ACTIVITY TITLE: EcoSort – Create Your Own Waste-Sorting App

Activity code: ncMPT02

DURATION	3 hours
AGE RANGE	13-14
TOPICS	ENVIROMENTAL EDUCATION MOBILE APP DEVELOPMENT COMPUTATIONAL THINKING

Description of the project

In this hands-on STEAM activity, students will collaboratively design and develop a mobile application that helps users sort household waste correctly. The purpose of the activity is to raise awareness about environmental sustainability and foster computational thinking by using digital tools to address a real-world challenge.

Through the use of MIT App Inventor, students will integrate environmental science with programming logic to build an educational app that provides guidance on sorting different types of waste (e.g., organic, plastic, glass). Key concepts explored include sustainability, conditional logic (e.g., *if/else* statements), digital design, and user-centered thinking.

The activity also encourages inclusivity and teamwork by prompting students to make design choices that ensure accessibility for diverse users (e.g., use of clear symbols and color contrast). By combining ecological responsibility with technological creativity, students will see how digital solutions can positively impact communities.

By the end of the session, students will:

- Understand key waste categories and their environmental impact.
- Apply basic app-building logic using block-based programming.
- Design a user-friendly and inclusive mobile interface.
- Present and explain their working prototype to peers or a broader audience.

Objectives: What will I learn?

- **Understand the environmental importance of proper waste sorting** by researching different types of waste (organic, plastic, glass, paper, general) and analyzing the consequences of misclassification in real-world contexts, to promote sustainable habits and ecological awareness.
- **Recognize and categorize waste types accurately** by hands-on app planning and design tasks, to apply this knowledge in the creation of sorting logic within their digital tool.
- **Develop basic programming skills** by using MIT App Inventor's visual block-based coding environment, to help them understand logic structures such as *if/else* conditions, loops, and event triggers.
- **Design and prototype a mobile application** by applying principles of user interface design and digital communication, to be able to create a final product that can be used as an educational resource for raising public awareness.
- **Strengthen teamwork, communication, and creative problem-solving skills** by collaborating in small groups throughout the project phases to simulate real-world design processes and promote inclusive participation in tech.

Materials: What do I need?

1. **Provided by the teacher/institution:**

- A simple demo app built in MIT App Inventor to model the expected outcome.
- Projector or screen to demonstrate app-building logic and user interface principles.
- Printed or digital articles on local recycling guidelines (municipal or school program).

2. **Provided by students:**

- Internet-connected computer or tablet per team or student.
- MIT App Inventor account https://appinventor.mit.edu
- Notebook or brainstorming worksheet for planning app logic and screen layout.
- Headphones (optional) for multimedia app testing or video resources.

3. **Downloadable resources:**

- App planning Worksheet
- Student Resource Guide
- Presentation Planning Worksheet
- Waste Data Worksheet

Previous preparation

- **Introduce Purpose and Context**

  Explain the main goal of the activity: to design a mobile app that educates users on how to sort waste properly, combining environmental science with digital creativity and programming logic. Emphasize the real-world relevance of sustainable waste management and digital citizenship.

- **Highlight Role Models and Gender Representation**

  Show a short video or article about Gitanjali Rao or another young female eco-innovator who uses technology to address environmental problems.

  Then, facilitate a short discussion with prompts such as:

  - Why is it important to see diverse people solving environmental problems?
  - How can we design apps that reflect everyone's needs?

- **Activate Prior Knowledge**

  Review the five main waste categories: paper, plastic, glass, organic, and general, and brainstorm local examples of waste mismanagement and its consequences.

- **Technical and Material Setup**

  Ensure all computers or tablets are internet-connected and capable of accessing MIT App Inventor.

  Then, ask students to create free MIT App Inventor accounts ahead of time, if possible. Teacher should explore MIT App Inventor in advance and prepare a demo app to showcase.

- **Organize Group Roles**

  Form inclusive teams of 3–4 students, aiming for diverse representation and balanced participation, and assign rotating roles, such as:

  - Designer (plans the interface layout)
  - Coder (handles logic blocks)
  - Researcher (verifies correct waste information)
  - Presenter (explains app functionality at the end)

  Encourage one team member to act as Inclusion Checker, ensuring accessibility and fairness in design choices.

- **Prepare Printables and Downloads**

  - App planning worksheet
  - Student Resource Guide
  - Presentation Planning Worksheet
  - Waste Data Worksheet

RESEARCH

Have a look at these resources

Why This Matters – Context and Relevance

It's easy to think of waste as "out of sight, out of mind." But how we sort, recycle, and dispose of waste directly impacts the health of our communities, the environment, and future generations. Every item we throw away has a story and a destination. When waste is incorrectly sorted, it can lead to landfills overflowing, water pollution, climate change, and public health risks.

