



The Computing Curriculum & Computational thinking



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A bit of history...



History

"The current curriculum cannot prepare British students to work at the very forefront of technological change."

Mr Gove - Jan 2012



History

'Harmful' ICT curriculum set to be dropped this September to make way for rigorous Computer Science.

"Coding is the new Latin"



Alex Hope, co-author [Next Gen](#). A report commissioned by Tech Industry (e.g. Microsoft, Google, etc) to look at use of computers in UK Education.

Mr Gove - Jan 2012

"Instead of children bored out of their minds being taught how to use Word and Excel by bored teachers, we could have 11-year-olds able to write simple 2D computer animations using an MIT tool called Scratch."

Does technology hinder or help toddlers' learning?

COMMENTS (226)

By Philippa Roxby
Health reporter, BBC News



Screen time could help children as young as two to learn words and be curious.

Children under five years old have an uncanny knack of knowing how to master new technology.

Related Stories

[Aric Sigman](#)

[Prof Annette Karmiloff-Smith](#)

[Touch Screen Generation](#)

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Multimodal Literacies in the Early Years



<http://www.open.ac.uk/blogs/multimodalliteracies/key-findings/>

Home

Posted on January 28, 2011 by admin



The research project *Multimodal Literacies in the Early Years* explored what learning to be 'literate' means for young children growing up in today's media-rich world. It was funded by the Economic and Social Research Council (ESRC), and was led by Dr Rosie Flewitt with Dr Sylvia Wolfe (University of Cambridge) as Research Associate.

What's it about? In this study, we wanted to find out how three and four-year-old children develop literacy knowledge and skills as they participate in a range of everyday practices with traditional and new technologies, from mark-making on paper, to sharing story books, computer games, interactive TV and digital toys, both at home and in early

Search [] Go

Navigation

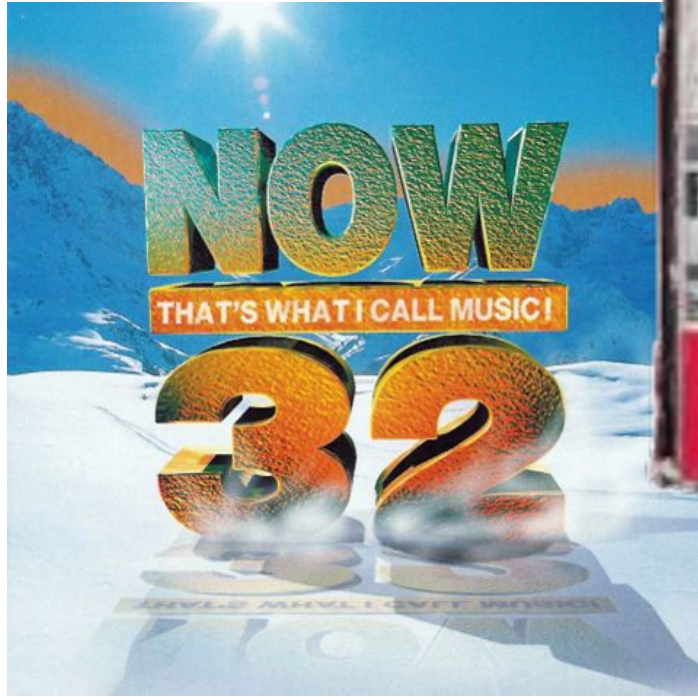
- Home
- Multimodality
- Multimodal Literacies
- Methodology
 - Data collection methods
 - Data analysis
- Key Findings
- Publications
- Bibliography
- People
- Useful Links



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Task 1







A male news anchor with grey hair, wearing a dark suit, white shirt, and patterned tie, sits at a desk with his hands clasped. The background features a large screen with the word "Newsnight" in blue text and abstract blue light patterns. The desk has a keyboard and papers.

Newsnight

**Why teach all this
computer nonsense when
we will just outsource it
to India anyway?**

Why teach all this computer nonsense when we will just outsource it to India anyway?

Discuss in pairs. 3 reasons.

Did you get?

- Economic reasons?
- 21st century skills - *'coding is the new latin'?*
- Entitlement to 21st education?
- It's the world around us?
- Engaging?
- Thinking skills?
- Anything else?

