Dream Space TV: The brAIn_waves Series Episode 2
Episode Objectives

By the end of this episode, students should be able to

1. Explain what an algorithm is 🎯
2. Identify coding elements in an algorithm 🧠
3. Explain how chatbots use datasets and algorithms to support users 🤖
4. Design an algorithm to solve a problem using pseudocode/code that utilises the parts of an algorithm (input ➔ process ➔ output)

UNESCO: K-12 AI Curricula

Artificial Intelligence (AI) refers to machines that imitate some features of human intelligence.

Artificial Intelligence, is a rapidly growing field that has the potential to impact many aspects of our lives. To prepare students for this future, UNESCO, the United Nations Educational, Scientific and Cultural Organization, has included AI as part of their K-12 curriculum. This series has used the UNESCO K-12 AI curricula to curate lessons on AI to help students understand what AI is, what it can do, and how it might impact society. The goal is to equip students with the knowledge and skills they need to navigate a world where AI is increasingly prevalent.

Episode 2: Timestamps

00:00 – 01:02: Introduction and learning outcomes
01:02 – 03:00: Introduction to Computational Thinking
03:00 – 06:00: Algorithms
06:53 – 10:10: Pseudocode
10:10 – 11:26: MakeCode micro:bit & activity 1
11:26 – 15:25: Activity 1 solution
15:25 – 19:23: Data and algorithms (chatbot) & activity 2
19:23: Episode closure
UNESCO K-12 AI Curricula - Knowledge

Algorithm Definition and Applications
- Understands what algorithms are and do
- Understands that learning algorithms are sets of instructions created by humans to modify an input to create an output

Algorithm Components and Processes
- Understands the parts of an algorithm (input, steps to change input, output)
- Understands the process of training, testing and deploying algorithms

Programming Languages
- Develops knowledge of block-based and other programming tools

Computational Thinking
- Understands abstraction
- Understands decomposition
- Explains the roles of decomposition, abstraction, pattern recognition and algorithms in computation

UNESCO K-12 AI Curricula - Skills

Algorithms
- Recognises patterns
- Follows clear instructions for action (algorithms) and carries them out
- Formulates clear instructions for action (algorithms) verbally and in writing

Programming
- Constructs simple code scripts using block-based programming

UNESCO K-12 AI Curricula - Values

Persistence/Resilience
- Solves problems using programming methodology
Episode Two: Lesson Plan

Curriculum Links

Junior Cycle Coding

Being a Coder: 1.4 develop appropriate algorithms using pseudo-code and/or flow charts

Being a Coder: 1.5 Write code to implement algorithms

Leaving Certificate Computer Science

Problem Solving: 1.3 solve problems by deconstructing them into smaller units using a systematic approach in an iterative fashion

Problem Solving: 1.4 Using logic to solve problems

Programming Concepts 2.5 use pseudo code to outline the functionality of an algorithm

Programming Concepts 2.6 construct algorithms using appropriate sequences, selections/conditionals, loops and operators to solve a range of problems, to fulfil a specific requirement

Programming Concepts 2.7 implement algorithms using a programming language to solve a range of problems

Lesson Duration

This is a 90-minute lesson.

This does not include extension activities

Materials Needed

- Worksheets provided in this teacher guide
- Pens and paper
Lesson Procedure 🏡

**Introduction to Computational Thinking (5 minutes):** Alongside the episode learning outcomes students will be introduced to the concept of computational thinking which includes four main parts: abstraction, pattern recognition, decomposition and algorithm design.

**Example of an Algorithm (2 minutes):** Here students will be shown an algorithm that can be used every day by humans. This will help students understand how algorithms need to be efficient and really specific.

💡 *Teachers click here for an extension activity for students to create their very own algorithms for an everyday task in which humans can follow.*

**Pseudocode (3 minutes):** In this section students will see how algorithms written by humans can be translated into pseudocode to get ready for the programming of the algorithm.

**MakeCode micro:bit (30 minutes):** Using the code file attached students should use their problem-solving skills and decide the sequence of the code. Answer solutions are included in the episode, with a walkthrough.

**Data and Algorithms (20 minutes):** Students will have the opportunity to explore how data and algorithms work together to create something like a basic chatbot.
Episode 2 Activity 1: Algorithms

• Students can download the code file at the following link [here](https://makecode.microbit.org) and open it up in https://makecode.microbit.org
• Using the pseudocode for support, put the code back in sequence so that it completes its timer task for us.
• When students are done, make sure they test it out.

**Pseudocode**

1. SET timer to 3 minutes (180 seconds)
2. WHILE timer is > 0
   - Show timer
   - Change timer by -1 second
   - Pause for 1 second
3. REMOVE egg from pot

**Coding Resources**

- Micro:bit resources
- Python resources
- Web Design resources
Episode 2 Activity 2: Chatbots

Visit the Dublin Airport website and answer the following questions

(i) List the sources of the data that you think this chatbot utilises.
(ii) Write a simple algorithm for how this chatbot works using the key word “if, then” – you can write this out in full or in pseudocode.

Episode 2 Activity 2: Sample Answers

(i) List the sources of the data that you think this chatbot utilises.

- flight information
- live data from security lines
- data from carpark to see how to pay for a space, the cost and how to book.
- data on shops and restaurants
- accessibility

(ii) Write a simple algorithm for how this chatbot works using the key word “if, then” – you can write this out in full or in pseudocode.

If user clicks flights
Then the chatbot shows flight information
Else if the user clicks on shopping
Then the chatbot will show information regarding to the shops in Dublin airports.
Activity 2: Chatbots Worksheet  Name________________________

List the sources of the data that you think this chat bot utilises.

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Write a simple algorithm for how this chat bot works using the key word “if, then” – you can write this out in full or in pseudocode.

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Introduction to Computational Thinking: Extra Teacher Resource

Computational thinking is a way of thinking that helps us solve problems using computers. It involves four main steps: decomposition, pattern recognition, abstraction, and algorithmic thinking.

**Decomposition** means breaking down a complex problem into smaller and simpler parts that are easier to understand and solve.

💡 You can decompose the problem of baking a cake into smaller parts, such as finding a recipe, gathering the ingredients, measuring the quantities, etc.

**Pattern recognition** means finding similarities and differences among the parts of the problem and identifying rules or trends that can help us solve it.

💡 Let’s say you’re playing X’s and O’s. You can recognize patterns among the moves of the game, such as how to win, how to block your opponent, or how to avoid losing.

**Abstraction** means ignoring irrelevant details and focusing on the essential features of the problem that matter for the solution.

💡 You can abstract the problem of writing a story by using characters, settings, plots, and themes to represent and organize your ideas in a general way, without worrying about the specific details.

**Algorithmic thinking** means designing a series of clear and precise instructions that can be followed by a computer or a human to solve the problem.

💡 Suppose you are making a paper airplane that can fly far and fast. You can design an algorithm, or a set of instructions, that can be followed by yourself or someone else to make the paper airplane, using the materials and tools that you have.