

A photograph of two young children, a girl on the left and a boy on the right, both wearing blue school uniforms. They are sitting at a white table, looking down at tablets. The girl has a pink flower in her hair. The boy is resting his chin on his hand. In the background, there is a colorful mural of a face. The text "DIGITAL TECHNOLOGIES INTEGRATION" is overlaid in the center in large white letters with a black outline.

DIGITAL TECHNOLOGIES INTEGRATION

Paul Butler

Before We Begin

- ▶ What are you doing with digital technology in your classroom?
- ▶ What would you like to learn from this PD?

Session Aims

Breaking down the Digital Technology Curriculum



Discuss data representation, digital systems, and digital design



Ideas for integration of elements into general learning areas

DIGITAL TECHNOLOGY IN THE CURRICULUM



What Is Digital Technology?

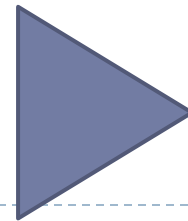
The Digital Technology curriculum has been created for 21st century learners. It's designed to allow students to have the opportunity to analyse digital systems and use their findings to develop solutions.



But Why?

Why is the Digital Technology curriculum being implemented across Australia?

- ▶ The job market is in a state of change. While many labour intensive and basic service-based jobs are becoming automated, other jobs are opening up. The children of tomorrow need these skills of using digital systems and data representation.



Digital Technology and ICT Capabilities

What is the difference between Digital Technology and ICT Capabilities?

- ▶ Digital Technologies is used to support students to understand the language behind digital systems, and in turn become creators. ICT capabilities are the tools that are used for our students to be consumers.
- ▶ Digital Technology is a reportable learning area, ICT general capabilities are expected to be taught alongside day to day concepts like reading and writing.

What's the difference between ICT Capability and Digital Technologies?

Information Communication Technology (ICT) Capability

A general capability taught within all curriculum areas for students in years F–10.

Develops skills and understandings in managing and operating ICT to investigate, create and communicate.

Incorporates digital citizenship when considering the ethical and social impacts of using technologies.

Is explicitly planned and taught in all subject areas.

ICT supports students to be effective users of technology.



Australian Curriculum: © ACARA 2010 to present, unless otherwise indicated. Licensed under CC BY 4.0.

Digital Technologies

A new subject for F–10 (optional in 9–10) students with new and unique skills and content.

Develops knowledge, understandings and skills of the underlying concepts of information systems, data and computer science.

Encourages students to design and create digital solutions that solve problems taking their preferred futures into consideration.

Must be assessed and reported at least once every two years.

Digital Technologies build on and extend ICT, moving students from technology consumers to creators.



Australian Curriculum: © ACARA 2010 to present, unless otherwise indicated. Licensed under CC BY 4.0.

Use ICT

Presentation tools

Locate information

Digital publishing

Interpret timelines

Ownership and use

Managing files

Mapping and geospatial tools

Online communication

Digital music / multimedia

Create solutions and learn about Digital Technologies

Digital systems (networks)

Robotics and automation

Coding and programming

Computational thinking

User interface design

Storing and transmitting data (binary numbers)

Pattern recognition

Algorithms

Programming boards

Data collection

Examples of ICT in action

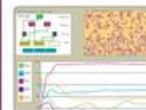
Use digital concept mapping tools to plan and select research tasks.



Use presentation software to present findings of an inquiry that includes text, images and video.



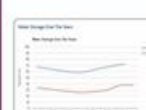
Use video to analyse a sports performance to provide coaching tips.



Use a computer simulation or game to test predictions and collect data.



Use a search engine effectively as a research tool.



Use spreadsheet functions to create tables, record, sort, calculate and present data to identify trends.



Use an online game that has a grid map system to learn about directions.

Examples of Digital Technologies in action

Create and code an image using black and white squares. Invite a classmate to decode and recreate the image.



Compare a transport network and computer network to explore ideas about pathways, reliability, protocols and security.



Create an interactive story with user-input using a familiar programming language.



Create your own simulation using a visual or text-based programming language.



Explore ways to securely transmit data through techniques of encryption and decryption.

