Barefoot
Computing at School

Computational Thinking in Early Years, an overview

What is Computational Thinking?

'Computational Thinking' is a set of problem solving skills that we can use in everyday life.

Why use such a complicated term?

This term 'Computational Thinking' can send practitioners into a panic, as it sounds very complicated. It is in fact just a technical term for the set of problem solving skills that were pinpointed by a number of computer scientists when they looked at how they solved problems. Often, but not always, the solutions they came up with involved building some kind of technology to help them solve the problem, but always they involved these problem solving skills - Computational Thinking skills.

So why should children in Early Years have to learn about Computational Thinking?

Interestingly, children in Early Years are already using and learning about Computational Thinking, we practitioners just may not realise we are embedding these already in our practise. The Early Learning Goals, Characteristics of Learning and Guiding Principles are peppered with Computational Thinking.

Still, why should we take any notice of Computational Thinking if we are already doing it?

We are required to ensure children's 'school readiness' and 'give them a broad range of knowledge and skills that provide the right foundation for good future progress through school and life' - Statutory Framework for EYFS September 2021. Computational Thinking is at the heart of the computing curriculum and children will only be ready for this subject if we provide them with foundational experiences. The problem solving of Computational Thinking closely aligns with the Characteristics of Effective Learning. So by aligning EYFS provision to Computational Thinking, we use the same vocabulary as used by our colleagues in KS1, and ensure progression.

What are these problem solving skills of Computational Thinking?

There are lots of definitions for Computational Thinking, some more suited to university graduates, others for KS3/KS4, others for primary. For EYFS a simplified version has been created. These are based on the Barefoot project's definition of Computational Thinking.

EYFS Computational Thinking simple definitions

EYFS Computational Thinking Skills	Simple definitions
Tinkering	Playing and exploring
Creating	Creating, checking and fixing things
Collaboration	Playing and working collaboratively
Persevering	Not giving up
Logic	Anticipating and explaining is logical reasoning
Pattern	Grouping things, comparing, spotting similarities and differences, working out rules
Abstraction	Naming and labelling, working out what is important, sticking to the main theme, ignoring what is not important, creating a summary
Algorithms and Decomposition	Responding to instructions, ordering things, sequencing things, introducing storylines, working out different ways to do things, breaking problems down into steps

So is Computational Thinking something children only do on a computer?

NO, definitely not. Computational Thinking is a set of problem solving skills we can learn away from the computer. When children are older they will start to use their Computational Thinking skills to create computer systems that are part of solutions to problems - but not quite in Early Years. We might use online activities now and then to practise some aspects of Computational Thinking skills, but in EYFS we can learn Computational Thinking without computers. This is called an 'unplugged' approach.

What will Computational Thinking look like in my learning environment?

We have created activities for you to use in your classroom that show you what Computational Thinking looks like in EYFS. These include a wide assortment of familiar activities such as water play, outdoor play, role play ideas, games and challenges. Each resource has a description, key questions and assessment support. Once you have tried these you might see how your normal planning already has Computational Thinking in it, and then you can just highlight the Computational Thinking in what you already do.

How does an activity map to my EYFS Profile/Assessments?

Each activity is mapped to the ELG it meets. Exemplification materials will build up over time to help you assess children's progress as you complete your EYFS Profile or assessments.

A note about sorting, ordering and sequencing, grouping and naming and abstraction!

Sorting

Often, in school, we use the word sort when we ask children to spot what is the same about a set of items. For example, we use sorting hoops or sorting trays for children to group items by colour, shape, size, use etc.

When we use the term sort in this way, it might upset computer scientists! In computer science, sorting is associated with putting things in order, rather than grouping things. In mathematics there is a similar distinction. Interestingly, the term sort is not mentioned in current EYFS guidance, but ordering and grouping is.

Ordering and sequencing

For example, if we sorted the set of numbers '5,2,3,1' we might put them in order from smallest to largest resulting in '1,2,3,5'. We might call this ordering. Computer scientists would say they sorted or ordered the numbers. The term sequencing is also used to mean putting in some kind of order, such as sequencing a daily routine.

Grouping and naming

In computer science, we are often concerned with spotting common features of a set of items and naming that group. You might hear computer scientists use the term class for the name of a group, and the term generalisation used to describe the activity of working out a general group.

For example, I have a pet called 'Tibbles', and my friend has a pet called 'Fluffy'. Both of these pets have whiskers, sharp claws, and chase mice, one of them has long fur, the other short, they are both cats. Here we have two pets with similarities and differences, but they both belong to a general group, a class called 'cats'.

Abstraction

Abstraction is perhaps an unfamiliar word in EYFS, but it is actually something we do all the time, but perhaps we don't notice. This could be one of the most powerful things we can teach children! Simply put, abstraction can be described as working at the right level of detail for a task. We abstract as we summarise, as we ignore detail we don't need at that point in time. We abstract when we make a mind map. Decomposition is a type of abstraction. The word decomposition is often used to describe how we break something down into parts.

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Cross-reference of the EYFS Computational Thinking to Characteristics of Effective Learning

	Playing and Exploring	Active Learning	Creating and thinking critically
Tinkering	✓	✓	
Creating			✓
Collaboration			
Persevering	✓	✓	
Logic	✓		✓
Pattern	✓		✓
Abstraction	✓		✓
Algorithms and decomposition	✓		✓

Cross-reference of the EYFS Computational Thinking concepts to the Prime Areas of Learning

	Communication and Language		Personal, Social and Emotional Development			Physical Development	
	Listening, Attention and Understanding	Speaking	Self-Regulation	Managing Self	Building relationships	Gross Motor Skills	Fine Motor Skills
Tinkering						✓	✓
Creating						✓	✓
Collaboration	✓		✓	✓	✓		
Persevering	✓			✓			
Logic	✓	✓					
Pattern	✓	✓					
Abstraction	✓	✓					
Algorithms and decomposition	✓	✓					

Cross-reference of the Early Years Computational Thinking concepts to the Specific Areas of Learning

	Literacy			Mathematics		Understanding the world			Expressive arts and design	
	Comprehension	Word Reading	Writing	Number	Numerical Patterns	Past and Present	People, Culture and communities	The Natural World	Creating with Materials	Being imaginative and Expressive
Tinkering									✓	✓
Creating								✓	✓	✓
Collaboration						✓	✓		✓	
Persevering										
Logic	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Pattern	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Abstraction	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Algorithms and decomposition	✓	✓	✓	✓	✓	✓	✓	✓	✓	