Design thinking and collaborative learning design

Access virtual goodie bag:

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Presented by: Catherine Newington

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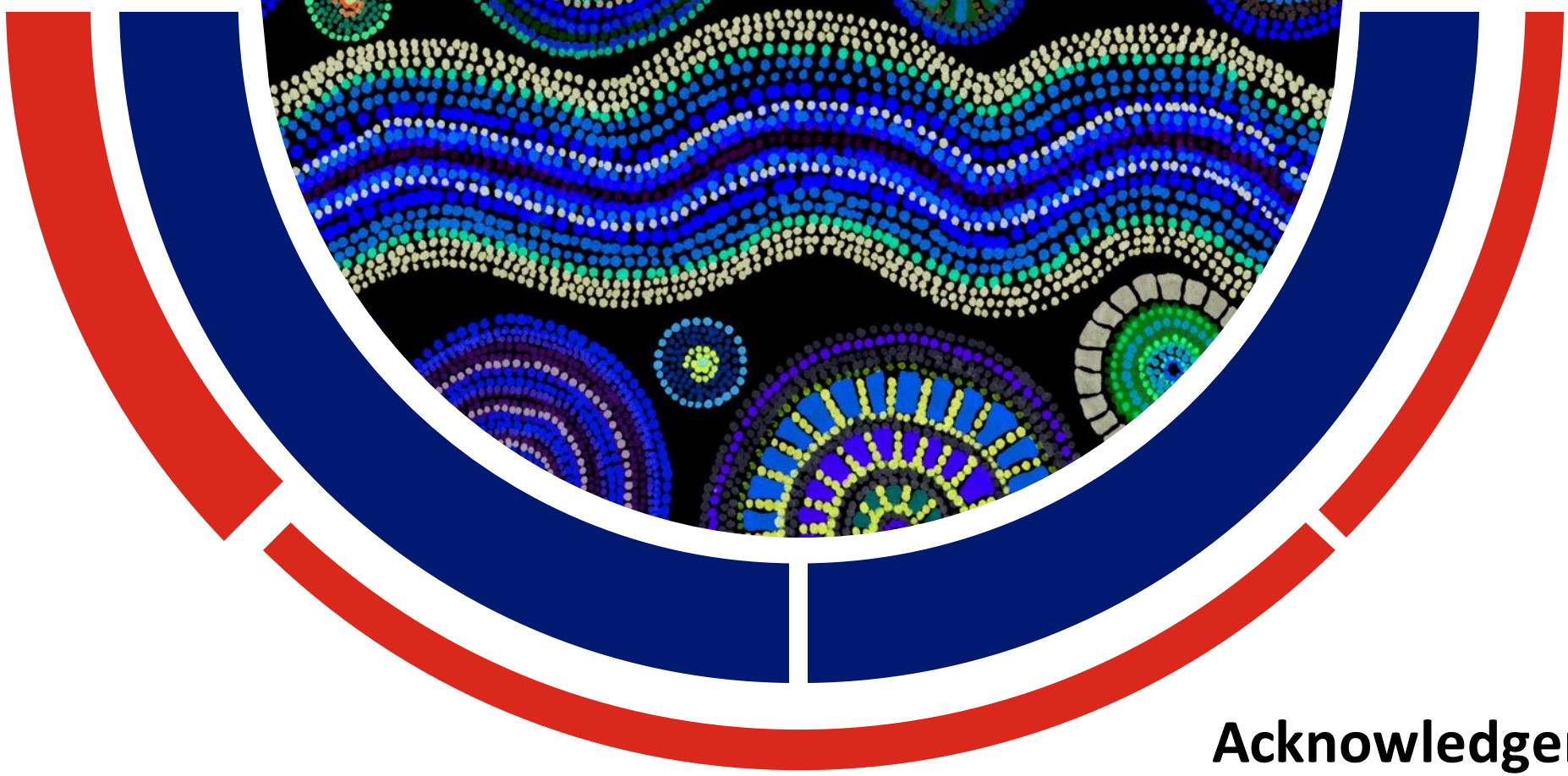


Acknowledgement of Country

The ACS would like to acknowledge the traditional custodians of all the lands from which we join. We pay our respects to the Elders past, present and emerging and extend that respect to other Indigenous Australians present.

Catherine Newington

I was a Primary School teacher for 12 years and a Technology and Learning Lead role for 5 years

I studied at Monash University to get my postgraduate degree specialising in Education Technologies.

I lead the ACS ICT Educators national program to support the implementation of the Digital Technologies Curriculum across Australia.

I am the co vice president of DLTV – the digital technologies subject association for Victoria.

Agenda

01 **Pedagogies**

The important role that pedagogies play when implementing technologies for learning.

02 **Design thinking and technology in the real world**

Using real world examples to make learning meaningful for students.

03 **Lesson and Unit Examples**

Putting all of this into a lesson and unit of work – what does it look like in the classroom.

04 **Digest and Implement**

Time to reflect on the information from yesterday and today and start implementing in your school programs.

Technology and Education

Educators

Knowing our students.
Knowing our pedagogy.

Curriculum

Honor the Curriculum.
Know what requirements we need to fulfill.

Technology

Allows you to evaluate the technology for your purpose. Choose the right tool for the task.

TPACK

TPACK is a way of describing how technology pedagogy and content fit together to enable powerful learning.

The TPACK model highlights that an idea for using ICT in classrooms must have a sound curriculum and pedagogical fit.