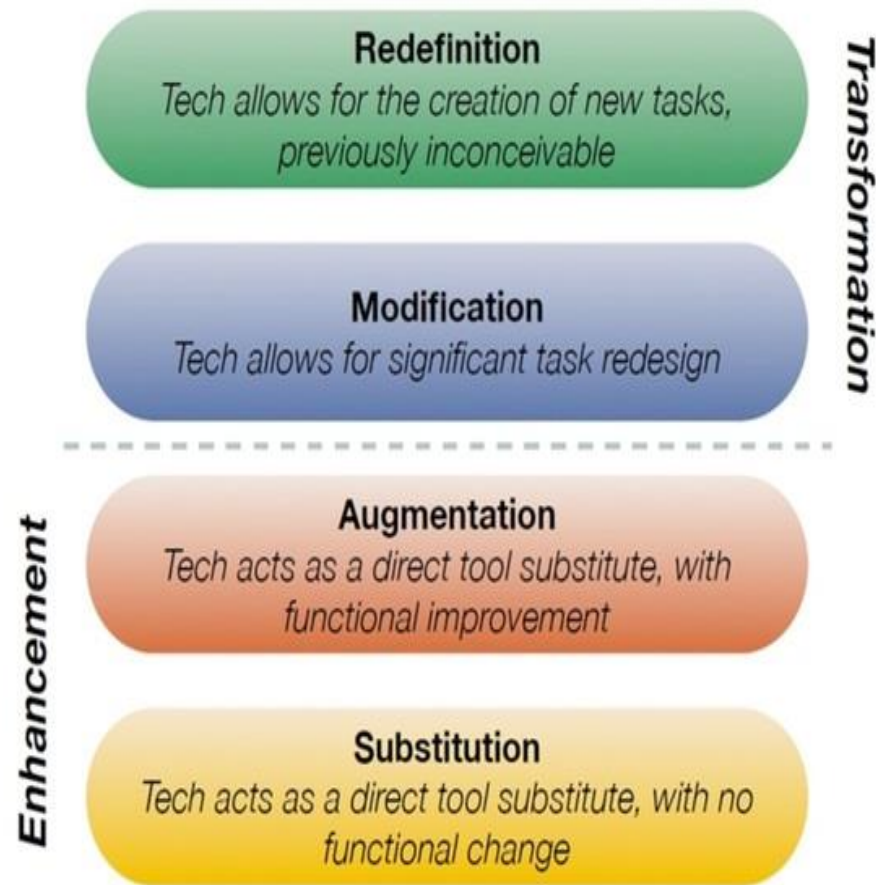


Create network diagrams to identify relationships between different sources of data (eg friends on social media) and analyse this data.



Design your own maze and use an app to program a robot to go through it.

