Computing in the Early Years and Key Stage 1

Making good choices to get children off on the right foot with computing!

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Technology in the Early Years

'I argue that there are very compelling reasons to conclude that ICT technologies are harmful for young children's development and learning.'

(House, 2012: 105)

'The world we've created is damaging our children's brains.'

(Palmer, 2006: p. 308)

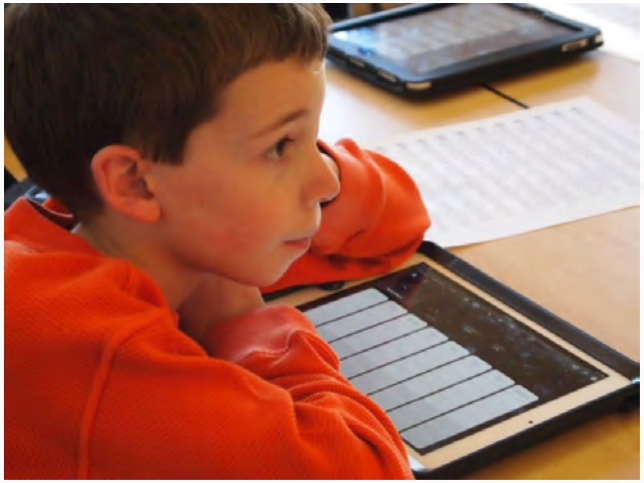
Screen Time

Early Learning Goal - Technology

‘Children recognise that a range of technology is used in places such as homes and schools. They select and use technology for particular purposes.’

(DfE, 2014: 12)

Understanding Technology in Their World



What kind of Technology Should We Use in EYFS?

Some items displayed from http://www.tts-group.co.uk/ and http://www.talkingproducts.com/ - images used with permission

How Can Technology Support Young Children's Learning?

- Ways of **communicating** for children who may not yet be able to read and write
- **Overcoming barriers** to learning
- Provide an **audience** and **purpose**
- Enhance **engagement**
- Access to **expertise**

Developing Skills of Independence

Much of what we do in Reception is about developing children's basic skills for surviving and thriving in a school!

Teach children to:

- Learn how to keep safe
- Look after equipment
- Log on
- Turn on / off

Computing for Young Children

'A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world.'

(DfE, 2013)

So the Problems are Key!

Mindset!

'If parents want to give their children a gift, the best thing they can do is to teach their children to love challenges, be intrigued by mistakes, enjoy effort, and keep on learning.'

(Dweck, 2012:176-177)

The Computational Thinker: Concepts & Approaches

Barefoot Computing

Concepts

- Logic predicting & analysing
- Algorithms making steps & rules
- Decomposition breaking down into parts
- Patterns spotting & using similarities
- Abstraction removing unnecessary detail
- Evaluation making judgement

Approaches

- Tinkering experimenting & playing
- Creating designing & making
- Debugging finding & fixing errors
- Persevering keeping going
- Collaborating working together

www.barefootcas.org.uk

Concept - Key Questions

- **Abstraction** - What are the key parts of the problem?
- **Decomposition** - How can I break the problem down into smaller parts?
- **Patterns** - When have I encountered a similar problem?
- **Logic** - What might happen if I do this? Which would be the best way?
- **Algorithms** - What are the steps I need to go through to solve the problem?
- **Evaluation** – What went well? Which was the best way? How could we improve it?

Approaches

- **Tinkering** – experimenting and playing
- **Creating** – designing and making
- **Debugging** – finding and fixing errors
- **Persevering** – keeping going
- **Collaborating** – working together

Characteristics of Effective Learning

1.9. In planning and guiding children's activities, practitioners must reflect on the different ways that children learn and reflect these in their practice. Three characteristics of effective teaching and learning are:

- **playing and exploring** - children investigate and experience things, and 'have a go';
- **active learning** - children concentrate and keep on trying if they encounter difficulties, and enjoy achievements; and
- **creating and thinking critically** - children have and develop their own ideas, make links between ideas, and develop strategies for doing things.

(DfE, 2014: 9)

Characteristics of Effective Learning / Approaches

- **Playing & exploring** links to – **tinkering** & **debugging**
- **Active learning** links to – **persevering** & **debugging**
- **Creating & thinking critically** links to – **creating** and also the computational thinking concepts of **algorithms**, **patterns** & **evaluation**

PSED one of the Prime Areas of Learning

Personal, social and emotional development involves helping children to develop a positive sense of themselves, and others; to form positive relationships and develop respect for others; to develop social skills and learn how to manage their feelings; to understand appropriate behaviour in groups; and to have confidence in their own abilities.