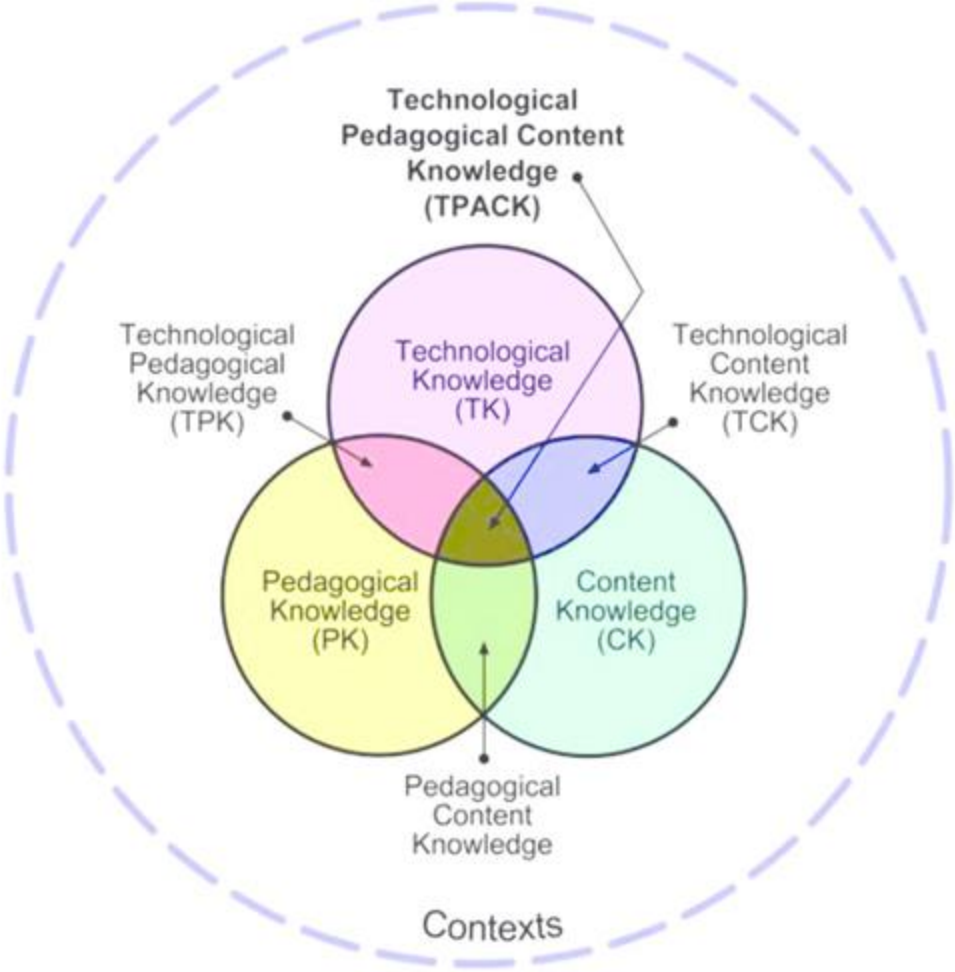


Image from http://tpack.org.

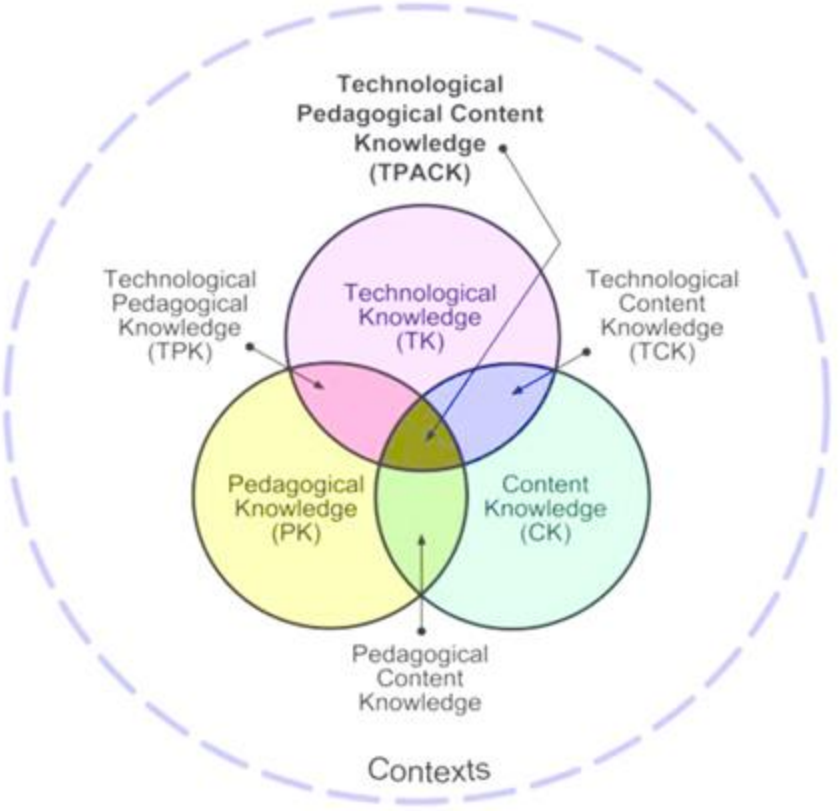
TPACK

Technology – Evaluating the technology as a tool and making sure you are using the right tool to complete the job.

Focus on how the students will use the technology when they are engaging in their learning. They need to be doing more than just engaging with the technology.

Look at how the technology fits into the curriculum rather than trying to fit the technology into the curriculum.

Example: Drones and 3D Printers



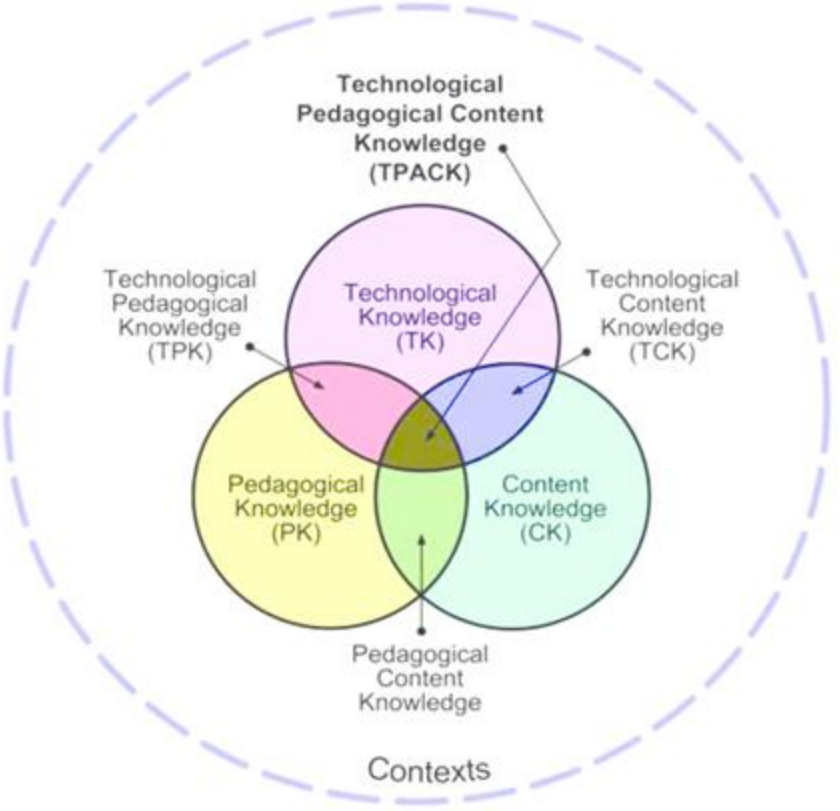
TPACK

Pedagogy – Knowing who you are as a teacher and knowing what works in your classroom.

Finding and evaluating the technology that fits into your pedagogy.

If you choose technology that doesn't marry your pedagogy, it can hinder.

I love project based learning, inquiry based learning where students are exploring and constructing their own knowledge. Drill and skill based technology doesn't work for me.