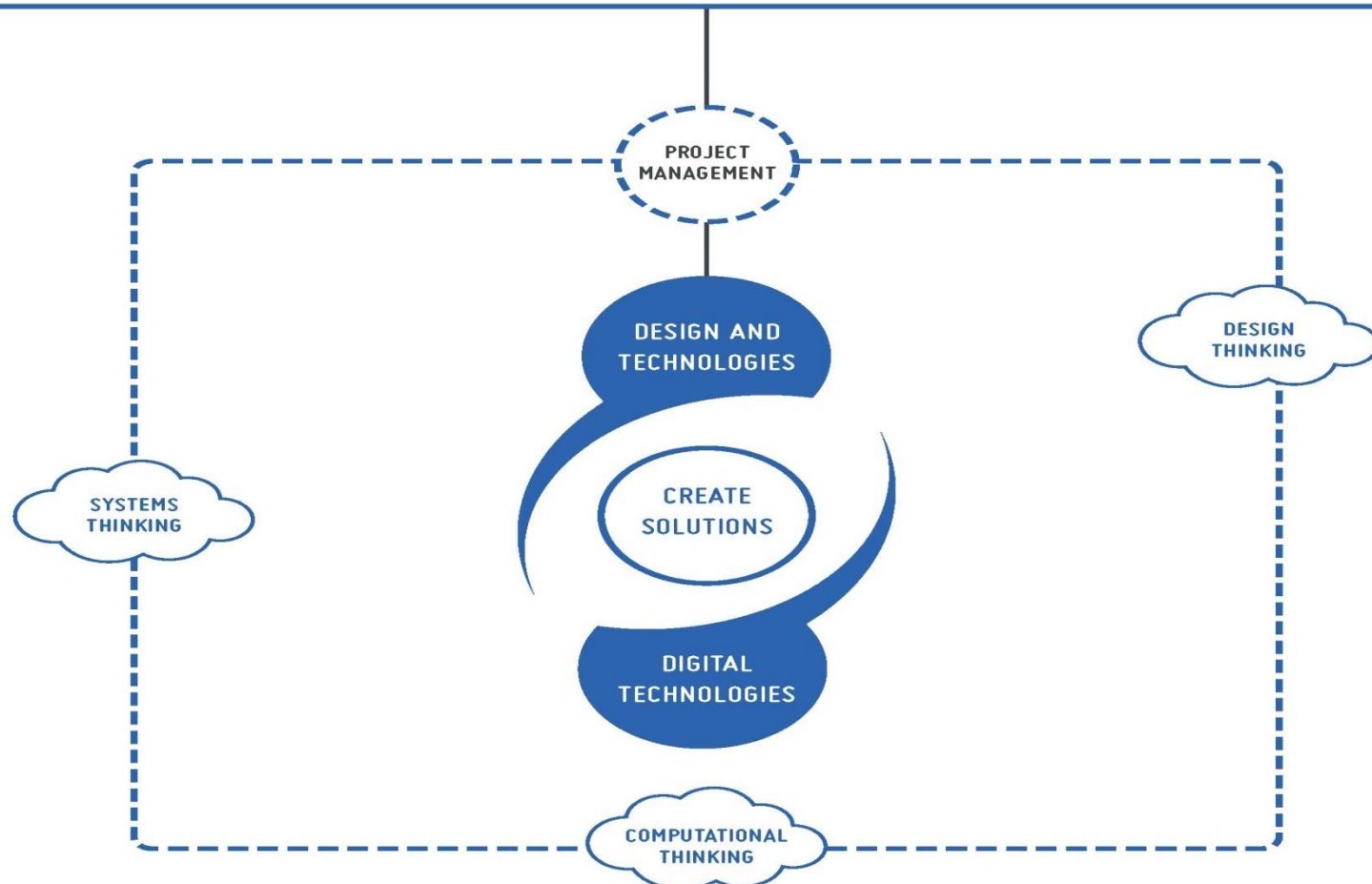
SAMR Model





TECHNOLOGIES

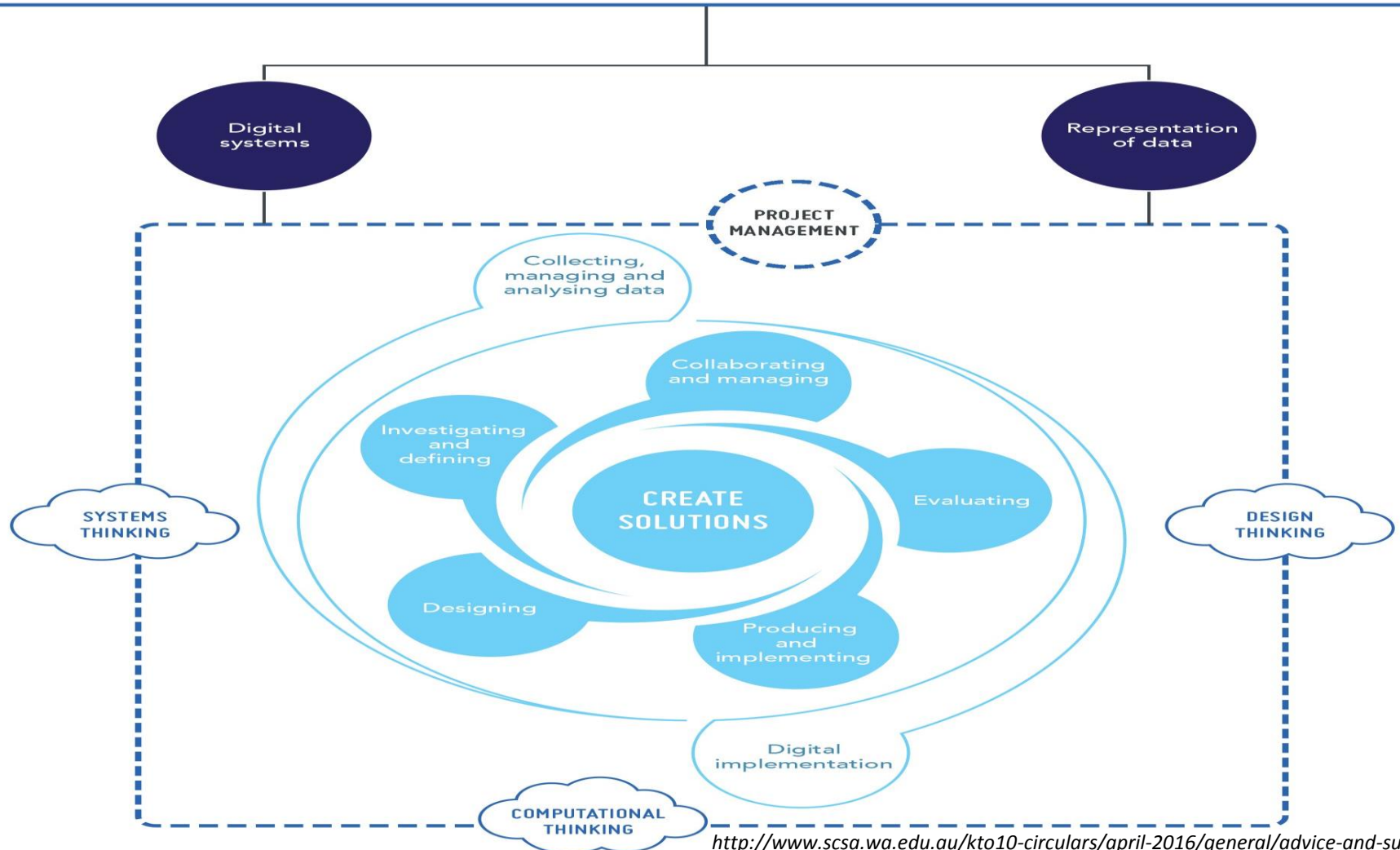
The Technologies curriculum is delivered through two distinct but related subjects: Design and Technologies and Digital Technologies. Students will develop skills to manage projects, apply computational, design and systems thinking to create solutions now, that can be used in the future.



DIGITAL TECHNOLOGIES

The delivery of Digital Technologies requires learning experiences where digital solutions are created by:

- teachers selecting specific content from digital systems and/or representation of data
- students applying skills from the Processes and production skills strand
- developing project management skills
- engaging computational, design and/or systems thinking.



DATA REPRESENTATION, DIGITAL SYSTEMS AND DESIGNS



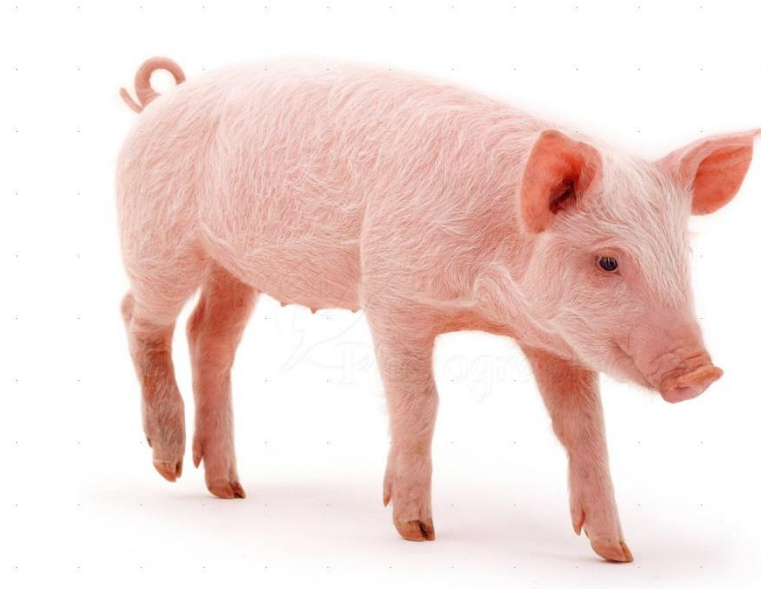
Data Representation

Data representation describes how data is represented and structured symbolically for storage and communication, by people and in digital systems...