(DfE, 2014: 8)

Playing & Exploring / Tinkering & Debugging

- Plan open ended activities
- Encourage physical and sensory engagement with the world
- Encourage representational play
- Modelling and encouraging trial and error with a resilient attitude – create an ethos in which anything is possible

Active Learning / Persevering & Debugging

- Provide time for activities that require extended engagement and concentration
- In the words of Carol Dweck - Use the word ‘yet’
- Celebrate persistence and children getting there in the end

Creating & Thinking Critically / Creating

- Encourage children to have their own ideas, make suggestions and do things differently
- Draw links between experiences
- Encourage children to make predictions and talk about cause and effect
- Get children to talk about and plan how to do things
- Encourage children to review work as they are going along changing strategies as appropriate

So Remember ……

- Much of what underpins computing in the Early Years does not involve computers!

A Web of Ideas

Creating

Logic

Algorithms

Decomposition

Persevering

Patterns

Collaborating

Abstraction

Debugging

Tinkering

Evaluation

Computing in Key Stage One

Pupils should be taught to:

- understand what algorithms are; how they are implemented as programs on digital devices; and that programs execute by following precise and unambiguous instructions
- create and debug simple programs
- use logical reasoning to predict the behaviour of simple programs
- use technology purposefully to create, organise, store, manipulate and retrieve digital content
- recognise common uses of information technology beyond school
- 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.

(DfE, 2013)

Ways of Working

- Continue the focus on problems!
- Play – tinkering
- Creating
- Challenge - progression
- Collaboration & talk
- Persevering & debugging
- Opportunities to explore other children's programs

Some Key Language

Algorithms

Debug

Digital Devices

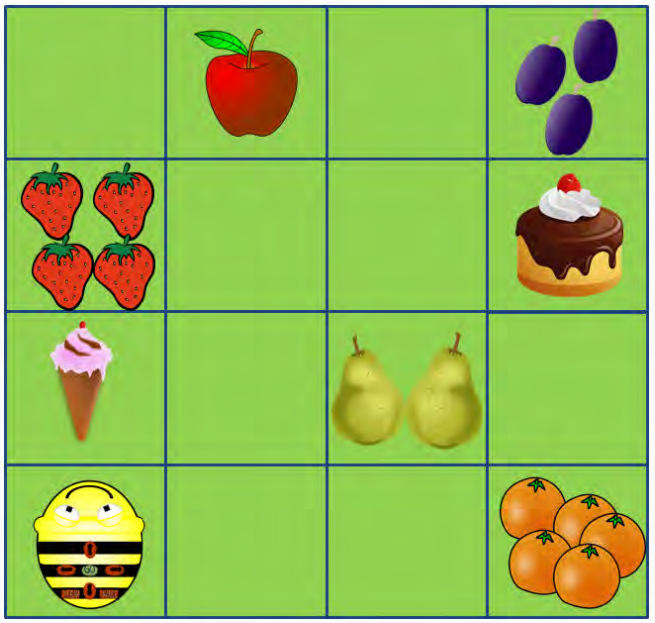
Execute

Logical Reasoning

Programs

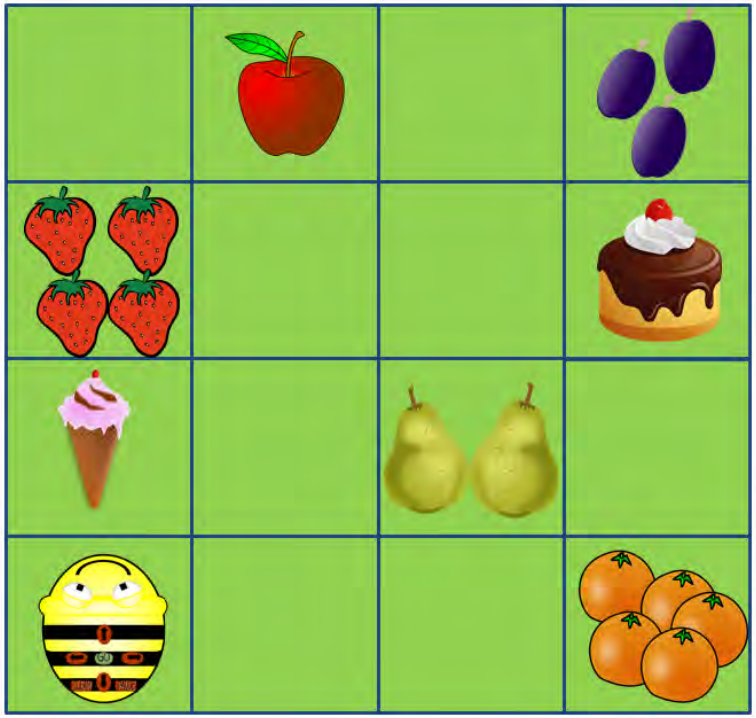
More Complicated Problems!