Computing: 3 strands

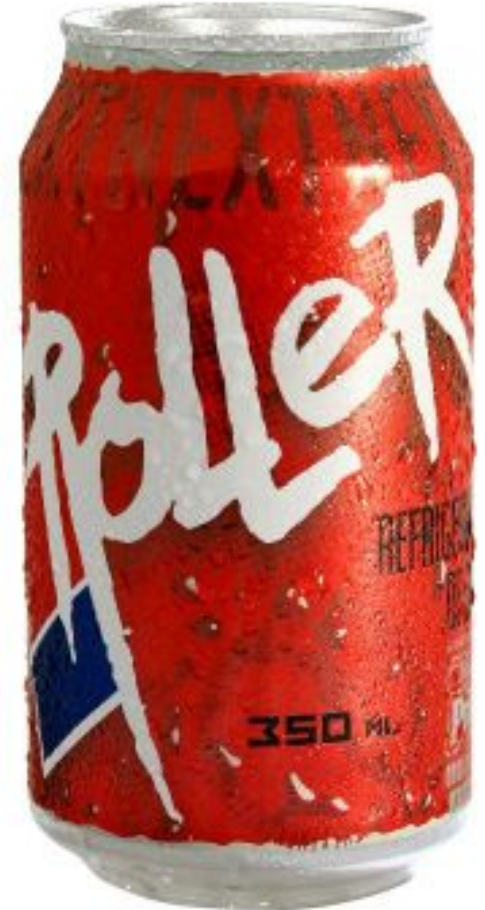
- Computational Thinking
- IT
- Digital Literacy

Task: 3 strands

Divide the KS2 curriculum in 3 areas.

