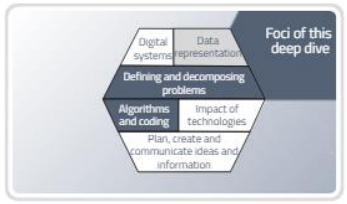
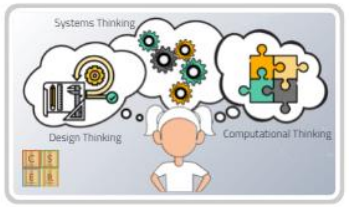
AI Professional Learning: AI and conventional programming

PRIMARY DD1: Session overview

DT Curriculum focus	Relevant slides	Covered in the session	Resources
Implementation		By the end of this session you should be able to design learning that helps your students respond to Q's like: • How can we create a program that includes decisions? • How can we remix someone else's computer program? • How can we use an AI model in our programming?	
Defining and decomposing problems/ algorithms/ Implementation		Curriculum connections • Digital Technologies: Focus on defining and decomposing problems creating a digital solution that incorporates algorithms and implementation the related key concepts include: **Defining and decomposing problems:** the focus on the precise definition and communication of problems and their solutions.	

	 	**Implementation**: the automation of an algorithm, typically by using appropriate software or writing a computer program. **Algorithms:** precise description of the steps and decisions needed to solve a problem. While focussing on implementation we can incorporate relevant general capabilities. • General capability: ICT capability • General capability: Critical and creative thinking We also include ways of thinking, particularly: • computational thinking	

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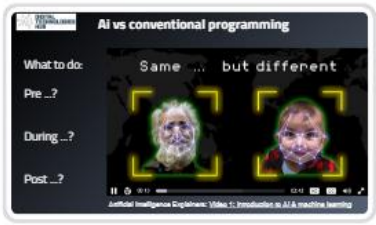
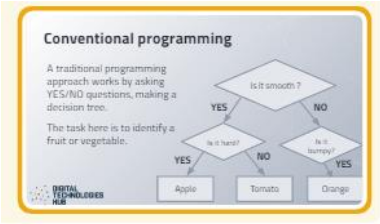
Implementation	 	How is AI different from conventional programming? We describe the way a machine learns using images as training data and predicting with accuracy what the image is. We contrast this with how difficult and challenging it would be to program a computer using conventional programming. The video listed provides a useful easy to understand explanation. We discuss how this video can be used in the classroom.	Downloadable resources/links Artificial Intelligence Explainers: Video 1: Introduction to AI & machine learning
Defining and decomposing problems/ algorithms/ Implementation	 	Conventional programming A part of a program showing how to identify a fruit or vegetable is shown. • Decision trees: the use of yes/no questions to reach a defined action	

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	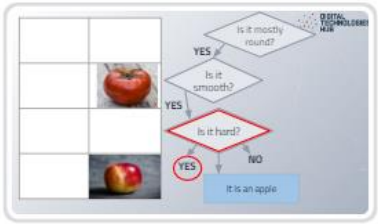	• The process is used to show the steps a computer programmer might use to identify an item from a group of items based on their attributes.	
Defining and decomposing problems/ algorithms/ Implementation	 	Comparing the code • Decision trees can quickly grow out of control when we need to check multiple things. • But with an AI, our code gets so much simpler	

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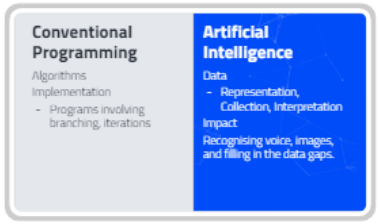
Defining and decomposing problems/ Implementation	 	Creating & training an AI model We introduce how to create & train an AI model (this is the focus of Deep Dive 3) The process involves: • Collecting data • Training the AI model • Testing the AI model	Downloadable resources/links Use this pre-made model to test the AI to see how well it recognises fruit and vegetables. (You will need a device with a webcam). https://teachablemachine.withgoogle.com/models/oE7da2v

Data representation/ algorithms/ Implementation		Compare and contrast
		
		Conventional Programming
		Includes:
		• Algorithms
		• Implementation
		  ○ Programs involving branching, iterations
		
		Artificial Intelligence
		Includes:
		• Data Representation, Collection, Interpretation
		• Impact
		  ○ Recognising voice, images, and filling in the data gaps.	