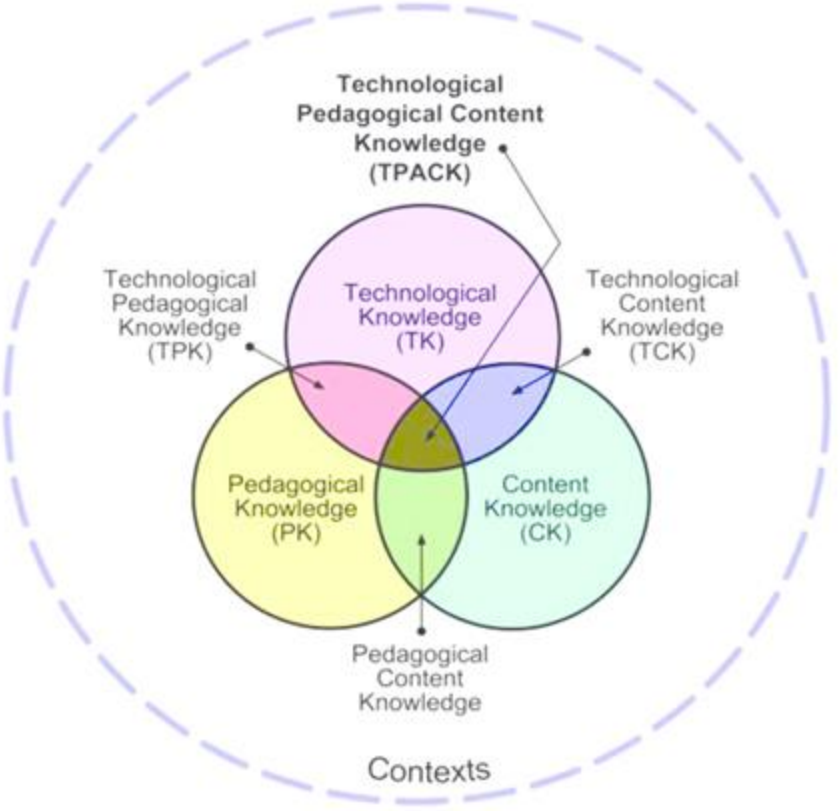
TPACK

Content – Knowing what you need to teach the students. Knowing the curriculum standards and knowing how you will assess.

Honour the curriculum

Knowing the standards that your students need to meet too. This may be different for some.

Explore the curriculum.



TPACK in 2 minutes

TPACK Reflection Activity

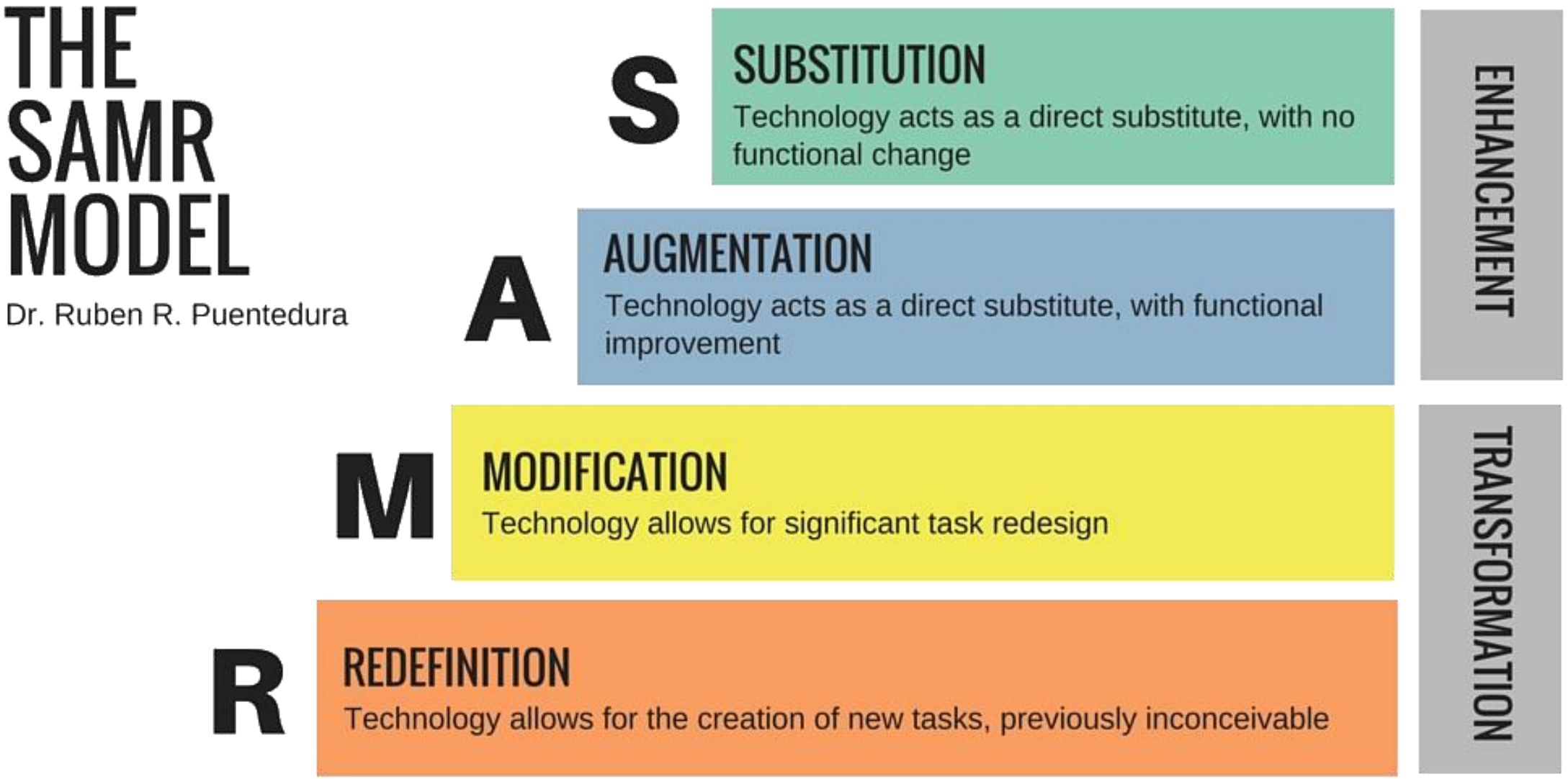
Suggested activity to do with staff

Technology: What technologies have you seen used for learning purposes? What programs are you confident with?

Pedagogy: What are your pedagogical beliefs? How would you use teaching to support your students? What is one thing you would look for when choosing technology?

Content: How are technologies supporting curriculum learning? What content do you need to cover and what technologies can help you teach and assess?

SAMR Model


THE SAMR MODEL
Dr. Ruben R. Puentedura
S
SUBSTITUTION
Technology acts as a direct substitute, with no functional change
A
AUGMENTATION
Technology acts as a direct substitute, with functional improvement
M
MODIFICATION
Technology allows for significant task redesign
R
REDEFINITION
Technology allows for the creation of new tasks, previously inconceivable
ENHANCEMENT
TRANSFORMATION

SAMR Model

Substitution - Technology acts as a direct tool substitute for traditional practices, with no functional change could be time saving and resource friendly

- Digital textbook - online quizzes - digital whiteboard - word/docs

SAMR Model

Augmentation - Some functional improvement

- Multimedia elements images, videos layout skills in presentations, online instruction, online independent research

SAMR Model

Modification - Co -authorship and collaboration intended - less teacher direction