- Computational Thinking
- IT
- Digital Literacy

Digital Literacy

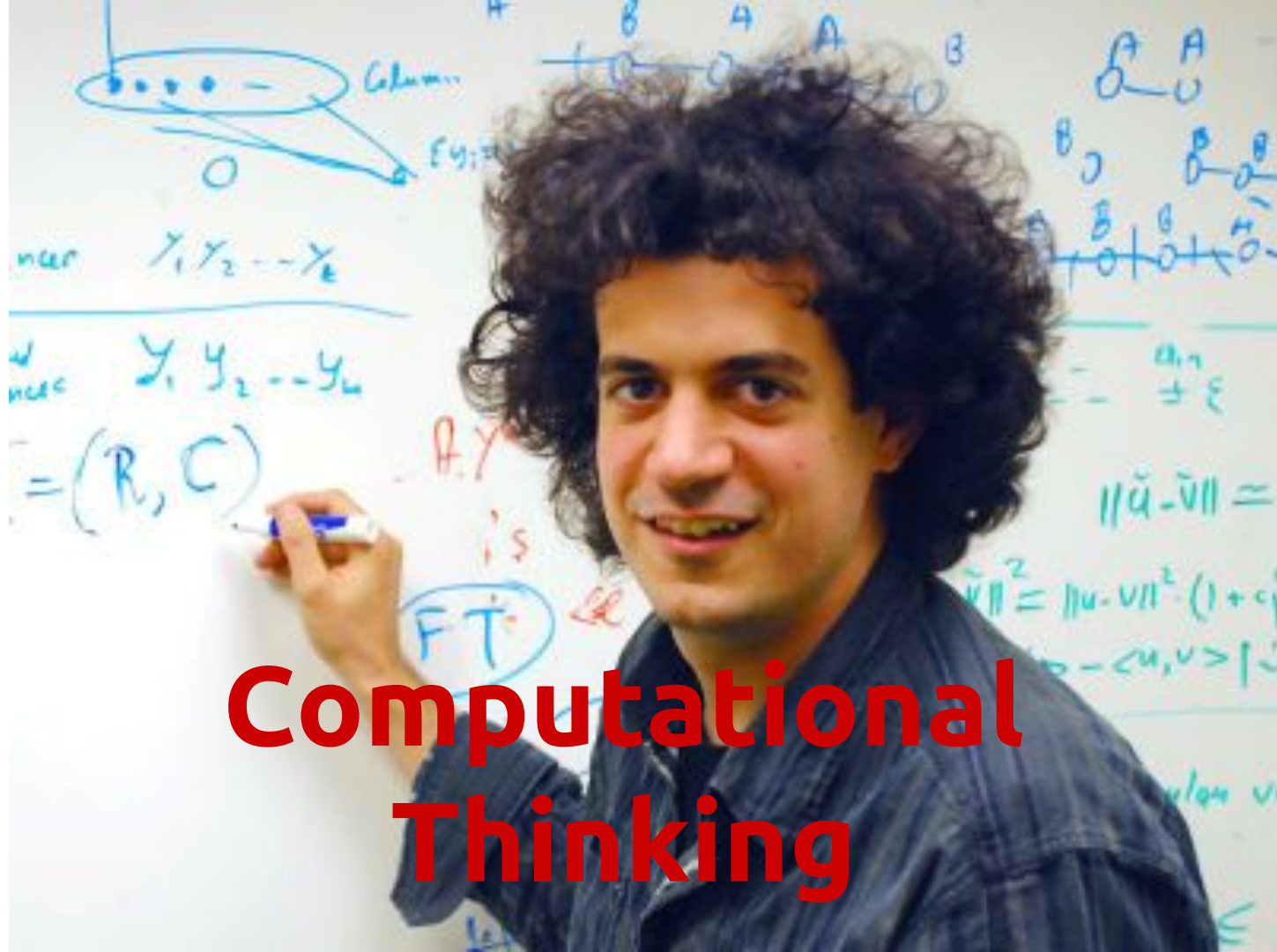




E-Safety



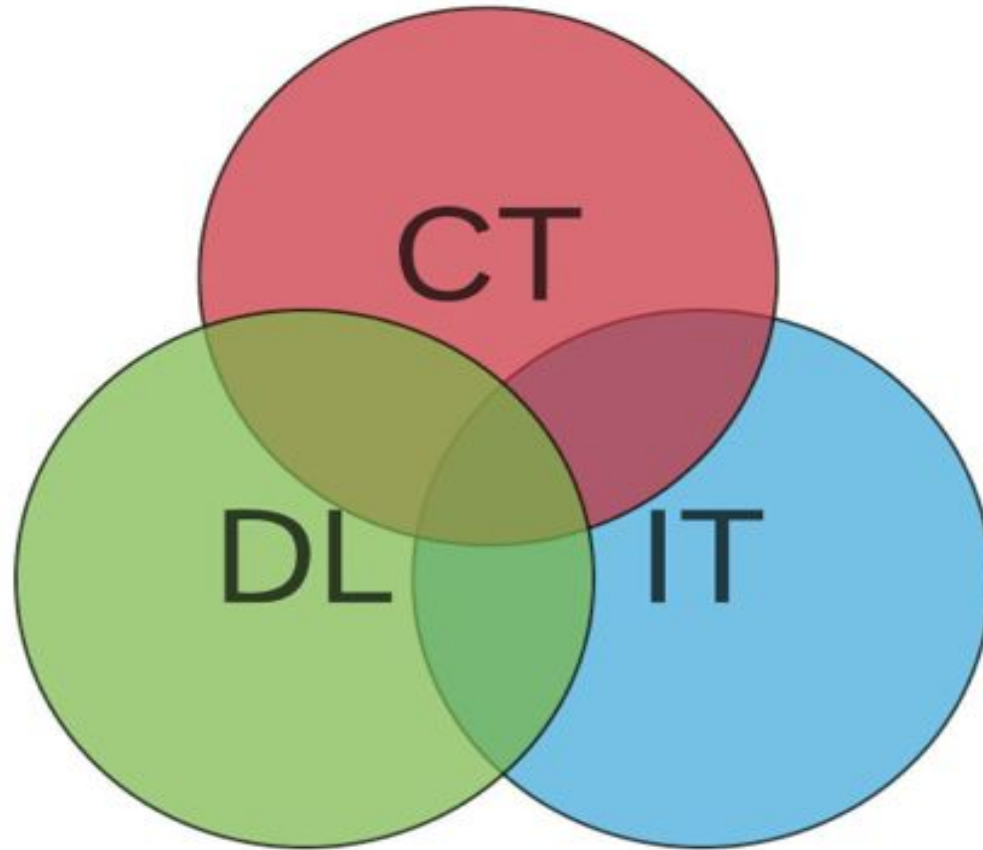
Information Technology



Computational Thinking

Task: 3 strands

- **Computational Thinking:**
Computer Science / programming.
- **Digital Literacy:**
Implications & choices.
- **Information Technology:**
Making stuff with computers.



