is crucial that all areas of the curriculum are considered and intertwined, so students can see the relevance to their own self.

"Inquiry is the pursuit of understanding"

- Leslie Memme and Kari-Lynn Winters

The inquiry unit into robotics that we planned was built around the 3 levels of thinking in the Technologies curriculum:

- Systems Thinking; develop students understanding of how digital systems work and the interconnectedness of different systems
- Design Thinking; the process of identifying problems, planning solutions and reflecting on their effectiveness
- Computational Thinking; ability to predict outcomes of algorithms, breaking down problems and organising and interpreting data

Setting the scene:

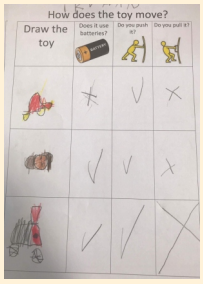
We teach within a cohort of 170+ Foundation students, 63% of which have English as an Additional Language (EAL) background. All students have access to a BYO iPad program as well as access to digital learning equipment, such as BeeBot, Ozobots, Sphero, Littlebits, Dash and Dot etc. Students already had some basic concepts of simple digital technology language and exposure throughout the school year. However, their understanding was quite superficial and we wanted them to have a deeper understanding of how and why robotics work and can be useful in real world contexts.

Inquiry process:

Inquiry is essential when teaching in the early years as it supports students in developing their curiosities. Nothing is more important than considering the students interests when planning an inquiry unit, and *seeing* that learning is student driven. Teachers have an important role throughout the inquiry process, ensuring that learning has purpose and scaffolding the students to become lifelong learners through the development of soft skills. The first part of the inquiry process is vital in finding out interests, current understandings and misconceptions in order to plan a successful cross curricular unit.

"The role of the teacher is to create the conditions for invention rather than provide ready-made knowledge"

- Seymour Papert



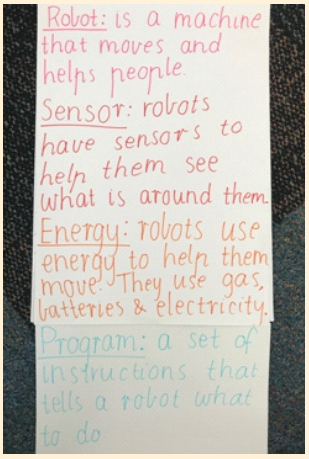
Forces and power - toys

Students brought a toy to school from home that moves and explored the types of forces or power they required to make them move. They compared the types of power various toys utilised and established meaningful insights by making personal connections to familiar objects.

Links to curriculum:

Science: Physical sciences (forces), Recording and processing

Mathematics: Data representation and interpretation

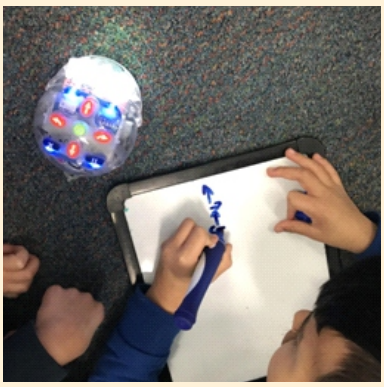


Making a glossary (reading texts, experimenting)

During literacy, the children were exposed to various texts about technology and robotics. Whole class focuses involved building vocabulary through co-constructed glossaries in which these were continuously referred to and built upon throughout the term to strengthen student understandings.

Links to curriculum:

English: skills such as inferring, vocabulary, questioning, summarising and so on.



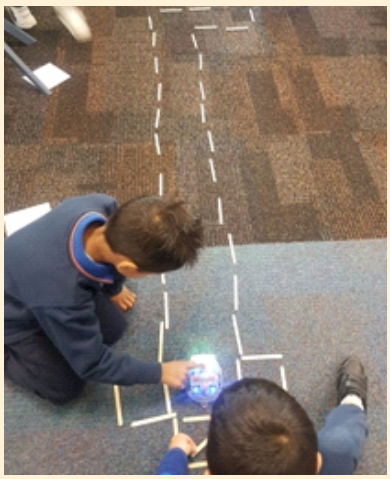
Programming - algorithm (patterns)

Students used their understandings of patterns and topic specific language to create algorithms so that they could program BeeBot. They collaborated with their peers and took turns at writing patterns, pressing buttons and challenging one another to follow the algorithms.

Links to curriculum:

Mathematics: Patterns and algebra, Location and transformation

Personal and social capabilities: Collaboration



How robots move - directional language

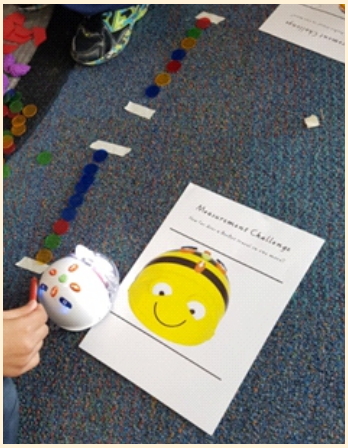
Students made paths for BeeBots and Ozobots and then coded them in order for the robots to move correctly through them. They then used their iPads to film and record their voice explaining the directions that the robots moved.