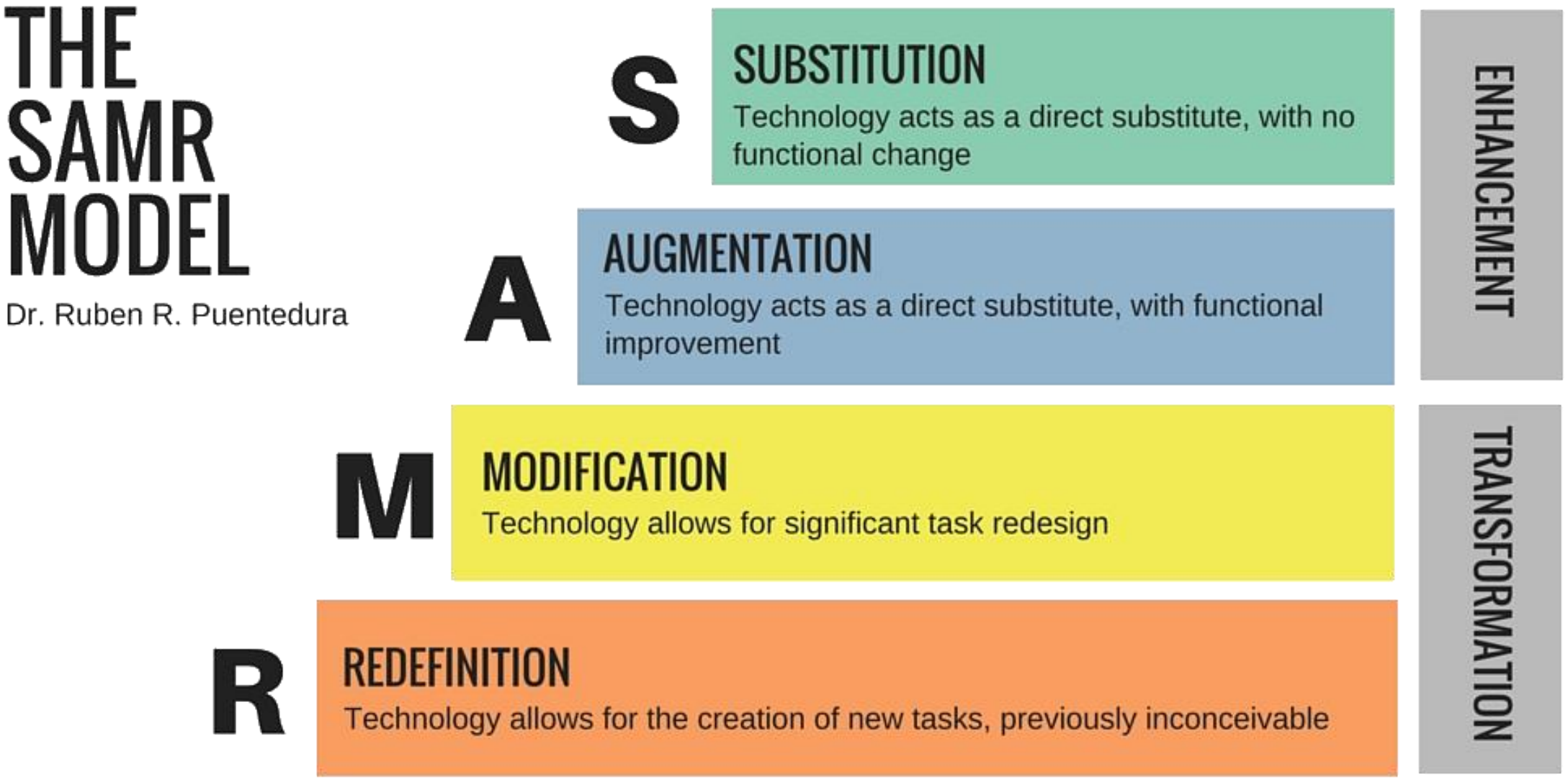
- Podcasts, blogs, website authorship ie google sites

SAMR Model

Redefinition - student centered, self directed learning, real-world authentic problem solving. Students display high levels of technology skills

- Extensive multimodal elements in presentations
- Potential world wide audiences

SAMR Model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SAMR Reflection

Suggested activity to do with staff

- What technologies are you using and how are you using them in your classes?
- Where are they in the regards to the positions within the SAMR model?
- What do you need to move onto the next level?

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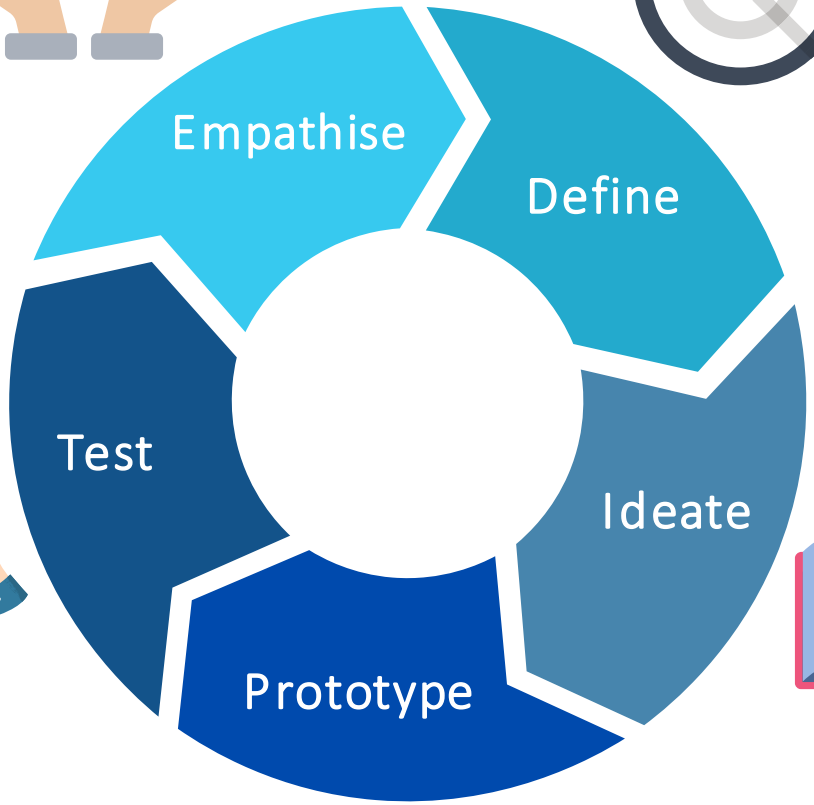
Empathise

Understanding people and connecting with community.

Define

Understanding the problem and understand the role of technology to help solve the problem.



Test

Refine the product by evaluating the idea ad prototype and make changes as needed.

Ideate

Generate ideas by connecting with stakeholders and understanding the needs of the people.

