NCD Innovation Lesson Plan

Curriculum links:

- Computing: Innovation to address real-world problems. Computational thinking: algorithms, decomposition, abstraction, logical thinking, programming, patterns, evaluating, debugging, prototyping, creating, designing.
- Geography, Citizenship, Maths, PSHE, Science, P.E.

Skills: Designing, researching, problem solving, team working, creative thinking, presenting.

Resources: Teacher Guide: downloads: presentation, lesson plan, student presentation template, materials for paper prototyping, MakeCode editor

Background:
It is assumed that you have first completed the introduction to NCDs lesson and ideally, a set of lessons taking students through an example innovation to address NCDs (e.g. Fitness Friend).

Introduction
In this lesson students use the knowledge, understanding, skills and insight they have developed from the NCD introductory lesson and example innovation to design and create their innovation to address the global problem of NCDs within their community. The time this takes will depend on your students and the tasks are split into 6 separate sections: defining the problem, designing, prototyping, coding, evaluating and presenting, evaluating and entering the competition (see presentation).

Teacher guide:

Learning objectives

- To design and create an original innovation using micro:bit to help to address the problem of non-communicative diseases (NCDs)
    - To choose a **problem** and explain why it is important
    - To **design** an original innovation and explain how it will address the problem
    - To **create** a paper prototype to explain how the innovation will work
    - To **code,** test and debug a Micro:bit prototype
    - To **evaluate** an innovation effectively
    - To **present** an innovation clearly to an audience
    - To **enter** the micro:bit Global Challenge competition

Agenda

Introduction

- Explain that students will be using what they've learnt so far to come up with their own original innovation to address the global goal of Health and specifically addressing NCDs (slide 2) and introduce the tasks (and learning objectives on slide 3 if you wish).
- Highlight they are using **decomposition** to break down the large problem of creating an innovation into smaller tasks that they can focus on.
- As they complete each task, they can fill in the presentation template so they build their 'presentation' material as they go and be ready to submit their entry.

- Ensure students understand they can work individually, in pairs or in teams, however only one student can enter the Global Challenge. They can go back to the ideas they created as teams previously and refine them, or come up with another idea entirely.

NCD recap (if needed)

- Remind students of Goal 3 and 3.4 of the Sustainable Development Goals (slide 4) and invite students to think/pair/share key facts about NCDs (some included on slide 5).

Defining the problem

- Explain that NCDs are a large problem, so focussing on a specific area for their innovation will be helpful. Their first task is to research one specific area of focus, defining the problem they wish to address (slide 6).
- Give students appropriate time to consider and research different areas of NCDs and focus on one they are interested in. There are excellent fact sheets on the WHO website which may help (slide 7).
- Once students have chosen the area they wish to focus on, invite them to complete slide 3 of their presentation if you wish and discuss their areas of focus as a class.

Designing the innovation

- Remind students they have been challenged to come up with an original innovation using the Micro:bit to address the problem and refer to the criteria for their innovation (slides 8 and 9).
- Give students large sheets of paper and give them sufficient time to brainstorm different ideas (in pairs to help each other if they are working individually), then to narrow them down and pick one to prototype.
- Encourage students to share their idea with others to gain feedback and revise it as appropriate.
- Invite them to complete slide 4 of their presentation and share the innovations as a class.

Prototyping:

- Explain to students that there are 2 parts to the prototyping task
    - Creating a paper prototype
    - Coding, testing and debugging a micro:bit prototype
- Highlight that prototyping is a simple form of **abstraction** - a basic representation that removes unnecessary complexity.

Creating a paper prototype

- If necessary explain what a prototype is and invite students to think/pair/share why prototyping is helpful (slide 10). There are also plenty of helpful prototype videos e.g. https://www.youtube.com/watch?v=JMjozqJS44M
- Ensure students know the requirements of their prototype, particularly that they should create a set of instructions on how to use it (an **algorithm**), which they will use to code the micro:bit prototype (slide 11).
- Give them a variety of different materials as you wish e.g. paper, pencils, different coloured pens, sticky notes, scissors, sticky tack.
- Once students have completed their paper prototype allow time to show a variety of people to get feedback and make any necessary revisions before completing slide 5 of their presentation.
- **Ensure students save their prototype and instructions for their competition entry.**

Coding, testing and debugging a micro:bit prototype

- Explain that now they will use their paper prototype and instructions (algorithm) to program and test a prototype using micro:bit (slide 12).
- Remind students of the need to test and debug their code regularly use paired programming if they can and recap how to use https://makecode.microbit.org if necessary.
- Allow time for students to code, test, debug and get feedback on their micro:bit prototype before completing slide 6 of their presentation.
- Highlight they are using **logical thinking** to program their micro:bit and encourage them to spot **patterns** in the code they use.

- **Ensure students download and save the hex file for their competition entry.**

Evaluating

- Invite students to consider why **evaluating** their innovation is important and refer back to the initial criteria (slide 13).
- Give students ample time to complete the evaluation questions (slide 14) and complete slide 7 of their presentation.

Presenting

- Give students time to complete their presentations (slide 15) before having an innovation showcase where they show and explain their innovation to the class. You could invite others to see their work and give our certificates and/or prizes if you wish.

Entering the Global Challenge Competition

- Show students how they can enter the competition (slide 16).

Differentiation

Support:

- Students may need additional help in choosing a suitable innovation, may benefit from working in a pair or with additional support and can be encouraged to present their work in any way they like.

Stretch & challenge:

- At each stage, students can be challenged to think more deeply, create a solution that really addresses the problem and consider carefully how their prototype would need to be adapted.

Opportunities for assessment:

- You can assess each step along the way along with a more formal assessment of the final innovations and presentations.