DTiF
Digital Technologies in focus
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acara AUSTRALIAN CURRICULUM, ASSESSMENT AND REPORTING AUTHORITY

CLASSROOM IDEAS: YEARS 1–2

Understanding algorithms and the smiley face biscuit challenge

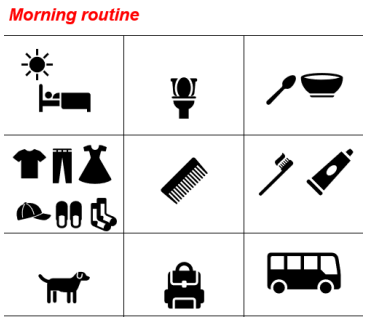

Figure 1: An example of a morning routine chart, made using symbols. Routines can be used to teach very young students about the importance of order and sequencing.

Figure 2: A visual algorithm that demonstrates the life cycle of a frog, created using hand-painted rocks

Figure 3: An illustration of the CS Unplugged kidbot algorithm activity. Source https://csunplugged.org/en/topics/kidbots/unit-plan/rescue-mission/ CC BY-SA 4.0

Algorithms are a core concept in Digital Technologies version 9 (key concept in V8.4) and fundamental in computational thinking (poster available – see Useful links.) They help us follow and describe algorithms involving a sequence of steps, branching (decisions) and iteration (repetition) (AC9TDI2P02). We use them every day, often in the form of procedures that can be easily repeated. Getting ready for school in the morning using a routine (Figure 1), the process of moving into or out of class and task instructions given by a teacher are all algorithms.

Algorithms can be expressed in many ways, for example as text, in timeline or flowchart form or demonstrated through an ordered sequence of images (Figure 2). They can even be mimed or acted out. In 1–6 Digital Technologies, algorithms can be created in block code (visual programming language). To learn about algorithms, 1–2 students could:

- discuss the sequence of steps needed to understand how to play a simple game. What is the purpose of rules in a game?
- sequence words or images that describe the order of events in a story or procedural text.
- create their own algorithm for a classmate to follow. For example, a sequence for a human robot to follow (Figure 3) or dance moves to perform using images or symbols as visual steps.
- create an algorithm in visual programming language to control a device such as a robot (Figure 4).
- order a sequence of visual cards to create an algorithm and then carry it out. The smiley face biscuit challenge (Figure 5) is one such activity. Students will use computational thinking to order the images and create an algorithm. They could then use the algorithm to make the biscuits. Students could consider if the algorithm is detailed enough so that a group of finished biscuits look the same. If not, how could it be modified or improved?

Links to the Australian Curriculum

Table 1: Aspects of the Australian Curriculum: Digital Technologies version 9 Years 1 and 2 which may be addressed depending upon the task.

Digital Technologies ***Achievement standard***	By the end of Year 2 students show how simple digital solutions meet a need for known users. Students represent and process data in different ways. They follow and describe basic algorithms involving a sequence of steps and branching. With assistance, students access and use digital systems for a purpose. They use the basic features of common digital tools to create, locate and share content, and to collaborate, following agreed behaviours. Students recognise that digital tools may store their personal data online.		
Strand ***Sub-strand***	Digital Technologies processes and production skills • Generating and designing		
Content descriptions	• follow and describe algorithms involving a sequence of steps, branching (decisions) and iteration (repetition) AC9TDI2P02		
Technologies Core concepts	• Technologies processes and production skills • Computational thinking	***Digital Technologies Core concepts***	• Abstraction • Specification • algorithms
		General capabilities	• Literacy • Numeracy
Cross-curriculum priorities		***Learning area or subject connections***	• Health and Physical education • Design and Technologies – Food and fibre production; Food specialisations

Table 2: Aspects of the Australian Curriculum: Digital Technologies version 8.4 F–2 which may be addressed depending upon the task.

Digital Technologies ***Achievement standard***	By the end of Year 2, students identify how common digital systems (hardware and software) are used to meet specific purposes. They use digital systems to represent simple patterns in data in different ways. Students design solutions to simple problems using a sequence of steps and decisions. They collect familiar data and display them to convey meaning. They create and organise ideas and information using information systems and share information in safe online environments.		
Strands	Digital Technologies processes and production skills • Creating designed solutions by: − Investigating and defining		
Content descriptions	• Follow, describe and represent a sequence of steps and decisions (algorithms) needed to solve simple problems (ACTDIP004)		
Key concepts	• abstraction • algorithms	***Key ideas***	Thinking in Technologies • computational thinking
Cross-curriculum priorities		***General capabilities***	• Literacy • Numeracy

Safety considerations: In implementing projects with a focus on food, care must be taken with regard to food safety and specific food allergies that may result in anaphylactic reactions. The Australasian Society of Clinical Immunology and Allergy has published guidelines for prevention of anaphylaxis in schools, preschools and childcare. Some states and territories have their own specific guidelines that should be followed. For further information about relevant guidelines, contact your state or territory curriculum authority. Ref: https://www.australiancurriculum.edu.au/resources/curriculum-connections/portfolios/food-and-wellbeing/

Useful links

- Australian Computing Academy (ACA) Unpack the curriculum – Algorithms https://aca.edu.au/curriculum/algorithms/ (V8.4)
- ACARA Digital Technologies in focus project resources https://www.australiancurriculum.edu.au/resources/digital-technologies-in-focus/resources/
- ACARA Digital Technologies in focus project computational thinking poster https://www.australiancurriculum.edu.au/media/7393/computational_thinking_poster.pdf
- Bebras UK downloadable computational thinking challenge cards http://www.bebras.uk/uploads/2/1/8/6/21861082/uk-bebras-cards.pdf
- Computer Science (CS) Unplugged activities https://classic.csunplugged.org/activities/
- CS Unplugged – Rescue mission activity (Figure 3) https://csunplugged.org/en/topics/kidbots/unit-plan/rescue-mission/
- Digital Technologies Hub – search resources using the term 'algorithms' https://www.digitaltechnologieshub.edu.au/
- Digital Technologies Hub – Buzzing with Bee-Bots activity https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/buzzing-with-bee-bots
- Digital Technologies Hub – What's the buzz? (Bee-Bot) activity https://www.digitaltechnologieshub.edu.au/teachers/lesson-ideas/what's-the-buzz

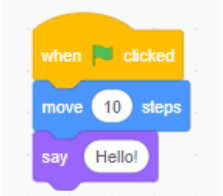

Figure 4: An example of visual programming language (block code) created in Scratch 3.0

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See next page for printable cards for task

The smiley face biscuit challenge

Begin and end the activity with a discussion. Compare the finished biscuits before they are eaten. Why are they not all the same? How could we change the algorithm to make sure they are?

Figure 5: Smiley face biscuit visual algorithm cards