ACTIVITY TITLE: Redesigning the Everyday: Life Cycle Thinking in Action

Activity code: ncCTA02

DURATION	120 minutes
AGE RANGE	13-14
TOPICS	LIFE CYCLE ASSESSMENT (LCA)

Description of the project

This activity invites students to explore the hidden environmental stories behind the objects they use every day—from water bottles to school supplies. Acting as sustainability engineers, students will investigate how a product's design and materials impact the planet across its entire life cycle: from raw material extraction to manufacturing, use, and disposal.

Through Life Cycle Assessment (LCA), students will examine environmental concepts like carbon footprint, material sustainability, and waste generation. They will apply redesign thinking to improve their product and create inclusive, low-impact alternatives using digital and artistic tools.

By the end of the project, each team will produce:ç

- A Life Cycle Map showing the stages of a chosen product
- A Redesign Proposal (sketch, CAD mockup, or annotated diagram)
- A Pitch Poster or Slide Deck that visually communicates their sustainable solution and includes an inspiring role model from the field

Objectives: What will I learn?

- **Understand and map** the 5 key stages of a product's life cycle—Raw Materials, Production, Transportation, Use, and End-of-Life—by conducting a product investigation, in order to recognize how everyday objects impact the environment.
- **Apply Life Cycle Assessment (LCA) thinking** to identify a product's environmental impact (waste, energy, water use, and emissions), using research tools and guided questions, so that students can base their redesign choices on evidence.

- **Use redesign thinking and inclusive design principles** to reimagine a product that is more sustainable and accessible, through sketching, prototyping, or annotated modeling, in order to propose solutions that are better for both people and the planet.
- **Create a visual pitch** using digital tools (e.g., Canva, Google Slides, CAD), to communicate their redesign effectively and support their arguments with clear data and persuasive storytelling.
- **Research and highlight** the contributions of women or gender-diverse leaders in eco-innovation, by selecting a role model to feature in their final design, in order to promote visibility and equity in STEAM fields.
- **Collaborate in structured teams** with rotating roles (e.g., analyst, designer, presenter), to foster accountability, creativity, and shared decision-making during the project.

Materials: What do I need?

1. **Provided by the teacher/institution:**
   - Internet access for research
   - Laptops or tablets (for Canva, Google Slides, or CAD apps)
   - Printed role model bios
   - Sample data sets (carbon footprint, material use, etc.)

2. **Provided by students (computer, internet access, notebook, pencils).**
   - Drawing and sketching supplies: colored pencils, markers, paper
   - Notebook or design journal for team notes, sketches, and research logs
   - Recycled materials (optional) for teams choosing to build physical prototypes (e.g., cardboard, fabric, plastic, etc.)

3. **Downloadable resources**
   - Life Cycle Assessment (LCA) map
   - Life Cycle Assessment (LCA Starter Kit)
   - Role model bios sheet
   - Reflection and feedback worksheet

Previous preparation

Form Student Groups

- Divide students into teams of 3–4, ensuring mixed abilities and balanced participation.
- Assign or let students select rotating roles: Research Lead, Redesign Engineer, Visual Designer, Presenter.

Set Up Technology & Digital Tools

- Ensure access to computers or tablets with:
  - Internet browser
  - Google Slides or Canva (for posters/presentations)
  - Optional: TinkerCAD or similar tool for 3D modeling/mockups
  - Test logins or shared folder setup if students will collaborate digitally

Print or Distribute Key Materials

- LCA Starter Kit (summary of Life Cycle stages with visual aids)
- Research template or LCA mapping worksheet
- Reflection & feedback sheets for session 3
- Role model bios sheet

Share Project Timeline and Goals with Students

- Introduce the activity structure and expected outcomes
- Explain how teamwork, redesign thinking, and creativity will all play a role
- Emphasize real-world relevance and student agency: "You have the power to improve a product that impacts the environment

RESEARCH

Have a look at these resources

Every day, we use dozens of products—pens, food containers, notebooks, water bottles—without thinking much about where they come from or where they end up. But every product has a story, and that story has a footprint.

From extracting raw materials to manufacturing, transporting, using, and eventually throwing the product away, each step of its life cycle can impact the planet. This is where Life Cycle Assessment (LCA) comes in—a method used by engineers and scientists to measure and reduce those impacts.

Why is this activity important?