What to do:

- Take two post-it-notes and draw a picture of a pig on one, and a picture of a dog on the other
- Hand one of the pictures to someone else on your table and keep the other one face-down on your table
- What do you have a picture of? A pig or a dog?

What Animal Is This?



- ▶ How do you know this? What tells you that this is a pig?



Purpose Of Data Representation

- ▶ Communication
- ▶ Thought/creating knowledge

When describing a pig

- ▶ Pre-language – pointing at an actual pig
- ▶ Painting – using symbols/drawings
- ▶ Development of language – using sounds
- ▶ Progression of language – names for pig

Purpose Of Data Representation

Why is this important in computer sciences?

- ▶ Abstraction involves hiding details of an idea, problem or solution that are not relevant, to focus on a manageable number of aspects. Abstraction is a natural part of communication: people rarely communicate every detail, because many details are not relevant in a given context...
- ▶ When humans want to count, we use a base number system, but when computers need to represent something, they only need two numbers.



Data Representation: Purpose

Binary Numbers

- ▶ When a computer wants to represent something, they use a binary system. By using the numbers 1 and 0, a computer can determine what is being represented

Everything is represented as numbers:

- ▶ Text
- ▶ Images
- ▶ Audio
- ▶ Video

Data Representation: Links

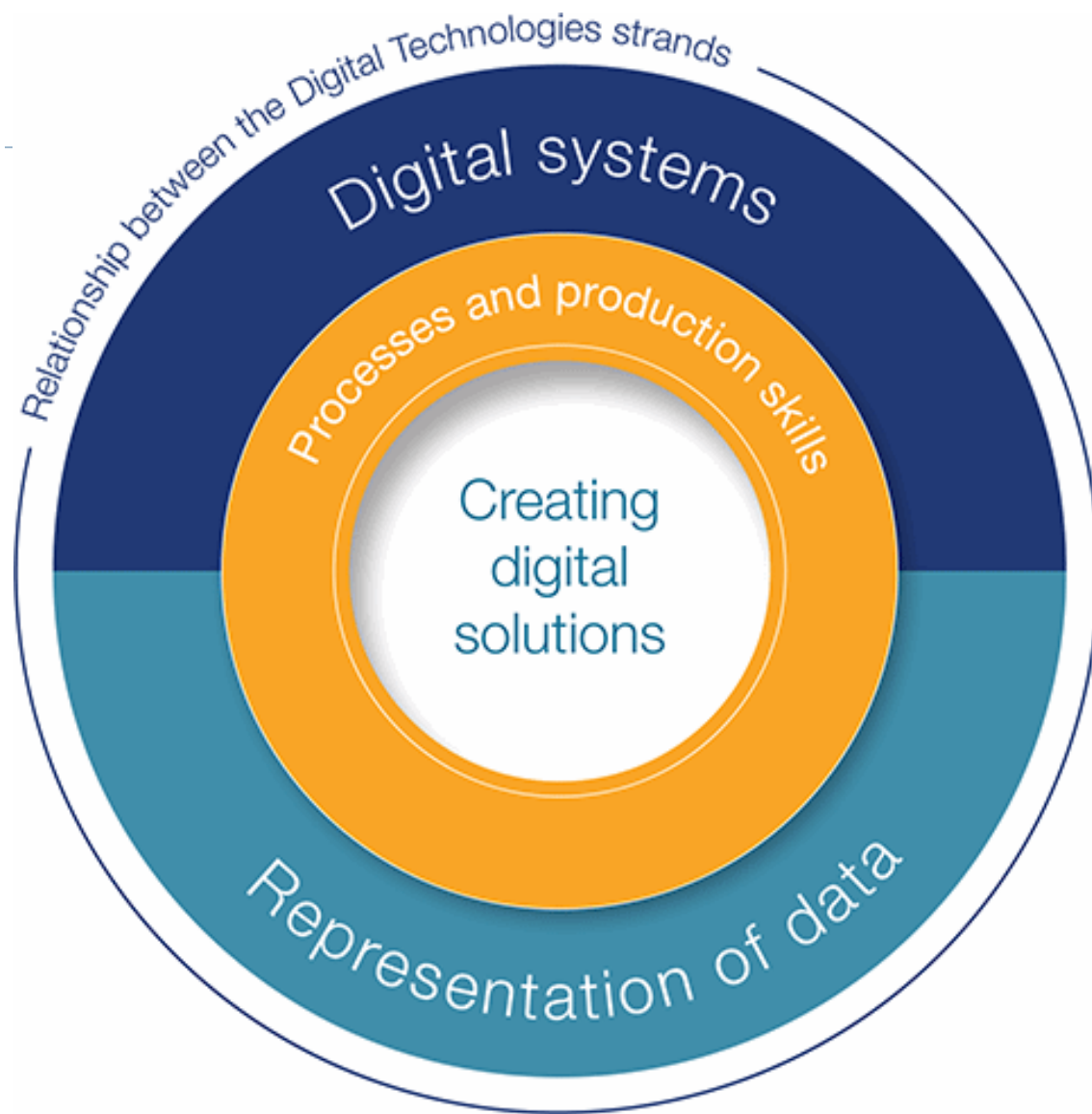
- ▶ English/languages - pronunciation, vocabulary, spelling, grammar conventions
- ▶ Design and Technology – communication skills and project management
- ▶ Mathematics – binary numbers and non-linear equations