Prototype

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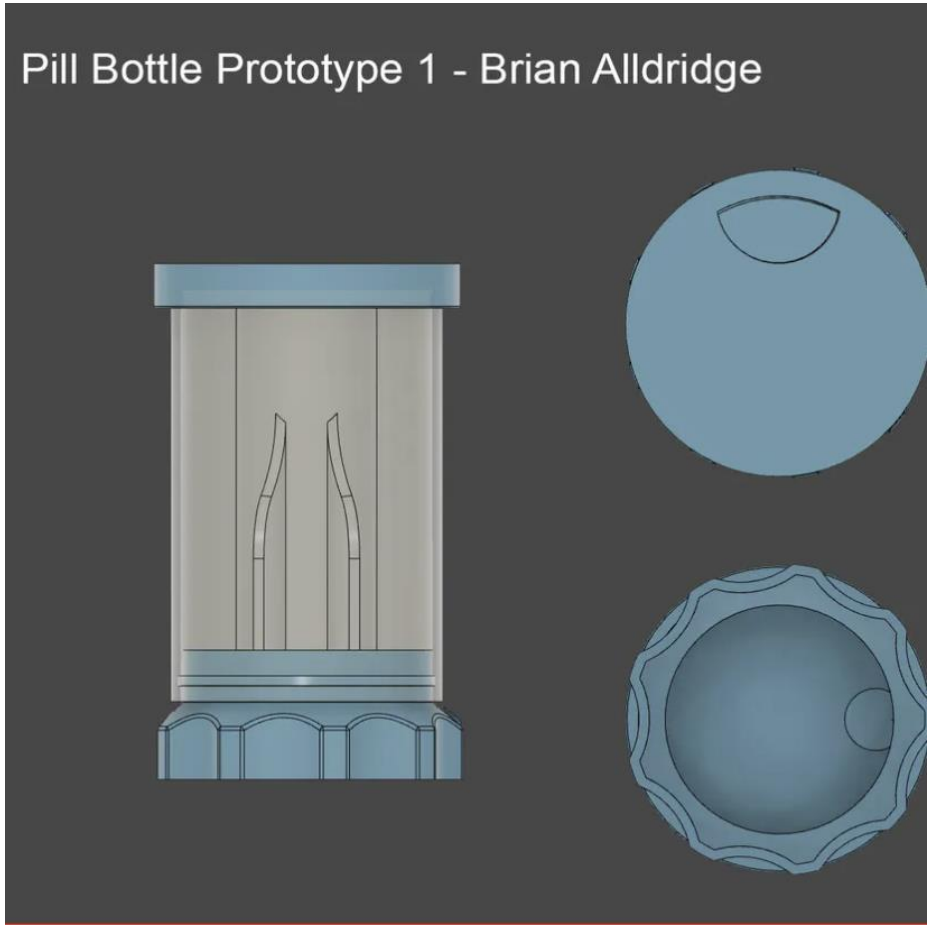
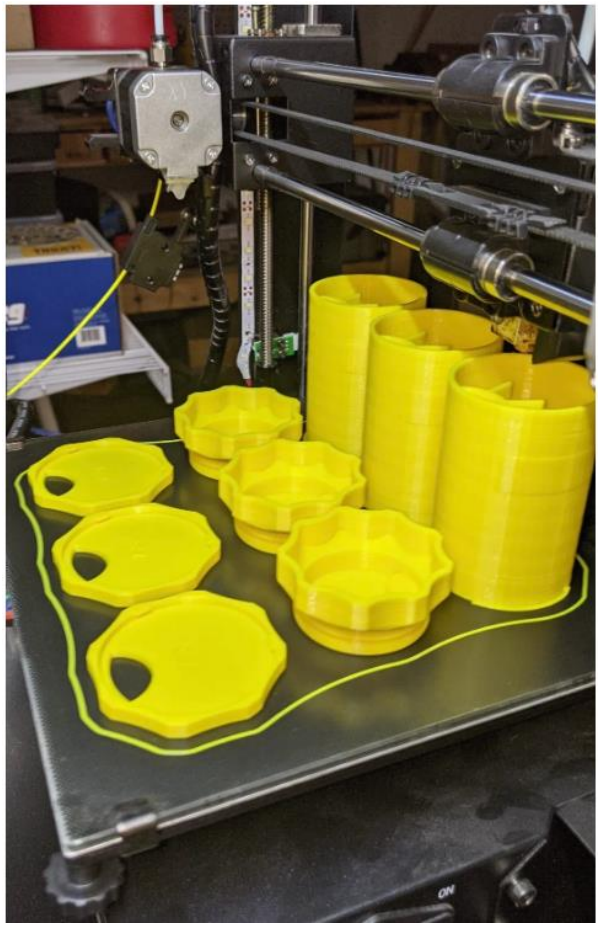
TikTok and 3D Printers





More information

https://www.theverge.com/2021/1/23/22244673/parkinsons-tiktok-crowdsourced-pill-bottle

Summary

TikTok was used as a platform to help a man dispense Parkinson's Disease pill easily.

Project Daniel & 3D Printers

More information

https://www.youtube.com/watch?v=SDYFMgrjeLg

Summary

An American built an arm for Daniel. The arm was created using 3D Printers. The local people were trained on how to create more arms.

Drones Stop Poaching

More information

https://mashable.com/archive/drones-stop-rhino-poachers

https://www.nbcnews.com/news/world/air-shepherd-uses-drones-stop-elephant-rhino-poachers-africa-n335801

Summary

Park rangers in Africa stop poaching using programmed drones that locate where the animals are and poachers are likely to strike.

Agriculture Farming Robot

More information

https://www.bridgestone.com/bwsc/stories/article/2019/06/17-7.html

Summary

An Australian design to help farms plough crops more effectively. There are sensors that help locate the crops!

Block by Block

More information

https://www.blockbyblock.org

Summary

Block by Block is a nonprofit organization that uses Minecraft as a tool to help people in the community have a voice on how to design and shape community spaces.

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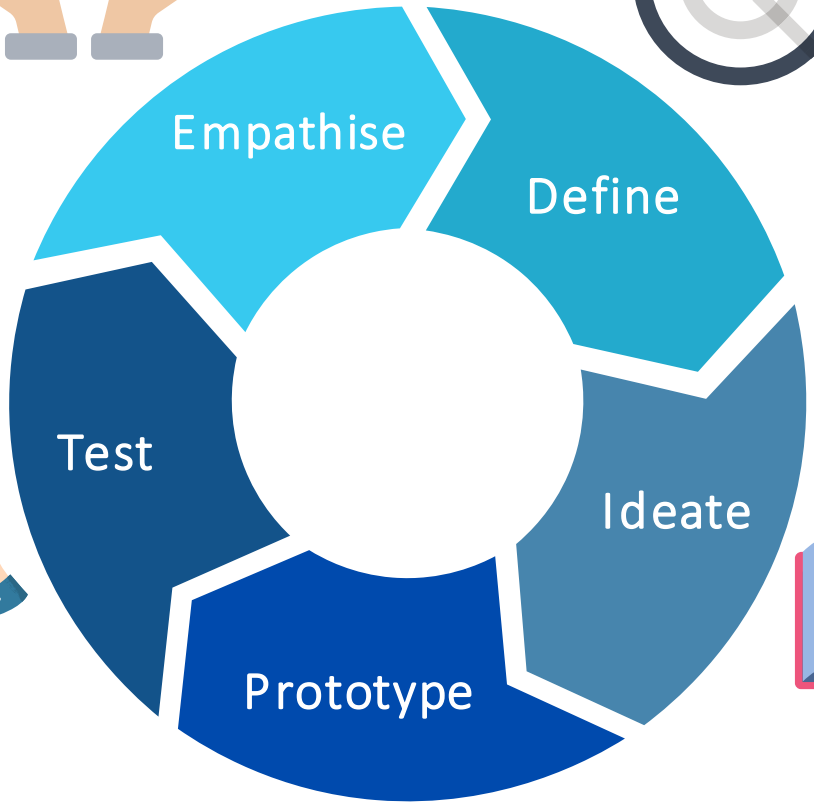

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Healthy Eating: Foundation - Year 2

Overview

Students identify healthy and unhealthy foods. The focus of the lessons is to introduce students to algorithms and sequences of steps through the use of robotics. Students will use Bee-Bots and provide the Bee-Bots with a sequence of steps to help make healthy choices.