	KS1	KS2
CS	<p>Understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions</p> <p>Create and debug simple programs</p> <p>Use logical reasoning to predict the behaviour of simple programs</p>	<p>Design, write and debug programs that accomplish specific goals, including controlling or simulating physical systems; solve problems by decomposing them into smaller parts</p> <p>Use sequence, selection, and repetition in programs; work with variables and various forms of input and output</p> <p>Use logical reasoning to explain how some simple algorithms work and to detect and correct errors in algorithms and programs</p> <p>Understand computer networks including the internet; how they can provide multiple services, such as the World Wide Web</p> <p>Appreciate how [search] results are selected and ranked</p>
IT	<p>Use technology purposefully to create, organise, store, manipulate and retrieve digital content</p>	<p>Use search technologies effectively</p> <p>Select, use and combine a variety of software (including internet services) on a range of digital devices to design and create a range of programs, systems and content that accomplish given goals, including collecting, analysing, evaluating and presenting data and information</p>
DL	<p>Recognise common uses of information technology beyond school</p> <p>Use technology safely and respectfully, keeping personal information private; identify where to go for help and support when they have concerns about content or contact on the internet or other online technologies</p>	<p>Understand the opportunities [networks] offer for communication and collaboration</p> <p>Be discerning in evaluating digital content</p> <p>Use technology safely, respectfully and responsibly; recognise acceptable/unacceptable behaviour; identify a range of ways to report concerns about content and contact</p>

What is Computational Thinking?



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What is Computational Thinking?

"A way that humans, not computers, think."

Wing, 2006

The Computational Thinker: Concepts & Approaches

Concepts

Logic
predicting & analysing

Algorithms
making steps & rules

Decomposition
breaking down into parts

Patterns
spotting & using similarities

Abstraction
removing unnecessary
detail

Evaluation
making judgement



Tinkering
experimenting & playing

Creating
designing & making

Debugging
finding & fixing
errors

Persevering
keeping going

Collaborating
working together

Approaches

Logic?



Big money idea...