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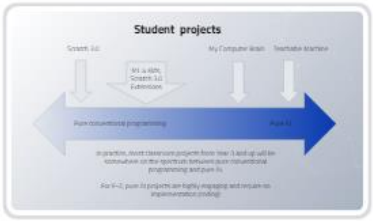
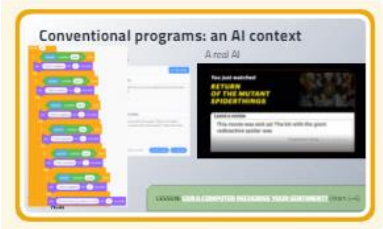
Defining and decomposing problems/ algorithms/ Implementation		Student projects with programming a digital solution In practice, most classroom projects from Year 3-6 will be somewhere on the spectrum between pure conventional programming and pure AI. For F-2, pure AI projects are highly engaging and require no implementation (coding).	
Defining and decomposing problems/ algorithms/ Implementation		Sentiment analysis When you read or write a review there is a chance an AI is involved. Here we show a conventional programming approach to sentiment analysis. It is a challenge to make the program work well and recognise the sentiment of a typed review. It is made in a standard Scratch 3.0 programming uses a string and if the word is recognised that event is triggered (the sentiment positive, negative or not sure).	Downloadable resources/links **LESSON: CAN A COMPUTER RECOGNISE YOUR SENTIMENT?** (Years 5-6) Artificial Intelligence Explainers: Video 2: AI in our everyday life
Defining and decomposing problems/ algorithms/ Implementation		We will be demonstrating creating computer programs using Scratch 3.0 or a version Scratch with text recognition capabilities. This enables the use of speech in Scratch programs that recognise text from user input. In a few steps you will have working code that you can use to translate the text you enter into another language.	Downloadable resources/links Scratch 3.0 Text to speech blocks and Translate blocks accessed in the additional blocks

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	 	Create a computer program with additional extensions (that incorporate an AI model) Standard Scratch 3.0 • Text to speech • Translation	**LESSON: Fun projects with language translation** (Years 3-6) Scratch 3.0 Sample code: Text to speech translator
Implementation ICT Capabilities	 	We introduce an online document provided by safety commission that provides guidance to schools on how to undertake a risk assessment for new technologies.	New technologies: Risk assessment https://www.esafety.gov.au/sites/default/files/2020-03/Prepare%203%20-%20New%20technologies%20risk-assessment%20tool.pdf

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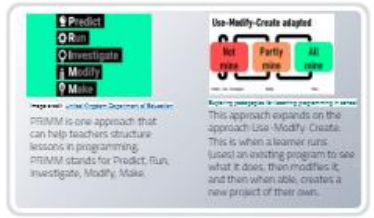
Implementation ICT Capabilities	 	Remixing someone else's program An evidence-based approach PRIMM is one approach that can help teachers structure lessons in programming. PRIMM stands for Predict, Run, Investigate, Modify, Make. Use-Modify-Create. This is when a learner runs (uses) an existing program to see what it does, then modifies it, and then when able, creates a new project of their own. ICT Capabilities locating/saving a file in a folder and recognise intellectual property	Downloadable resources/links Exploring pedagogies for teaching programming in school
Defining and decomposing problems/ algorithms/ Implementation/ Computational thinking		Using the context of home automation to program a digital solution Computational thinking: • Abstraction and pattern recognition • Algorithms • Model using a computer program	Downloadable resources/links **LESSON: Home automation** (Years 5-6)

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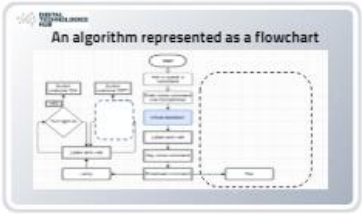
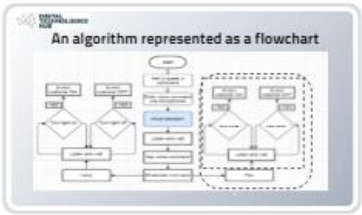
Defining and decomposing problems/ algorithms/ Computational thinking	 	Using the context of home automation to program a digital solution Show how a flow chart can be used to plan out the computer program and look for patterns. Identifying patterns is useful when coding as it reduces the workload when code can be copied and modified	Downloadable resources/links **LESSON: Home automation** (Years 5-6)
Data representation/ Digital systems	 	Looking for patterns in code Identify code that repeats and can be copied and modified to remix and animate (turn on/off) other appliances.	Downloadable resources/links **LESSON: Home automation** (Years 5-6)

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Spot the differences		Here we provide a basic version to demonstrate a simple block of code that students can use to predict and investigate We also provide a more complex version. The task for participants is to open each and see inside. How many differences can you spot? This approach can be used with your students.	Downloadable resources/links Basic code sample https://scratch.mit.edu/projects/559150293 Code sample more complex: Broadcast https://scratch.mit.edu/projects/559169857/editor/
Data representation/ Digital systems		We show how an AI recognises commands to turn on and off home appliances	**LESSON: Home automation with AI** (Years 5-6)

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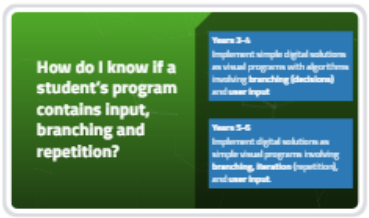
Implementation	 	Assessment We introduce a rubric for the assessment of a digital solution. We show how an input can be a text entry or an AI input such as speech or an image to use with a an AI Model We provide some sample code to see where it best fits aligned to our rubric.	Note each AI lesson plan has an assessment section
Implementation		Assessment: Project logs We use project logs as another way to monitor student's progress in designing and developing their digital solution	Downloadable resources/links An example of a project log that can be adapted BBC Micro:bit project 5-6