Key Understandings and Key Questions

Follow, describe and represent a sequence of steps and decisions needed to solve simple problems.
Use Bee-Bot devices to create and program a sequence of steps.
Program a Bee-Bot to go shopping for healthy food.

What are the sequence of steps in the Hungry Caterpillar?
What are the sequence of steps when we eat? What happens in our body?
What steps would you create to code a robot to only pick up healthy foods?
How can you program your bee-bot to only picky up healthy foods?

Perfect Plants: Year 3 - 4

Overview

These lessons have been designed to complement a unit of work that investigates plants and greenhouses. Prior to these lessons, students will have demonstrated knowledge and understanding of farming and have created a mini greenhouse. It is the intention for students to grow and maintain their plant. They will investigate important factors that influence the growth of plants and collect data to judge the 'best' location to place their greenhouse.

Students will use robotics to collect data to influence the placement of the greenhouse to maximise plant growth. They will represent the data and use the data to explicitly influence their decision to find the 'best' suitable place for their plant.

Key Understandings and Key Questions

- Program the Cubit to gather light and temperature data.
- Gather and sort the light and temperature data.
- Make conclusions backed up by their data collection to find the most suitable spot for their green house.

- How does the Cubit Kit help your decision to find the 'best' spot for your greenhouse?
- Why is it important that we gather this data?
- What data have you collected from programming the cubit?
- What does it tell you about the 'best' position for you to keep your greenhouse?

Enhancing Communities with Minecraft: Years 5 - 6

Overview

This unit of work has been created to demonstrate how a global non-profit organisation, Block By Block has utilised the features of Minecraft to help under privileged communities. Students will use the ethos of the organisation as a catalyst to design and virtually build a community that will benefit the needs of an identified group of people. The chosen community can be one for local friends and family or reach another community on a global scale.

Key Understandings and Key questions

- Describe how digital technology has been used to help communities.
- Use Minecraft to design a solution to a problem in a community.
- Use Minecraft to explore how coding can be integrated into their design to further enhance functions within Minecraft.

- How is Minecraft used to help real life communities around the world?
- How can you use Minecraft to redesign an area in our local community to benefit our members?
- How can you incorporate code into your design to enhance any features to automatically move/change

Getting Connected: Years 7 - 8

Overview

Students will investigate and explore the hardware, software and processes that are required to build and create a network and allow users to have access to the internet. Once students have the initial knowledge they will commence putting their knowledge into a real-life application. Students will explore communities around Australia and globally that do not have access to the internet. They will research these communities and create profiles of these communities – creating an understanding of the needs of the communities and how they can support their needs. In small groups, they will use the profiles to help design and create the community and include information on how they can support the community and provide them with fast, reliable internet speed.

Key Understandings and Key Questions

- Explain how the internet and networks are formed
- Explain how data is transmitted through the network
- Explain how binary code is the representation of data when data is transmitted and stored
- Evaluate existing digital solutions to connect using a set questions and prompts
- Design a digital solution to provide a remote community access to the internet and networks.
- Evaluate student digital solution using a set questions and prompts
- How do you access the internet?
- What resources and devices do you need?
- How can you increase the speed of a network
- Why is it important to connect remote communities? How does it benefit the remote communities?
- What would you do to provide a community with a network and connection?
- What would that network connection look like?

Creating Entrepreneurs: Year 9 - 10

Overview

In today's society, digital technology has paved the path for entrepreneurs and successful businesses. Some of these businesses have disrupted the market (created a share economy like Airbnb and Uber) and would not be effective without the use of digital technology. Students will study the implications and affordances of using digital technologies to become entrepreneurs. Students will work collaboratively and create business that uses digital technology as it's building block for success. Students will be given the opportunities to plan and create a business idea that leverages digital technologies. They will attempt to solve a problem, find appropriate stakeholders and collect data to ensure the concept is appropriate for their target audience. Students will build a prototype of their business digital platform. A final pitch will include a run through of the digital prototype and a presentation that includes how the business targets the buyer's needs through data collection, user experience and is an innovative idea to a problem within society.

Key Understandings and Key Questions

- Analyze how current digital technology is used to help entrepreneurs make successful businesses.
- Design and develop a digital platform based on identifying the needs of a group of users (stakeholders).
- Engage with stakeholders to collect and collate data to ensure the design will appropriately address the defined problem.
- Evaluate and analyze their design based on a set criterion.
- How has digital technology been used to help create and promote businesses? What are the founders' stories?
- What problem can you solve by using digital technology?
- How do you know your solution is appropriate for your stakeholders?
- What type of data do you need to collect to ensure you are targeting your stakeholders?
- What type of app would you create to solve your problem?
- What content will you use in your design? How will you use texts, images, videos and sound in your app?

Empathise

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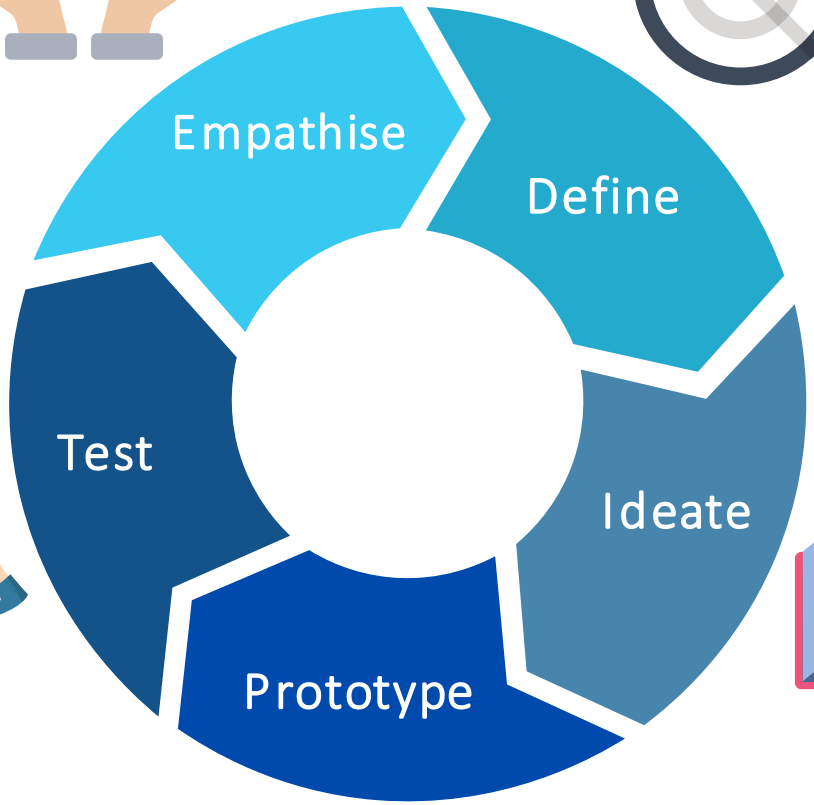