Other links to the curriculum:

Mathematics: Using units of measurement, Patterns and algebra, Location and transformation

Critical and creative thinking: Meta-Cognition

Personal and social capabilities: Collaboration



How robots move - measurement

Students explored how BeeBot moves by finding out how far it travels in one move. They used a range of resources such as counters, unifix or natural resources to measure and record how far it moved.

Links to the curriculum:

Mathematics: Using units of measurement, Patterns and algebra, Location and transformation

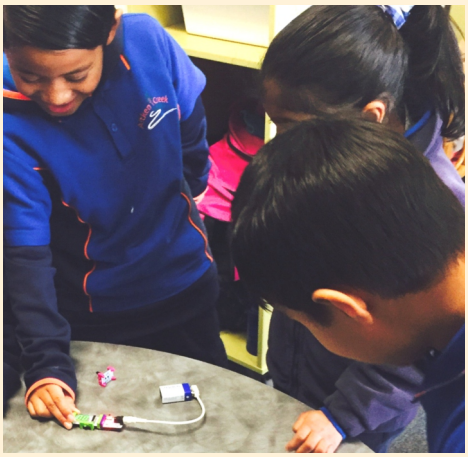
Comparing and contrasting (Katie)

Students explored numerous robotics, such as Ozobot, BeeBot and Sphero, to identify features that they had. They then collected yes/no data on the features (wires, lights, wheels etc.) and organised this into a simple data display.

Other links to the curriculum:

Mathematics: Data representation and interpretation

Science: Recording and processing



Exploring circuits

Students experimented with the functions of Little Bits. Some students decided to follow a set of instructions while others explored through trial and error. They developed vocabulary such as 'input', 'output', 'wires' and 'battery' and used this to label photographs or record their voices on their iPads explaining how circuit work.

Links to the curriculum:

Personal and social capabilities: Collaboration

Science: Planning and conducting, Communicating

Mathematics: Patterns and algebra

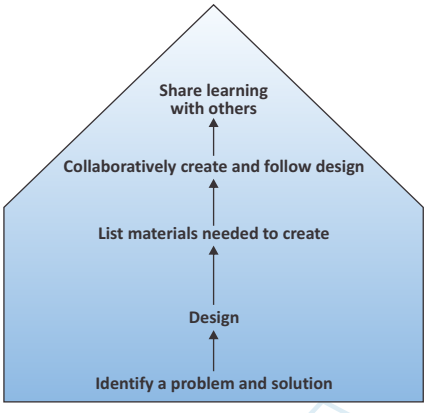
Critical and creative thinking: Reasoning, Metacognition

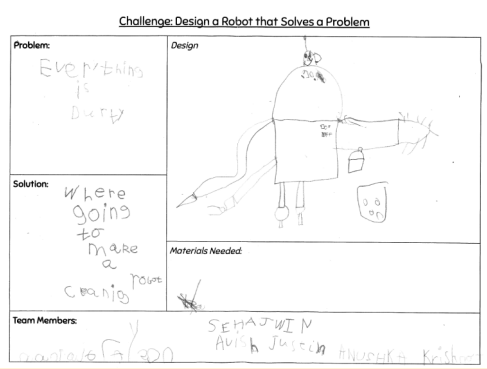
Outcomes: student understandings and exhibition - posing the question/challenge.

- Planning and designing (Liz-design/Katie-problem/solutions)
- Exhibition photos (Both)

The design process → problem/solution → plans → materials list → collaboratively creating robot → Exhibition

At the end of the unit, students were able to apply what they had learnt by responding to a challenge of designing and creating a robot as a solution to real world problems. This process demonstrated their level of understanding and was used as a rich assessment tool as it required various understandings and skills to be put to practice.



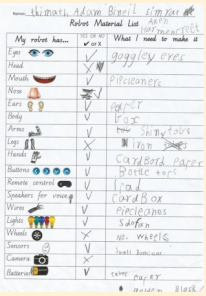


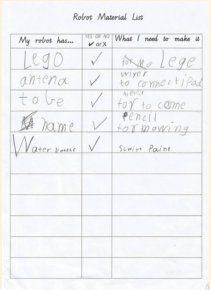
One of the groups of children read about elderly people who experience trouble standing up and need assistance. The children identified this as a problem and designed a "doctor robot" to aid in helping such people to stand up. They listed some materials they would need to make this robot and substituted these for craft materials.

Links to the curriculum:

English: Text structure and organisation, Phonics and word knowledge, Creating literature, Creating texts.

Speaking & Listening: Expressing and developing ideas, Interacting with others.





This group of students had identified a problem of not having enough lego for a building they were making. After planning, they created a list of materials by identifying what would work best for each part of their plan.

Students wrote descriptive pieces about their robots, explaining what materials they used, what parts the robots had or how they worked. This was presented at the exhibition alongside their robots.

Students used Book Creator on their iPads to create advertisement posters to send to their families and friends about the exhibition.

Links to the curriculum:

English: Text structure and organisation, Phonics and word knowledge, Creating literature, Creating texts

References and further readings:

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