Digital Systems

The digital systems content descriptions focus on the components of digital systems: hardware, software and networks. In the early years, students learn about a range of hardware and software and progress to an understanding of how data is transmitted between components within a system, and how the hardware and software interact to form networks.

- ▶ This section links in with your ICT general capabilities



**Yokine
Primary
School**

Process And Production

This is the design process section of the curriculum. It links in directly with the Design and Technology curriculum, and focuses entirely on using digital systems and data representation to create solutions. This is project-based learning.

- ▶ Developing algorithms
- ▶ Branching and sequencing
- ▶ Communicating and interacting
- ▶ Data collection, representation, and interpretation
- ▶ Digital design

INTEGRATION IN THE CLASSROOM



How do you fit it in?

Project-based learning is no quick and simple task. How do you fit it into an already jam-packed schedule?

- ▶ 5 hours of Mathematics
- ▶ 5 hours of Literacy
- ▶ 5 hours of students at recess and lunch
- ▶ 2 hours of Physical Education
- ▶ 1 hour of Health
- ▶ 2 hours of HASS
- ▶ 2 hours Science
- ▶ 1 hour LOTE
- ▶ Library & assemblies/other stoppages
- ▶ How long is recommended for Technologies?

27

25

Integration into other learning areas

STEM – At Yokine, we use STEM as a method to integrate the Technologies curriculum into the Science and Mathematics curriculum.

Some things I have tried:

- ▶ Using Mathematics and Design and Technology to make Sphero racetracks
- ▶ Creating digital narratives and informational animations with Scratch and Scratch Jr.
- ▶ Using algorithms to develop solutions for design tasks.

How do I integrate in a normal class?

Algorithms in Literacy and Languages

- ▶ Students create a basic sequence of steps to lead their main characters through a story
- ▶ Students develop their own algorithms explaining their decision-making processes when creating texts
- ▶ Students act out a story using robots as their “actors”
- ▶ Students relate data representation and coding languages to learning secondary languages
- ▶ Using software to animate a story