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Logic TWO DOORS

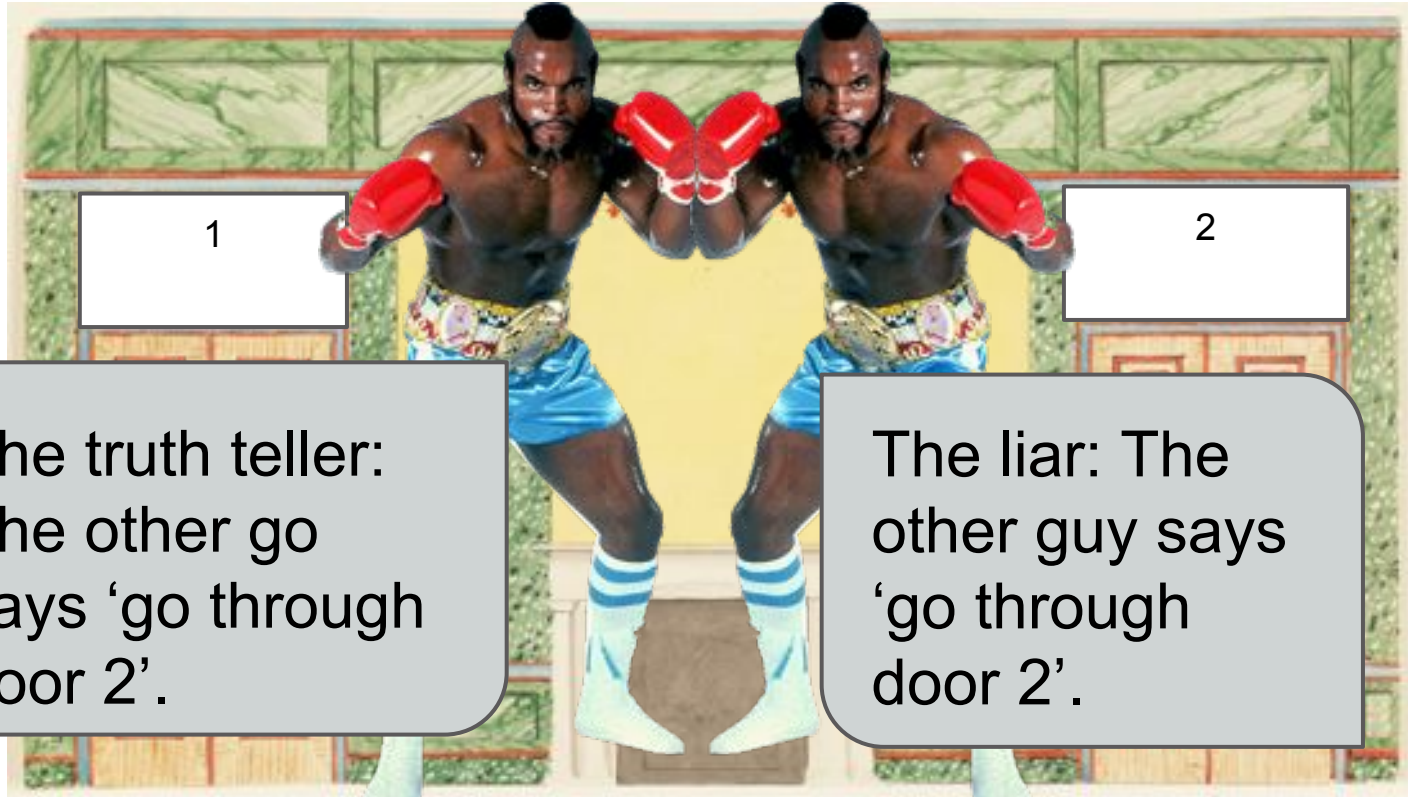


Logic: TWO DOORS

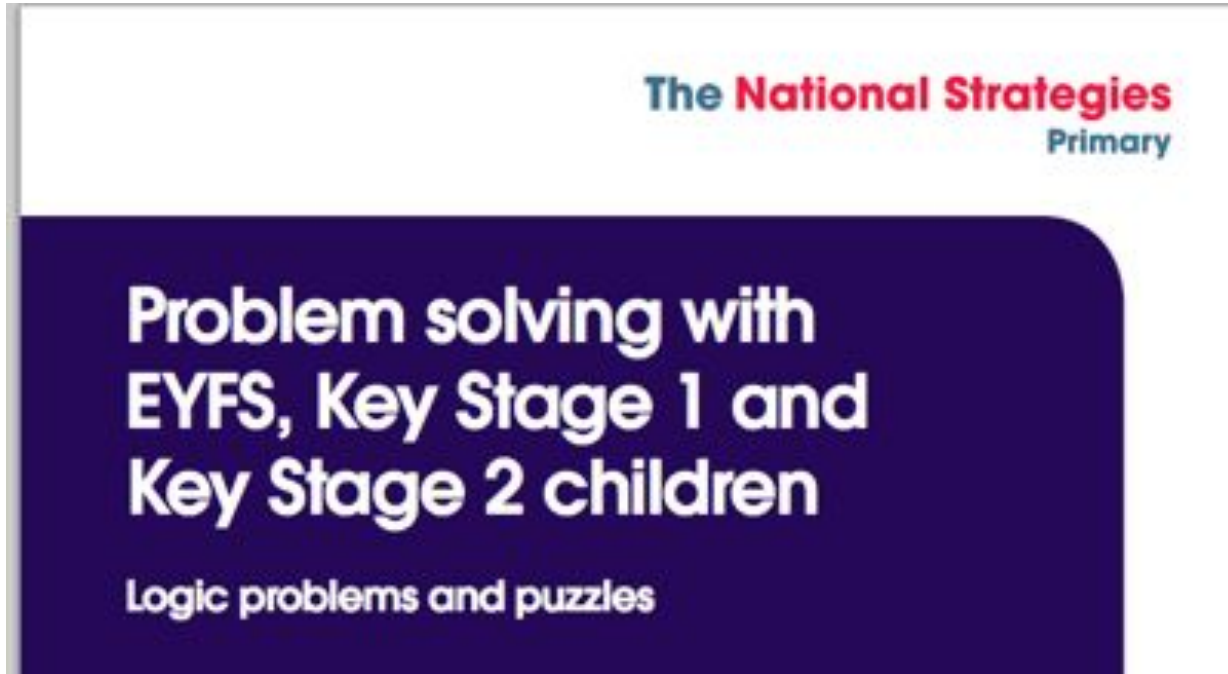
2 doors.
2 guards.
One always lies.
One always tells the truth.
Which is which?
1 question (to both)?