By learning how to assess and redesign everyday objects, you're thinking like a sustainable engineer—someone who solves problems in a way that protects the Earth. Even small changes in how we package, use, or dispose of products can lead to big changes for the environment.

Through this project, you'll learn how to evaluate an object's "life story" and design a better, greener version of it. Your ideas could inspire real change in your school, home, or even your future career.

Real-World Inspiration

- Isatou Ceesay (The "Queen of Recycling" in Gambia) turned plastic waste into reusable bags and created jobs in her community.
- Julia Watson, an ecological designer, uses indigenous knowledge to build sustainable, low-impact structures with natural materials.
- A high school in Sweden redesigned their cafeteria cutlery and dishes to be fully compostable reducing 80% of lunchtime waste.

These people and projects all started with **one question**:

How can we make this better for the planet?

Key Questions to Think About

To guide your investigation and design process, ask yourself:

- What is something I use every day that creates unnecessary waste?
- What stages does this product go through before it reaches me—and after I throw it away?
- What materials could be used instead to make it more sustainable or reusable?
- How could my redesign help not just the environment, but also people (affordability, accessibility, fairness)?
- Who are some real-life inventors or activists creating eco-friendly products—and how can I learn from them?

This activity is your chance to think like an engineer, design like an artist, and act like a changemaker. Let's redesign the everyday—one product at a time.

CREATE

Some things you need before beginning

Before you start redesigning your chosen product, it's important to understand some **key concepts** that will help you become a more thoughtful, eco-conscious designer.

Interesting Facts About Life Cycle Thinking:

- Everything has a life cycle. From a pencil to a phone, each product goes through 5 main stages:
  1. Raw Materials → 2. Manufacturing → 3. Transportation → 4. Use → 5. Disposal
- 90% of a product's environmental impact is decided at the design stage! That means the way something is made from the start affects its future waste, pollution, or recyclability.
- Plastic products can take 400–1000 years to break down—and many of them are used for only a few minutes.
- Products are often shipped thousands of kilometers before they reach you—burning fuel and adding CO_2 to the air.
- Life cycle thinking is used in industries like fashion, architecture, food, electronics, and even space exploration to reduce waste and improve design.

Why this matters to YOU:

- You can reduce waste and pollution by changing the way you choose, use, and dispose of products.
- You have the power to design a product that helps both people and the planet.
- You are practicing real skills used by engineers, designers, and innovators around the world.

Now, follow these steps

STEP 1: Choose and Investigate a Product

- Pick a simple, everyday product you use at school or at home. Examples:
  - A plastic bottle
  - A snack wrapper
  - A notebook
  - A pen or pencil case
- Use the Life Cycle Map Worksheet to break it down:
  - What raw materials is it made of? (Plastic, paper, aluminum?)
  - How is it produced? (Factory? Hand-made?)
  - How is it transported?
  - How do you use it? (Once? Many times?)
  - What happens after you're done? (Recycled? Thrown away?)

Optional: Watch a short video on how things are made (e.g., "How pencils are made").

https://www.youtube.com/watch?v=2N_d1ZpwdJ8

STEP 2: Identify the Problems

Discuss in your teams:

- Which stage of this product's life cycle causes the most damage to the planet?
- Does it create unnecessary waste?
- Could it be reused or made with different materials?
- Is it accessible for all users?
- Who is affected by the environmental impact of this product? Does its current design create inequalities (e.g., high cost, single-use reliance, poor working conditions)? How does your redesign promote eco-justice and social fairness? Use sticky notes or a team whiteboard to brainstorm the "pain points" and where the product could be improved.
- Investigate how traditional methods or materials have addressed sustainability. For example: banana leaf wrapping, clay cups, cloth bags, natural dyes, etc. Compare these with modern versions and identify what we can learn from them.
- Review the bios and select one role model whose work connects to your product investigation or redesign goals (you will have to explain later in the presentation how you have been inspired by her). You can also search for other pioneers.

STEP 3: Redesign It!

Now comes the creative part—design, a new, improved version of your product with a lower environmental footprint.

You can:

- Draw a labeled sketch of your redesign
- Create a slide or infographic in Canva or Google Slides
- Make a CAD mockup in TinkerCAD (if available)
- Build a simple physical prototype using recycled materials

Your new design should:

- Use more sustainable or recycled materials
- Be reusable, durable, or biodegradable
- Be fair and inclusive (for all ages, abilities, or budgets)
- Have a positive message or story
- Include a visual or a message that communicates the social or environmental injustice your redesign addresses (e.g., a quote, symbol, short testimonial, or call to action).
- Use a visual or creative element (drawing, icon, pattern, color choice) in your slide or prototype that represents the traditional method you researched. For example, if you were inspired by indigenous cloth bags or bamboo containers, you might use natural textures, organic shapes, or handmade motifs in your design.