By creating a mobile app that helps users sort waste correctly, you're not just building a tech tool, you're designing for change. You're using coding, environmental science, and digital communication to tackle one of the most urgent sustainability issues today.

Real-World Examples: Why It's Relevant Today

- The Ellen MacArthur Foundation reports that over 90% of raw materials used globally become waste. Sorting at source can reduce this dramatically.
- Apps like *Litterati* and *Too Good To Go* use mobile tech to promote sustainability and engage communities in environmental action.
- Gitanjali Rao, a teen scientist and inventor, developed an app to tackle water pollution, showing how young people can use coding to solve environmental problems.
- Many cities struggle with contamination in recycling bins due to improper sorting, leading to recyclables being sent to landfills.
- Inclusive app design ensures that people of all ages, literacy levels, and backgrounds can participate in sustainable behaviors.

Key Questions to Spark Inquiry and Engagement

- Why do some people fail to sort their waste correctly and how could your app help change that?
- How might an app be more effective than a poster or flyer in teaching people how to recycle?
- What barriers do users face when trying to sort waste (e.g., unclear labels, visual impairments)?
- How can app design be more inclusive, engaging, and easy to use for everyone?
- What would happen if every school or household used your app for just one week?

CREATE

Some things you need before beginning

Before you begin designing your app, take a moment to explore why waste sorting is so powerful and how your creativity and coding skills can make a real difference.

- One third of all food produced globally is wasted, yet millions go hungry every day. Proper sorting helps turn organic waste into compost instead of trash.
- Contaminated recycling (e.g., a greasy pizza box in the paper bin) can ruin entire loads of recyclable material.
- E-waste (electronics like phones and chargers) is the fastest-growing waste stream in the world. Only about 17% is properly recycled.
- Plastic takes up to 1,000 years to decompose. But when sorted correctly, it can be repurposed into clothing, furniture, or even building materials.
- When waste is sorted at the source (your home, school, or community), it saves money, reduces pollution, and protects wildlife.
- Many recycling centers now rely on apps and digital signage to teach users how to sort correctly.
- Apps you build today can lead to skills in environmental science, UX/UI design, programming, and even entrepreneurship.
- Cities like San Francisco and Seoul have achieved over 70% recycling rates through public education, often supported by tech solutions.
- Young changemakers like Gitanjali Rao and teams in Technovation Girls competitions have created apps to solve pollution and sustainability issues.
- Sorting waste correctly is not just a personal habit; it's a civic action that supports collective well-being and environmental justice.

Now, follow these steps

Step 1. Discuss the Problem

- Begin with a whole-class discussion using guiding questions:
  - Why is it important to sort waste?
  - What happens when it's not sorted properly?
  - What are common mistakes people make when recycling?
- Show real examples of local recycling bins, public signage, or sorting guides:
  - Are they easy to understand? How?
  - Do the symbols, colors, or wording support all users equally? How?

- Review the five main categories of waste:
  - Paper, Plastic, Glass, Organic, General/Mixed
- As a class, collect data from the waste generated in your school (e.g., tally of bottles, wrappers, papers found in bins). Use the document Waste Data Worksheet and discuss the results and how incorrect sorting occurred.
- Challenge students with the task: "Can you design a mobile app that teaches users how to sort waste correctly and inclusively?"

Step 2. Plan the App

- Divide students into teams of 3–4 and distribute the App Planning Worksheet.
- Brainstorm:
  - Will the app be a quiz, a drag-and-drop game, or an information tool?
  - What kind of users will it support (children, multilingual, visually impaired)?
  - How many screens will it have (recommend 3–5)?
- Sketch app screens, including:
  - Title screen
  - Waste item display
  - Sorting buttons or interaction zone
  - Feedback screen
- Draw a logic flow using "if... then..." reasoning.
  - Example: *If the user selects "Plastic" and the item is a bottle → show 'Correct!'*
- Discuss inclusive design:
  - Clear icons instead of long text
  - Contrasting colors for visibility
  - Friendly tone and positive reinforcement.