What would the other guy say?



Logic Puzzles



Logic Puzzles: Year 2 Activity

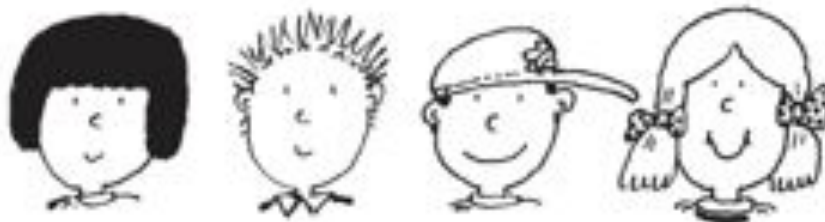
			<input type="text" value="12"/>
			<input type="text" value="14"/>
			<input type="text"/>
<input type="text" value="20"/>	<input type="text" value="6"/>	<input type="text"/>	

Logic Puzzles: Year 4 Activity

▲	♣	▲	●	<input type="checkbox"/>
♣	●	♣	▲	25
●	●	●	●	20
▲	♣	♣	▲	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	26	

Yr 5

Dawn, Mark, Josh and Tina are friends.



They each have a nickname.

Their nicknames are Spider, Curly, Ace and Fudgy, but not in that order.

What is the nickname of each of the friends?

Clues

- ◆ Josh plays tennis with Curly and goes swimming with Ace.
- ◆ Tina has been on holiday with Curly but travels to school with Fudgy.
- ◆ Spider, Curly and Dawn play in the football team.
- ◆ Spider sometimes goes to tea with Josh.

Algorithms

Diving Bell and the Butterfly



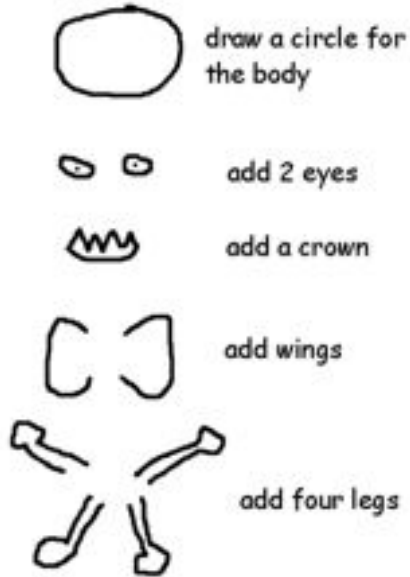
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Diving Bell and the Butterfly



Crazy drawing

How to draw a crazy character algorithm



An example crazy character algorithm

Fluffy



Algorithm by Miss Waite, drawn by Charlie

Fluffy



Algorithm by Miss Waite, drawn by Chloe

Crazy drawing



Decomposition

Decomposition

Five Education Secretaries took part in a race. Charles Clark finished before Ruth Kelly but behind Estelle Morris. Ed Balls finished before Michael Gove but behind Ruth Kelly. What was the finishing order?

Decomposition in Algorithms



Decomposition

Haiku: 5-7-5

The bartender said
to the neutron, “For you, sir,
there will be no charge.”

magnetic poetry



Patterns

Sharing sweets



Sharing sweets

KS1 Sharing Sweets Activity: understanding algorithms

Recommended Year Group: Year 1 or 2 (although can be adapted for other years)

Activity Duration: 30 minutes

Concepts and approaches



Algorithms



Patterns

Curriculum links

Computing

- understand what algorithms are

Maths

- Year 1: recognise, find and name a half as one of two equal parts of an object, shape or quantity; recognise, find and name a quarter as one of four equal parts of an object, shape or quantity
- Year 2: recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity

Introduction

An **algorithm** is a precisely defined sequence of instructions or a set of rules, for performing a specific task. Unplugged means you do not need a

Which of these is the odd one out?



