Which of the following outcomes from the Digital Technologies strand of the new K-6 Science and Technology Syllabus does the planned lesson address? Please circle all those apply.

Stage 1

- uses materials, tools and equipment to develop solutions for a need or opportunity (ST1-2DP-T)
- describes, follows and represents algorithms to solve problems (ST1-3DP-T)
- identifies the components of digital systems and explores how data is represented (ST1-11DI-T)

Stage 2

- selects and uses materials, tools and equipment to develop solutions for a need or opportunity (ST2-2DP-T)
- defines problems, describes and follows algorithms to develop solutions (ST2-3DP-T)
- describes how digital systems represent and transmit data (ST2-11DI-T)

Stage 3

- plans and uses materials, tools and equipment to develop solutions for a need or opportunity (ST3-2DP-T)
- defines problems, and designs, modifies and follows algorithms to develop solutions (ST3-3DP-T)
- explains how digital systems represent data, connect together to form networks and transmit data (ST3-11DI-T)

NSW Syllabus Outcome(s): *Does the lesson involve concepts or outcomes from the Science and Technology syllabus that are not listed above or that are from another Key Learning Area (for example, English or the Creative Arts)? If so, what concepts and outcomes are these?*

Introduction: *How will you get the students motivated, curious and ready to learn?*

- Students have a blank grid + create a black/white pattern on it.
- Ask students how to give instructions to others to recreate the pattern without seeing it.
- Brainstorm ideas and test.
- Introduce constraints to the level of instructions given, eg: 25 words only, no words or letters, etc.
- Compare and discuss strategies as a class.
- Introduce concept of binary code and link it to black/white concept.

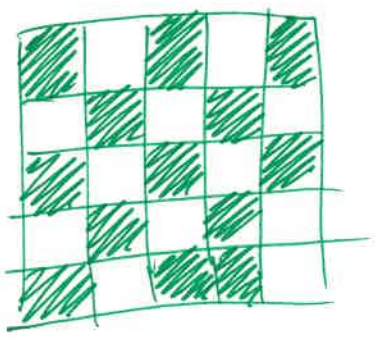
Metalanguage: *What are the key concepts or procedures that you want students to understand as a result of this lesson?*

Binary
Sequence
Code
Debugging
Computational Thinking
Text Compression / Image representation
Pixel

Please turn page over

Teaching Activities: *What strategies will you use to teach the content and skills? How long will you spend on each of those strategies and with the content? How would you address different levels or prior knowledge?*

- Provide students with blank grids. Each student designs a pattern/picture on their grid and writes binary code to represent it.
- Students swap grids and try to recreate each other's patterns using only binary code.



10101
01010
10101
01010
10110

- Students compare patterns with originals. If errors have occurred, they determine the nature of the error (human or code) and debug.
- Continue with increasingly complex grids/patterns.
- Discuss errors – what was common?
  – what impacted on accurate data representation

Lesson Closure: *How will you bring the lesson to a conclusion?*

- Show students the Pixel Viewer from CS Field Guide. Zoom in and out and discuss the necessity of numbers in the code used to display the picture.
- Show a picture in the Image Bit Comparer – talk about the difference to the picture depending on the complexity of the number code.
- Discuss real-world applications, eg: TV
  Netflix
  etc.

FOLLOW-UP LESSONS:

- Digital Art
- Create Pixel Art → famous artworks recreated
- Cross stitch

Please turn page over

Assessment: *How will you know whether the students achieved what you wanted them to achieve?*

- Grid completion } evidence
- Code written
- Discussion + observation

Resources: *What materials do you need for this lesson? Have you used ideas from elsewhere?*

Digital Technologies Hub - Using Binary to create on/off pictures.

CS Field Guide – pixel viewer (Chapter 5.5)

– Colour mixer

– Image Bit Comparer.

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