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Creating a Scope and Sequence

YEAR LEVEL:	TERM 1	TERM 2	TERM 3	TERM 4
KEY CONCEPTS • What is the focus/big question that will drive the term?	Focus:	Focus:	Focus:	Focus:
SHORT OVERVIEW • What's happening in the term? • What will the students achieve?	Summary:	Summary:	Summary:	Summary:
CURRICULUM • Where do the concepts sit within each term?	Curriculum Focus:	Curriculum Focus:	Curriculum Focus:	Curriculum Focus:
ASSESSMENT • What is the assessment? • What part of the achievement standard/content descriptions will be the focus? • What content descriptions will be the focus?	Assessment: Achievement Standard: Content Descriptions:	Assessment: Achievement Standard: Content Descriptions:	Assessment: Achievement Standard: Content Descriptions:	Assessment: Achievement Standard: Content Descriptions:
RESOURCES • What resources will help you teach the Curriculum?				

YEAR LEVELS: 3	TERM 1	TERM 2	TERM 3	TERM 4
KEY CONCEPTS • What is the focus/big question to drive the term?	**Classroom Concept: Australia's past** Digital Technologies Focus: Using technologies to remember our past. Focus Question: How can we use technology to keep our past alive?	**Classroom Concept: Life cycles** Digital Technologies Focus: Algorithms and sequence of steps	**Classroom Concept: First Fleet Journey** Digital Technologies Focus: Mapping the First Fleet journey with Ozobots	**Classroom Concept: Earth and Space** Digital Technologies Focus: Merge Cube and using the Mbot to recreate the movement of the sun, earth and moon.
SHORT OVERVIEW • What's happening in the term? • What will the students achieve?	Students will investigate and explore how technologies have been used to help keep our past alive. They will explore Virtual Song Lines and look at how technology teaches us about the Indigenous past. They will use the Merge Cube to create a 3D, AR model of their life, to keep their heritage alive for future generations.	Students will investigate the different life cycles of animals then use a digital platform to create and a code a digital representation of a life cycle.	Students will recreate the first fleet journey through planning and using the Ozobots. Students will use the different codes to change the speed of the Ozobot.	Students will code the Mbots to recreate the movement of Earth orbiting the sun. They will look at current technologies and why space technologies are important for space exploration.
CURRICULUM Where does… • Digital Systems • Data and Information • Online collaboration • Creating Digital Solutions …sit in within the 4 terms?	**Curriculum Focus:** **Digital Solutions:** Explain the purpose of Virtual Song Line and other technologies used to help remember our past. **Computational thinking language** (user input and branching) to plan and create their virtual model.	**Curriculum Focus:** **Creating Digital solutions:** using a visual programming software to show the life cycle of a chosen animal.	**Curriculum Focus:** **Digital Systems:** Explaining how the Ozobot connects and follows the black line. **Data and Information:** Data representation through investigating how the movements of the Ozobots are represented through different colours and combinations. **Creating Digital Solutions:** Create a map for the Ozobot that recreates the journey of the first fleet.	**Curriculum Focus:** **Creating Digital Solutions:** Recreate the orbit of the earth around the sun.
ASSESSMENT • What content descriptions will be the focus? • What part of the achievement standard/content descriptions will be the focus? • What will be the assessment piece or pieces?	**Assessment:** • Students will evaluate how current digital systems are created to help remember our past. • Students will plan and create their own digital portfolio using a Merge Cube to keep their family history alive. **Achievement Standard:** • Students define simple problems, and design and develop digital solutions using algorithms that involve decision-making and user input. • They explain how their developed solutions and existing information systems meet their purposes. **Content Descriptions:** • Define simple problems, and describe and follow a sequence of steps and decisions involving branching and user input (algorithms) needed to solve them (VCDTCD023) • Explain how student-developed solutions and existing information systems meet common personal, school or community needs (VCDTCD025)	**Assessment:** • Students will create a digital life cycle of a chosen animal. **Achievement Standard:** • Students define simple problems, and design and develop digital solutions using algorithms that involve decision-making and user input. **Content Descriptions:** • Define simple problems, and describe and follow a sequence of steps and decisions involving branching and user input (algorithms) needed to solve them (VCDTCD023) • Develop simple solutions as visual programs (VCDTCD024)	**Assessment:** • Explain how the Ozobot works by looking at the hardware and how it connects to the black line. • Investigate how the Ozobot movement data is represented by coloured lines. • Create a digital solution to represent the journey of the first fleet. **Achievement Standard:** • Students describe how a range of digital systems and their peripheral devices can be used for different purposes. • Students explain how the same data sets can be represented in different ways. • They explain how their developed solutions and existing information systems meet their purposes. **Content Descriptions:** • Recognise different types of data and explore how the same data can be represented in different ways (VCDTDI020) • Explain how student-developed solutions and existing information systems meet common personal, school or community needs (VCDTCD025)	**Assessment:** • Coding the Mbot recreate the rotation of the earth in comparison to the Sun. **Achievement Standard:** • Students define simple problems, and design and develop digital solutions using algorithms that involve decision-making and user input. • Students define simple problems, and design and develop digital solutions using algorithms that involve decision-making and user input. **Content Descriptions:** • Define simple problems, and describe and follow a sequence of steps and decisions involving branching and user input (algorithms) needed to solve them (VCDTCD023) • Develop simple solutions as visual programs (VCDTCD024)
RESOURCES • What resources will help you teach the Curriculum?		Virtual Song Lines Merge Cubes Merge Cube Planner (for student design)	Ozobots Map of the world	Mbots Orbit route of earth around the sun.

Creating a Unit of work

OVERVIEW

- What does the unit entail?
- What is the main assessment piece or work students will complete?
- How des that relate back to the curriculum?

KEY LEARNINGS

- What are the key questions you will ask?
- What are the key learnings the students will take away form the unit?
- What is the key vocabulary that students will be using throughout the unit?

LESSONS

- What is the lesson topic?
- How does this align with the curriculum?
- What is the learning intention and success criteria?
- What do you want the students to learn?
- How will they demonstrate their learning?

ASSESSMENT

- How does the unit align to the Achievement Standards?
- How have students demonstrated their learning?
- How can you link what they have learnt with the Content Description and achievement standard?