Motor

Battery

Light Bulb

Abstraction

Abstraction

Removing unnecessary
detail.



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Tinkering
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Creating
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Debugging
finding & fixing
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Persisting
keeping going

Collaborating
working together

Approaches

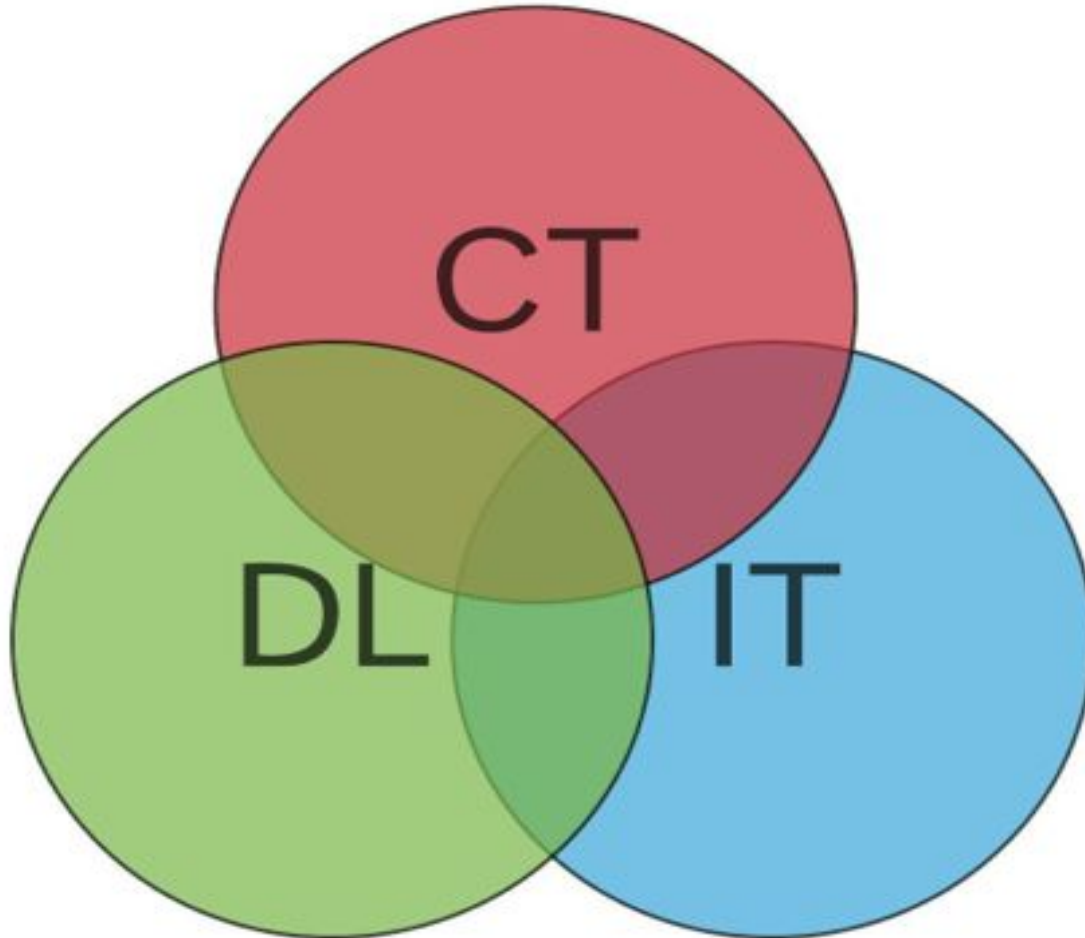
Key things to remember

1) Three themes.

Digital literacy: Critical thinking

IT: Using computers

Computational thinking: Logic and problem solving



2) Computational thinking is not hi-tech.