Integration

Mathematical understandings

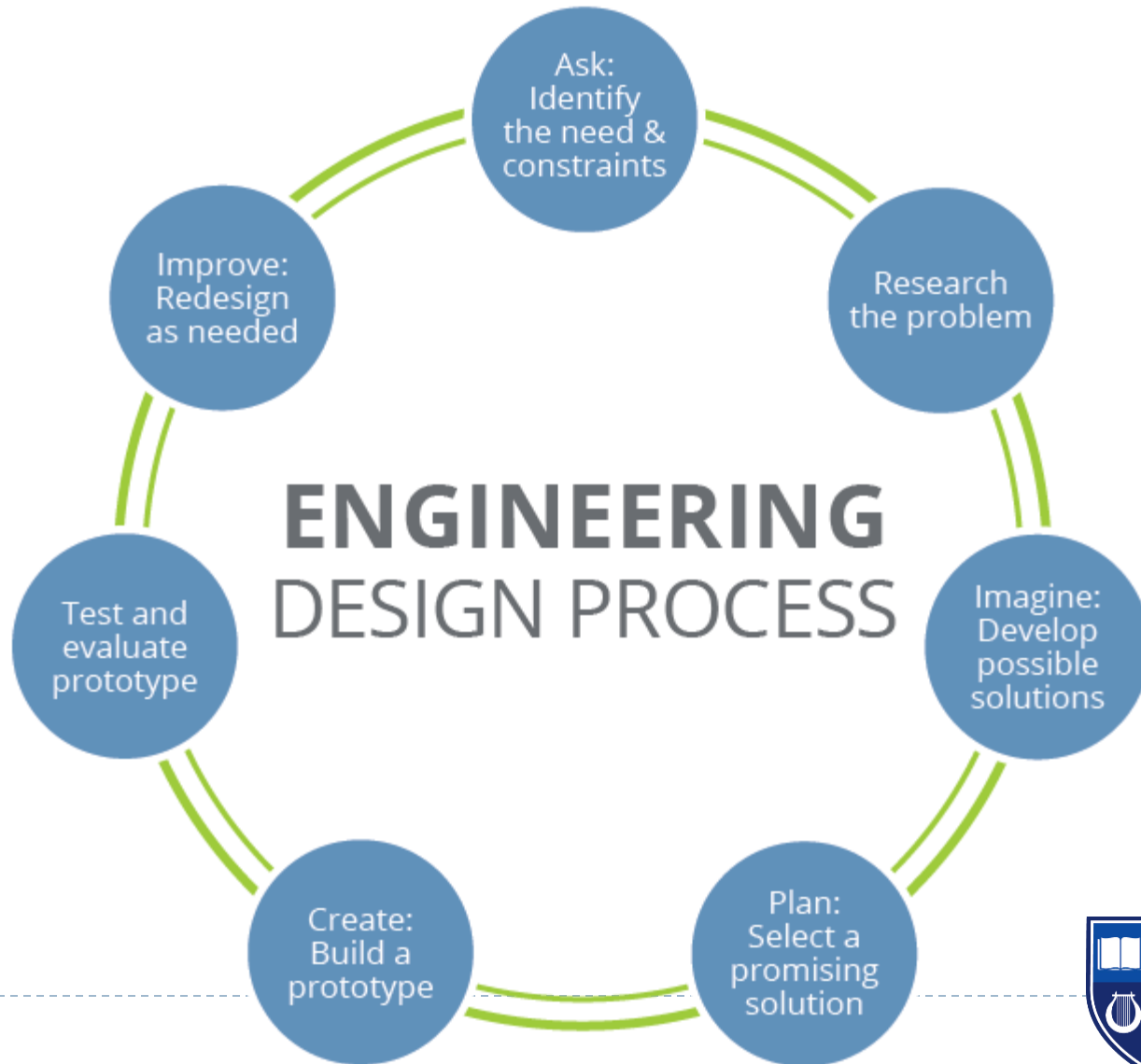
- ▶ Number and Algebra to explain binary systems
- ▶ Number and Algebra when creating coding variables
- ▶ Measurement, scale, and angles when moving robots around an environment
- ▶ Base 2, 6, 8, 12, and 16 number systems
- ▶ Grid referencing systems
- ▶ Creating, and analysing data
- ▶ Explaining found data
- ▶ Real-world contexts for probability

Integration

Computer Sciences in HASS

- ▶ Comparison of old technologies with newer technologies
- ▶ Using coding-based systems to map on a grid (Mathematics and Geography)
- ▶ Designing solutions to community-based problems using technologies (Civics & Citizenship and Engineering)
- ▶

Integration - The Design Process



Recommendations

- ▶ Go back to your classroom and start a Code.org classroom
- ▶ Start a Scratch classroom – look at codeclub.uk for ideas
- ▶ Play around with these
- ▶ Find out what happened to your Digital Technology kits that were given to all government schools last year, and look into using one piece of equipment this term

Remember: These are learning tools, not toys. It's imperative that you explain this to your students.