- Consider the difference!
  - Get Beebot to the apple
  - Get Beebot to travel to all the fruit the Hungry Caterpillar ate in order. Program him to pause on each fruit. Avoid the junk food and don't travel over fruit twice!
- A Beebot can be programmed with up to 40 instructions



My Algorithm

By my calculation the second example takes 33 instructions – Can you do it in less?



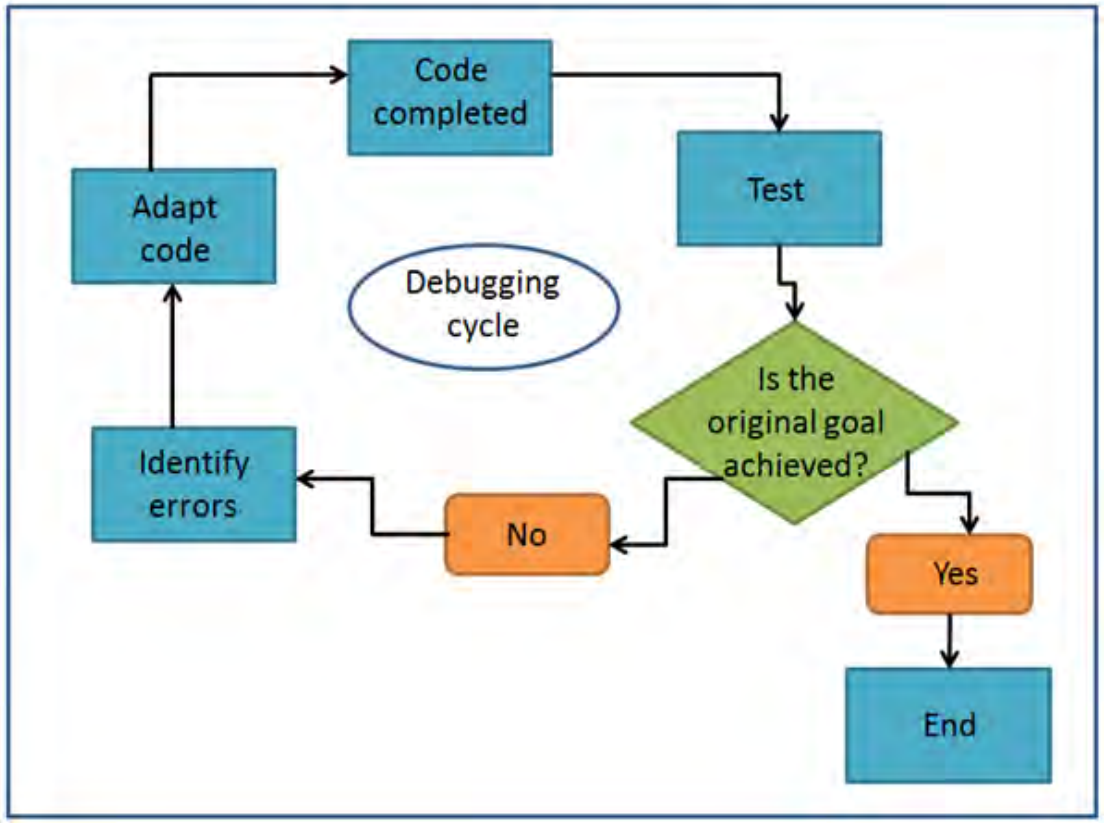
right, forward, left, forward, forward, forward, pause, back, back, right, forward, pause, left, forward, forward, right, forward, pause, back, right, forward, right, forward, forward, pause, back, left, forward, forward, left, forward, forward, pause

An Algorithm is….

