Gladiators Inventor Workshop #3
Refining and Designing as a Team

micro:bit the next gen

Estimated duration: 50mins

Lesson Overview

In this lesson, the children will work in small teams to refine the individual designs they made in Gladiators Inventor Workshop #2 into stronger iterations by combining their best ideas. They will learn about the concept of iterative design - the process of making continuous improvements to their product idea. Through teamwork, they will decide which ideas to bring forward for their final fitness gadget design, intended to improve a Gladiator's performance in a specific way.

By the end of the lesson, each team will have a complete project consisting of a labelled sketch, an exploded diagram or cross-sectional diagram, and a written explanation of how their design works and the problem it aims to solve.

There is also an included extension activity, inviting pupils to create marketing campaigns and demonstrations for their gadgets.

Learning Objectives:

- Understand the process of iterative design and its importance in improving product design.
- Collaborate as a team to refine design ideas and develop a final version.
- Create a labelled sketch and a cross-sectional or exploded diagram of the design.
- Write a description of the design explaining its function, purpose, and how it addresses a Gladiator's challenge.
- Optional: Develop creative marketing campaigns or presentations to support their designs.

Curriculum Links:

England: Design and Technology (KS2)

- Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups.
- Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design.
- Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work.

Scotland: Technologies (Second Level)

- TCH 2-11a: Use a range of graphic techniques, manually and digitally, to communicate ideas.
- TCH 2-05a: Investigate how product design has been influenced by changing lifestyles.

Wales: Curriculum for Wales (Progression Step 3)

- I can use design communication methods to develop and present ideas and respond to feedback.
- I can consider how my design proposals will solve problems and how this may affect the environment.
- I can use design thinking to test and refine my design decisions without fear of failure.

Northern Ireland: The World Around Us (Science and Technology)

Pupils will be taught how to:
- Develop ideas and make models.
- Consider how science supports technological inventions.

Materials Needed

- Paper, pencils, erasers, rulers
- Coloured pencils or markers
- Digital devices for research (if available)
- Example images of labelled, cross-sectional, and exploded diagrams (see resources)

What benefits to working as a team can your class think of?

Lesson Outline

Introduction (5 mins)

Teacher Introduction: Explain the concept of iteration as the process of refining a design through multiple versions to improve its functionality. Relate this to how professional designers often go through many drafts of a product to ensure it works as intended.

Use real-world products as examples, such as the evolution of mobile phones or sports equipment (e.g. football boots or fitness trackers). Highlight how these items improved through feedback and new ideas. Discuss that many designers work together, each contributing to the final product and that everyone's input is taken on board to arrive at the final product design.

Designing Sustainable Solutions (5 mins)

Discuss the importance of ensuring that the designs carry a philosophy of sustainability where possible. Sustainability in this context means designing gadgets and products in a way that reduces their negative impact on the environment.

This might include:

1. Using recyclable materials that can be reused instead of thrown away. Encourage the children to think about building their gadget out of materials that can be easily recycled, like certain plastics, metals, or cardboard.
   Example: If their gadget has a casing, they could design it using biodegradable plastic or recycled metals reducing the need for new raw materials.
2. Making gadgets durable so they last a long time and don't need to be replaced often.
   Example: If their gadget has a casing, they could design it using biodegradable plastic or recycled metals, reducing the need for new raw materials.
3. Creating energy-efficient devices that use less power, like solar-powered gadgets.
   Example: Using energy-efficient components and possibly adding a solar-powered element to their device to make it self-sustaining.

Ask the children if they can think of any other ways in which they can ensure that their designs are as sustainable as possible.

Group Activity: Refining Designs (10 mins)
The children form their teams of three or four. Each child presents their individual fitness gadget design from Gladiators Design Workshop #2 to their group. Take turns, allow approx. 2 mins each child to explain their designs to the group.

With the class having explained their designs, the teams discuss each design in their group.

- How does the idea help improve a Gladiator's performance?
- What do they like about the ideas?
- What about the ideas might need changes?
- What ideas could be combined to make a stronger idea?

For example: If one student designed a balance aid, and another designed a reaction timer, the group might combine these ideas to help a Gladiator with both balance and reaction time during a competition. It's time for the groups to make a decision! Each team chooses one or two of the best design features to include into their final product. They should aim to create a more innovative and functional gadget by combining and refining ideas.

Teamwork on Final Design (25 mins)

N.B. We have allotted most of the lesson plan for this part of the activity, but if you and the class are excited to take your time with this or explore things further, this and the extension ideas can become an additional lesson on another day.

It's not just refining ideas that can benefit from teamwork – drawing and writing up a final design idea can also be done as a team. Help the class split up into roles that will help put together the final designs the class have settled on:

- **Design Sketcher:** Creates a labelled sketch of the fitness gadget, showing how it will look and function.
- **Diagram Specialist:** Draws either an exploded or cross-sectional diagram of the gadget to show its internal components and how they fit together.
- **Gadget Explainer:** Drafts an explanation (100-300 words) of the design, including the problem it solves, how it works, and how it can help a Gladiator improve their performance.

The Gladiators micro:bit challenge page has printable worksheets alongside these lesson plans for students to draw their diagrams, if blank paper feels too directionless.

Hand out the examples of the different design diagrams included in Gladiators Inventor Workshop #2 to aid the children with their own designs. Allow the children time to create their final designs. Visit each group in turn to lend support and encouragement.

Optional Tasks

If time during subsequent lessons allows, teams can also create:

- A marketing campaign to promote their gadget, including a catchy slogan and key benefits.
- A demonstration or presentation explaining how the gadget works, which could be recorded or acted out.

Sharing Ideas and Feedback (5 mins)
Teams share their final designs with the class.

Encourage positive feedback and suggestions for further refinement. Celebrate the children's ideas, showing how they have fulfilled the task of designing a micro:bit gadget to help improve the Gladiators' performance. Turn the classroom into a "design gallery". Teams display their final designs & explanations on their table. Allow the children time to move around (if able to) and review each team's submission.

At a later date, you can display the entries from the class groups in an interactive display at school, where pupils from other classes can see the designs and vote for their favourite ideas by writing down their choice on a piece of paper and placing it in a ballot box (any container will do). Votes can be based on creativity, functionality, and how well the design supports the Gladiators. The teacher can then announce the winner in class or as part of an assembly.

Assessment and Evaluation:

Teamwork: Assess how well students worked together to refine their ideas and collaborate on the final design.

Creativity and innovation: Evaluate the creativity of the designs and how well they address the challenge.

Accuracy in diagrams: Ensure students understand the purpose and use of labelled, cross-sectional, and exploded diagrams.

Written explanation: Assess the clarity and depth of the 100-300 word description, making sure it explains the problem the gadget solves and how it works.