STEP 4: Present Your Redesign

Create a final poster, slide deck, or visual pitch. Include:

- A diagram of the old vs. new product
- A brief explanation of the traditional methods or materials you searched for that have addressed sustainability
- A short paragraph about what you improved and include an explanation of how you new design benefits social or environmental injustice your redesign addresses. This can be a drawing, statement, or poster element that shows empathy and advocates for a fairer system.
- A photo or reference to a female or gender-diverse sustainability role model that inspired you (explain why, how, etc…) and explain why you where inspired.
- A title or slogan for your solution

COMMUNICATE

You've redesigned the everyday—now it's time to share your ideas and inspire others! Organize a "Redesign Showcase" in your class or school space. Each team presents their final pitch using:

- Their poster, infographic, or slide deck
- A short 2–3 minute explanation of their redesign
- Their chosen role model and what they learned from them

- Their message or slogan

Each team should be ready to:

- Show the original vs. redesigned product
- Give a brief explanation of the traditional methods or materials searched for that have addressed sustainability
- Explain the problem(s) identified
- Explain who is affected by the environmental impact of this product and how your new design benefits it
- Explain who have inspire their new design and why
- Highlight the eco-choices they made in materials and design
- Share how they made the product more inclusive or accessible
- Explain how their design was inspired by a real sustainability leader

It is time to share!

Share your amazing work and inspire others!

#RedesignSTEAMbrace

- Publish work via class drive or school display
- Share on school's platforms
- Option: Create a QR-coded gallery of each group's pitch slide
- LinkedIn: https://www.linkedin.com/company/steambrace-project/posts/?feedView=all
- Instagram: https://www.instagram.com/steambrace_eu/
- X: https://www.instagram.com/steambrace_eu/

KEEP ON LEARNING

How can I make a similar project by myself?

- What other everyday products do you think need a sustainability redesign, and why? *Think about things you use at school or at home—are there better ways to make or use them?*

- How would your redesign change if you were making it for a different place in the world (a village, a city, a rainforest community)?
  Consider how location and resources affect what's sustainable.

- If you could work with a real company to improve one product, what would it be—and what change would you suggest?

- *Imagine you are part of a design team working to reduce environmental impact:* How can learning about product life cycles help you make better choices when shopping or using items in the future?
  Think about packaging, reusability, and what happens after you throw something away.

Which are other connected projects?

🛍️ **"Sustainable Shopping Challenge"**

Create a mini research project where students compare the life cycle of two similar products (e.g., plastic water bottle vs. metal reusable bottle). Students present which is more sustainable and why. They can create **comparison posters or short videos** to raise awareness at school or at home.

🧠 **"Design a Zero-Waste Starter Kit"**

Invite students to design a set of everyday tools for living a low-waste life at school (e.g., reusable lunch kit, refillable pens, DIY notebooks). They can **build mockups, sketches, or models** and explain how each item helps reduce environmental impact.

📦 **"Reimagining Packaging"**

Encourage students to select a real product they use (snack, cosmetic, school supply) and **redesign its packaging** to be more sustainable. They can work with recycled materials or design digitally and explain how their design reduces plastic, adds reusability, or includes biodegradable options.

LINKS FOR FURTHER INFORMATION

🌍 **Ellen MacArthur Foundation – Circular Economy for Kids**

https://www.ellenmacarthurfoundation.org/topics/circular-economy-introduction/overview

An interactive introduction to **how products can be redesigned** to fit a circular economy model—minimizing waste and reusing materials. Includes real-life product examples and videos.

🧠 **BBC Bitesize – Materials and Sustainability**

https://www.bbc.co.uk/bitesize/topics/zrssgk7

Explains how materials are chosen and used in products, and introduces the idea of sustainability. Great for 11–14-year-olds with visual summaries and short quizzes.

♻ **How Stuff Is Made (EcoFocus)**

https://www.ecofocusworldwide.com/survey

A student-friendly database where learners can explore the life cycles of everyday products—from jeans to smartphones—and discover how to reduce environmental impact through design.

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