- A step by step procedure to solve a problem or explain a process.

- A plan of the steps you would have to go through to solve a problem.

Debugging


Code completed
Test
Adapt code
Debugging cycle
Is the original goal achieved?
Identify errors
No
Yes
End


North Pole
Discovered by
Pooh
Pooh found it

Debugging

- Humans make mistakes
- Programs will therefore contain bugs / errors
- Part of the programming cycle
- Requires logical reasoning
- Resilience and persistence
- Mindset!

Mindset!

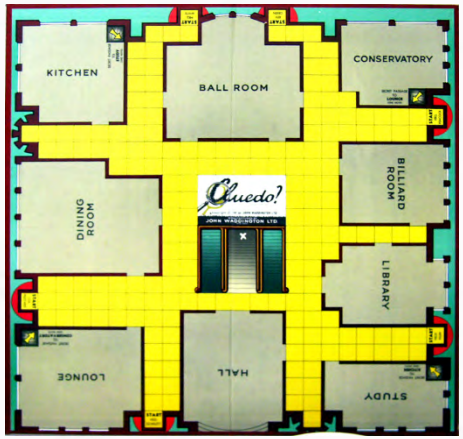
'If parents want to give their children a gift, the best thing they can do is to teach their children to love challenges, be intrigued by mistakes, enjoy effort, and keep on learning.'

(Dweck, 2012:176-177)

Dweck, C. (2012) *Mindset: How You Can Fulfil Your Potential. London: Robinson*

Logical Reasoning

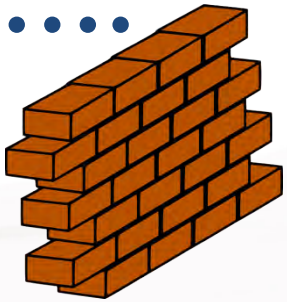
- Thinking logically and analytically
- Exploring other people's programs and algorithms
- What happens?
- Where will it go?
- What will it do?
- How do you know?



Using Technology Across the Wider Curriculum Can….

Provide an Audience

Enhance Creativity



Overcome barriers

Support Assessment

Enhance Engagement

Aid Communication

Continue to Help Children Understand Their Place in the World

- How do the computer systems they meet day to day work? – dinner ordering, library, cash machine, supermarket till - lots of unplugged opportunities
- E-safety – linked to AUP, books and digital resources – Penguin Pig, The Internet is Like a Puddle, Chicken Clicking, The adventures of Smartie the Penguin, Hectors World, Lee and Kim, etc

Computational Thinking

‘A high-quality computing education equips pupils to use computational thinking and creativity to understand and change the world.’

Using Technology Across the Wider Curriculum Can….

Remove barriers

Enhance Creativity

Provide an Audience

Support Assessment

Enhance Engagement

Aid Communication

Digital Literacy - E-safety

Our school technology charter

In the Oaks Learning Federation we will stay safe on the computers and other equipment by remembering our charter. Remember that the school owns the computer network and can see anything you do on it. People who use technology in school in the wrong way may be stopped from using it.

I will be polite, kind and gentle to others and equipment.

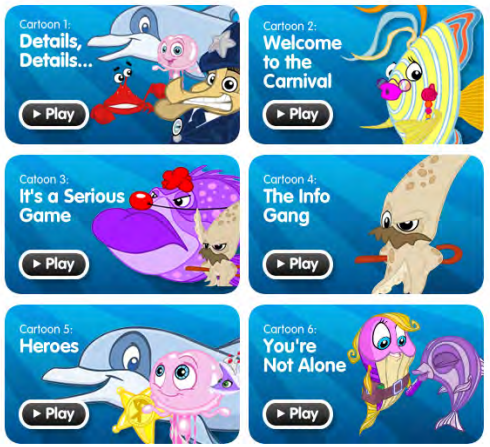
I will take turns with the computers and other equipment

I will only click buttons if I know what they do.

I will check with a teacher before using the internet or downloading things.

If I see something on the screen that upsets me I will tell an adult straight away.

- Circle-time and drama activities based around the children's AUP
- Think u Know – Hector's World



The KS1 Computing Curriculum

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