Developing Maths through Scratch

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Author How to teach Primary Programming using Scratch
Scratch Overview

- Programming Language Since 2007
- Two versions 1.4 & 2.0
  - Pyonkee (iPad version of Scratch 1.4)
- Online & Offline
- User Community
- Used from Y3 to Undergraduate Study
- Block based rather than text based
- Limitations
Computational Thinking & Scratch

• Algorithms
• Algorithm Evaluation
• Decomposition
• Generalisation
• Abstraction
### Example Question
What is 3x3?

After a count of 3 all shout out your answer

1 2 3

If you shouted 9 then well done and give yourself a point.
If you shouted anything else you are wrong and receive no points.

### Algorithm
Think of a question
Think of the answer
Ask the question
Compare your answer with users answer
If same award point
If different award no point

All programming is an algorithm turned into code.
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Generalisation
Adapting a solution that solved one problem to solve another.
Examples of programming decomposition
Incidental Maths

- Angles (Smoking Car)
- Percentages
- Decimal Fractions (Music Machine)
- = Same as (Maths Quiz)
Maths Related Projects

• Training Computer to do Maths
• Maths Quiz
• Counting Machine
• Coin Program
• Times Table Game
• Perimeter Program
• Angle Sorter
• Cartesian Coordinates

Planning can be found here
http://code-it.co.uk/scratch/scratchplan

However latest version is here
http://www.amazon.co.uk/Teach-Primary-Programming-Using-Scratch/dp/1908684534
Counting Machine

Module Aim: Create and adapt a counting machine.

Module Learning Focus

By the end of the module children will be able to:
- Solve simple maths problems using Scratch code
- Understand the benefit of changing a variable within a loop
- Investigate and modify a simple program that changes a variable
- Begin to look for ways to generalise this idea elsewhere

Maths Concepts

- Counting in multiples, counting backwards, counting in halves, counting in tenths, counting in hundredths, counting from a different starting number

Computer Science Concepts:
- Repeat x times loops
- Variables in a loop
- Reporting a variable by using it within a say command
Counting Machine

Can you get the cat to count?
Modelling a better solution

https://youtu.be/_26bc5twFRg
Which two blocks go inside the repeat loop?
Counting Machine Challenges

• Can you count faster?
• Can you count in multiples of 7?
• Can you count backwards?
• Can you count in tenths or hundredths?
• Can you start from 30 and count down to 0?
• Can the user say how long they want the countdown timer to last for?