Step 3. Build the App

- Visit: https://appinventor.mit.edu
- Click "Create Apps!" and sign in with a Google account.
- Start a new project: name `EcoSort` it
- Use the *Designer View* to construct the app layout: images, buttons, labels, etc.
- Use the *Blocks View* to build logic: what happens when users press each button.
- Test the app using the built-in emulator or live test in the browser—no phones or AI Companion needed
- Provide to students the Resource Guide to build the App, in which the following will be explained:
  - Visual walkthroughs of the Designer View and Blocks View
  - Instructions tailored for computer/tablet use
  - Sample layout and code logic

- Tasks with checkboxes to track progress

Step 4. Test and Improve

- Exchange apps with other teams for testing and give feedback about:
  - Was the app easy to understand?
  - Did the logic work as expected?
  - Could all users (young, non-native speakers, etc.) use it comfortably?
- Based on feedback, teams revise:
  - Logic or error handling
  - Layout or screen readability
  - Labels, colors, or image choices

Step 5. Prepare the Final Presentation Sketch

- Each team will create a presentation sketch or storyboard that outlines:
  - What their app does
  - How it works
  - Why it matters
  - Who it is for
  - What they learned during the process
  - Which visual or design elements were inspired by another country's recycling system, and why
  - How the app reflects a transition from traditional or past waste practices (e.g., from grandparents or community knowledge) to modern digital solutions

COMMUNICATE

Now that the app is completed and the presentation is planned, it's time to share the final product with the class and wider community.

- Each team will present their app in the format chosen during Step 5
- Presentations should aim to be engaging, clear, and brief (around 3–4 minutes). Every team member is encouraged to speak or contribute.
- While watching other teams' presentations, classmates are encouraged to:
  - Ask questions about app features or decisions
  - Offer constructive feedback
  - Highlight something inspiring or creative from each project
- After the classroom presentations:
  - Create a digital showcase (Padlet, slideshow, school website).
  - Ask students: Who else could benefit from using an app like this?

It is time to share!

Share your amazing work and inspire others!

#EcoSortApp

- 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?

- **Could you tackle other environmental challenges with technology?**
- Can you design an app that helps reduce food waste or teaches water conservation?
- What types of user interactions would help people change daily habits?
- Could you turn your EcoSort app into a multilingual version for your community?
- **Can you add new features or technologies?**
- How could you make your app use voice instructions or sound effects?
- Could you explore image recognition to identify waste types automatically?
- What tools or platforms could help you make your app even more inclusive?
- **Can you involve real people in your design thinking?**
- What would a local recycling worker, garbage collector, or eco-club member say about your app idea?
- Could you create a short interview or podcast asking: "What's the biggest recycling problem you see every day?"
- How could feedback from real users help you improve your app?
- **Can you research environmental innovators from your region?**
- Is there a young environmental activist or inventor in your country? What have they done? How did they start?
- Could you share their story through a comic strip, video, or poster?
- How do they use science and creativity to make change?
- **Can you combine STEAM to raise awareness?**
- Could you create a poster campaign using your app's icons to teach sorting at school?
- Can you write a poem or short story from the perspective of a piece of trash?
- Could you use recycled materials to build a prototype of your app as a physical object?

Which are other connected projects?

1. **Design a Schoolwide Recycling Campaign**

- Create visual signs using your app's iconography to label bins around your school.
- Add QR codes that link to videos or app demos explaining how to sort waste.
- Include inclusive design elements: multiple languages, visual icons, and easy instructions.

- Reflect: How can visual communication make everyday habits easier and more just?

2. Eco-Innovation Comic or Story

- Write and illustrate a short graphic story or comic about a young inventor solving an environmental problem.
- Use real science blended with fiction: what tools or logic does your character use?
- Include a female inspired by real environmental scientists or technologists.
- Add a personal challenge they face (cultural, social, or ecological) and how they overcome it.

3. Local Voices, Global Issues – Podcast or Interview Series

- Record 3–5 minute audio interviews with people in your community:
  - Recycling workers
  - City sanitation officials
  - Teachers or family members who care about sustainability
- Ask: "What do you wish people understood better about waste and sorting?"
- Reflect on how local knowledge can shape inclusive, usable solutions.

4. Design for Good: Waste-Inspired Fashion or Art

- Create wearable art or sculpture from recycled materials.
- Document your process in a short video or zine.
- Connect it to an environmental message (e.g., ocean plastic, overconsumption).
- Include a section on representation: feature women artists or designers from sustainability fields.

LINKS FOR FURTHER INFORMATION

- **The Story of Stuff Project** – Short films and resources on consumption and sustainability- https://www.storyofstuff.org/
- **MIT App Inventor Tutorials (Official)** – Step-by-step beginner guides- https://appinventor.mit.edu/explore/ai2/tutorials
- **App Inventor Gallery (Examples)** – View and remix existing student-created apps- https://gallery.appinventor.mit.edu/
- **Earth Guardians –** Youth activism and climate action - https://www.earthguardians.org/

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