**Sensory classroom**

**Lesson 3: Developing pattern algorithms**

**Introduction**

In this lesson students plan how to create a classroom sensory aid to provide a visual sensory pattern using micro:bit. They create an algorithm to show the sequence of instructions to follow to program their sensory aid using inputs, outputs, iteration and selection.

**Time:** @60 minutes

**Materials needed:** Lesson plan, lesson guide, rough paper, planning sheet (printed from slide 6), light pattern sheet (printed from slide 8), ‘Have you thought about?’ sheet, selection of resources that be used to construct and decorate the sensory aid such as paints, felt, tissue paper, marker pens, small cardboard boxes, kitchen roll tubes, nets of 3d shapes printed on card.

**Learning objectives**

* To create a sensory aid for a classroom that meets given criteria.
* To use pseudocode to write an algorithm using inputs, outputs, iteration and selection

**Lesson summary**

1. Introduction: Sensory classroom recap (5 minutes)
2. Introducing the design and build challenge (15 mins)
3. Planning and designing (30 minutes)
4. Sharing designs (10 minutes)

**Introduction: Sensory classroom recap (5 minutes)**

* Give out rough paper, and ask students to work in pairs, or small groups, to draw a diagram of a sensory classroom, labelling as many sensory aids from a sensory room as they can remember and adding how learning environments can be beneficial (**slide 2**).
* Ask students to share their diagrams with another pair and compare their ideas.

**Introducing the design and build challenge (15 mins)**

* Share the learning objectives on **slide 3** and introduce the design and build challenge (**slide 4**), highlighting that students will be creating an *abstraction* of a sensory device and will need to *decompose* the different parts to create a working device, to link to Computational Thinking.
* Share the criteria (**slide 5**) and discuss why user interaction and hiding any wires (if using physical micro:bits are important considerations).
* Note: It may be helpful to remind pupils that sensory aids are designed to stimulate one sense (e.g. visual stimuli and other stimuli, such as sound, should be avoided so as to not over-stimulate the user).
* Invite pupils to share ideas around different ways visual stimulus could be provided (e.g. micro:bit images, micro:bit light patterns, different coloured surfaces, patterned surfaces, simple drawings, etc).
* Show students the resources and equipment that they will have available for creating their sensory aid (see materials list above for suggestions). If they do not have access to physical micro:bits explain they can create a prototype and use the simulator in the MakeCode editor for their code.
* Give students a planning sheet and copies of the light pattern sheet (**slides 6-8**) and check understanding of what needs to be recorded in each section.
* Invite students to recap the computer science concepts that they are likely to make use of in their algorithm if helpful (**slides 9 and 10**).

**Planning and designing (30 minutes)**

* If you wish, as a class, create a mind-map - on the class interactive display board or on large sheets of paper - showing potential ideas for the sensory aids that could be made, before allowing students thinking time to come up with their idea(s) for a classroom sensory aid.
* Once students have an idea, ask them to use their planning sheet to create a diagram to show what their intended product will look like, what it will be made from, where micro:bit (sharing the criteria on **slide 11** and example on **slide 12** if helpful).
* Throughout this phase, encourage students to constantly refer to the design criteria and to ask each other for potential solutions to problems. Use the **Have you thought about?**sheet to allow students to reflect on the progress of their design.

**Sharing Designs (10 minutes)**

* Ask students to share their designs either with another pair or the class as a round robin (**slide 13**).
* Invite others to ask questions and give constructive feedback (e.g. 2 stars and a wish).
* Revisit the learning objectives on **slide 14** if you wish.

**Extension ideas:**

* Students could create a sensory aid similar to a colour cube that has several repeating patterns that are activated individually. Both buttons A and B could be used as well as shake.
* Students could record each other sharing their algorithms and design ideas and upload the videos to a shared area, blog or vlog.

**Differentiation**

**Support:**

* Students could be paired sympathetically to ensure they can make good progress and could work in a group with an adult who could help to develop their ideas (and be a scribe if helpful).

**Stretch & challenge:**

* Students could make use of their programs from the previous lesson to create a sensory aid that displays more than one repeating pattern, or students could investigate how to design a sensory aid based on a bubble tube (see example files in lesson 2).
* Students could also investigate how to use variables and design a sensory aid that selects a random light pattern.

**Opportunities for assessment:**

* Informal observation of students’ during activities and discussion.
* Informal, or more formal assessment if wished, of students’ design plan and algorithm.