1

Overview

2

Key learnings

3

Resources

Term	1	Term Focus	Technology Past and Present
Term Overview	Investigating how digital games have changed over time.		
Key Concepts	Digital Systems, Evaluating - meeting recreation needs		

Session Number	Summary	Learning Intention and Success Criteria	Digital Technologies Curriculum Links	Key Resources	Assessment Statement
1.	Using iPads play a range of games starting at Pong to a common game. Evaluate how digital games have changed over time. Look at colours and image quality.	**Learning Intention** Students will evaluate how digital technology and gaming has changed and developed over time. **Success Criteria** I can explain how digital games have changed over time.	Recognise and explore digital systems (hardware and software components) for a purpose ACTDIK001 Explore how people safely use common information systems to meet information, communication and recreation needs ACTDIP005	• A range of apps predownloaded on iPad for students to play.	Students evaluated how digital technology games have developed over time.
2.	Investigating how Mario has changed overtime. Students will sequence images of Mario. Using grid paper. Students try and draw common images e.g. love heart, circle, letter.	**Learning Intention** Students will evaluate how digital technology and gaming has changed and developed over time. **Success Criteria** I can explain how gaming characters have changed over time.	Recognise and explore digital systems (hardware and software components) for a purpose ACTDIK001	• Pictures of Mario • http://isatv.com/blog/entertainment/old-school-super-mario-bros/	Students evaluated how digital technology gaming characters have developed over time.
3.	Recap of Mario and then try and predict what gaming could look like in 20 years. What would the next generation of Mario look like	**Learning Intention** Students will reflect on how gaming can change for the future. **Success Criteria** I can design a game for the future.	Explore how people safely use common information systems to meet information, communication and recreation needs ACTDIP005	• Drawing and writing materials	Students investigated how digital technology was used to meet recreation needs. They predicted what digital technology gaming would look like in the future.

Unit Overview

This unit of work has been created to demonstrate how a global non-profit organisation has utilised the features of Minecraft to help under privileged communities. Students will use the ethos of the organisation as a catalyst to design and virtually build a community that will benefit the needs of an identified group of people. The chosen community can be one for local friends and family or reach another community on a global scale.

Other Curriculum Targeted Areas

Other curriculum areas can be targeted and assessed within this unit.
Other areas of interest may include:

- Design and Technology
- Mathematics (Data)

Further investigation into these areas is required to ensure they align with the following activities. Activities may need to be modified to ensure content descriptions and achievement standards are met.

Australian Curriculum Alignment

The following sessions have been created using the Australian Curriculum: Digital Technologies Curriculum. Tasks may need to be modified to ensure state Digital Technologies Curriculum content descriptions and achievement standards are met. ACS has support and documents to help align this unit to other Digital Technology Curricular.

Session

'Session' has been used to define the order of tasks to complete the unit. It does not define a set time required to complete the task. Time allocated to complete a session is the teacher's discretion. This allows for flexibility for the teacher to drive the duration of the task and make modifications if necessary. Sessions can be merged into one set period or sessions may run over multiple periods.

Key Preparation

Minecraft is the chosen platform to complete this unit of work. The right platform will depend on the school's resources and access to digital technology. Investigation into other platforms may be required if Minecraft is not suitable.

It is encouraged to explore and understand basic functions within the chosen digital platform. Full knowledge and upskilling is not required. By providing skill development for the students (see Session 3) students will familiarise themselves with the capabilities and functions within the platform.

ACS Resources

Resources have been created to help teachers and students unpack and understand topics found within the Digital Technologies Curriculum. These give brief explanations of the topic and the expectations to teach the topic at the curriculum year level. It is intended the information is presented in a way that will set the foundation for further research.

ACS ICT Educators Community

ACS has resources to support the teaching of the Digital Technologies Curriculum from Foundation to Year 10. Access the community and resources by joining for free via: https://www.acs.org.au/ict-educators.html

Key Understandings

- Describe how digital technology has been used to help communities.
- Use Minecraft to design a solution to a problem in a community.
- Use Minecraft to explore how coding can be integrated into their design to further enhance functions within Minecraft.

Key Questions

- How is Minecraft used to help real life communities around the world?
- How can you use Minecraft to redesign an area in our local community to benefit our members?
- How can you incorporate code into your design to enhance any features to automatically move/change?

Key Vocabulary

Collaborative projects, online protocols, design thinking, Minecraft, computational thinking, algorithms, flowcharts, programming, iteration, branching, user input, flowchart, digital solutions.

Session Number	Session Topic Focus	Learning Intention and Success Criteria	Introduction/Teacher Instruction	Whole Class Activity
1.	Online Collaboration	**Learning Intention** Students will identify a set of protocols to follow when working in online spaces. **Success Criteria** I can generate a list of dos and don'ts and explain why they are important protocols to follow. When working in online spaces, I am an active member of my team and the workload is shared evenly between us.	Discuss the similarities and differences of working in the classroom and online and the importance of continually abiding by these protocols (rules).	Students work in small groups and connect with each other in an online document that allows them to collaborate. They create a list of 'dos and don'ts' to successfully work online. They explain why it is important that the protocols are upheld.
	Student Resources • ACS Student Resource: Online Collaboration		**Teacher Resources** • ACS Teacher Resource: Collaboration • Chosen digital platform to allow users to collaborate online	
2.	Digital technology used to help communities	**Learning Intention** Students will explain how the non-profit company, Block By Block, uses Minecraft to redesign underprivileged communities. **Success Criteria** I can explain how Minecraft is used to help design and create communities.	Students brainstorm all the different uses of Minecraft and any functions of Minecraft they know.	Introduce students to the non-profit organisation Block By Block, Together watch the introduction video (found on the home page of the Block By Block website). In groups student choose and investigate different projects that have been created through Block By Block. They complete a profile card, explain the project, the design and a personal reflection. Students share their findings with their class.
Session Resources	**Student Resources** • Block By Block		**Teacher Resources** • Block By Block Project Profile (located at the end of the unit session)	

Assessment – Australian Digital Technologies Curriculum			
Content Description	**Session Number**	**Assessment Piece**	**Assessment Statement**
Examine the main components of common digital systems and how they may connect together to form networks to transmit data (ACTDIK014)	N/A		
Examine how whole numbers are used to represent all data in digital systems (ACTDIK015)	N/A		
Acquire, store and validate different types of data, and use a range of software to interpret and visualise data to create information (ACTDIP016)	N/A		
Define problems in terms of data and functional requirements drawing on previously solved problems (ACTDIP017)	2	Design of their community	Students identified the needs of the people in the community by gathering data about the people and the environment. They used this data to influence the design of a new space.
Design a user interface for a digital system (ACTDIP018)	2 & 3	Design of their community	Students used the digital platform Mine Craft to design and create a community.
Design, modify and follow simple algorithms involving sequences of steps, branching, and iteration (repetition) (ACTDIP019)	4	Flowchart/written instructions	Students identified different tasks they could add to their community design in Minecraft. They created a flowchart/set of instructions to show the sequence of steps to complete their tasks. The sets incorporated branching and iteration.
Implement digital solutions as simple visual programs involving branching, iteration (repetition), and user input (ACTDIP020)	5	Code written	Students converted their flowchart/written set of instructions to code in Minecraft. The code they created used branching, iteration and user input.
Explain how student solutions and existing information systems are sustainable and meet current and future local community needs (ACTDIP021)	1 & 6	Community design reflection	Students explained how Block By Block (an organisation that uses Minecraft to help design communities) meets the needs of local and global communities.
Plan, create and communicate ideas and information, including collaboratively online, applying agreed ethical, social (ACTDIP022)	1	Working collaboratively to design and create space	Working in the collaborative environment (Minecraft) students worked together to design and create a community. They followed protocols (identified within their group) and followed these to ensure all teams members contributed to the project.

Questions?

Access resources:

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