Facilitator Guide

Create building solutions to real-world sustainability challenges using the objects around you! This lesson is made up of three activities that scaffold learners' understanding of sustainability: (1) discussion to (2) building models/prototypes with reusable materials to (3) creating a Scratch project that incorporates the prototype, bringing to life ideas on how to integrate sustainable elements. Learners follow the Creative Learning Spiral and imagine, create, play, share, and reflect throughout the lesson.

The idea comes from the LEGO Group's Build the Change social impact program, "Immerse, Create, and Share." Learn more here: lego.com/sustainability/children/build-the-change.

Audience: Classroom Teachers, Instructional Technology Specialists, Library Media Specialists, Informal Learning Environments

Time: Approx 2 hours total

- Part 1: Sustainability Discussion - 30 minutes
- Part 2: Create Your Build - 30 minutes
- Part 3: Bring Your Build to Life with Scratch! - 60 minutes

Necessary Supplies:

- recyclable materials and craft materials found in your home or office (i.e., boxes, small sticks, paper, scissors, play doh, tape, etc.) and LEGO; consider remixing our Creative Learning Supplies List
- a device with a camera to take pictures
- a computing device that can access the online version of Scratch (or alternately the downloadable version)

Objectives (Learners Will):

- Explore environmental sustainability and identify real-world challenges in their local community
- Create models/prototypes of solutions to address energy efficiency, accessibility, and climate resilience
- Transition from hands-on prototyping to digital design using Scratch, refining their ideas through an iterative, creative process while increasing computational fluency
- Reflect on what they've learned, as well as the process of both building prototypes and creating a Scratch project
- Communicate and share their projects

Resources for Learners *(additional throughout)*:

- Scratch Build the Change Slide Deck
- Build the Change Coding Cards
- Scratch has also teamed up with Take Action Global (TAG) on a student-facing Coding4Climate playbook that introduces our Build the Change activity

Part 1: Sustainability Discussion

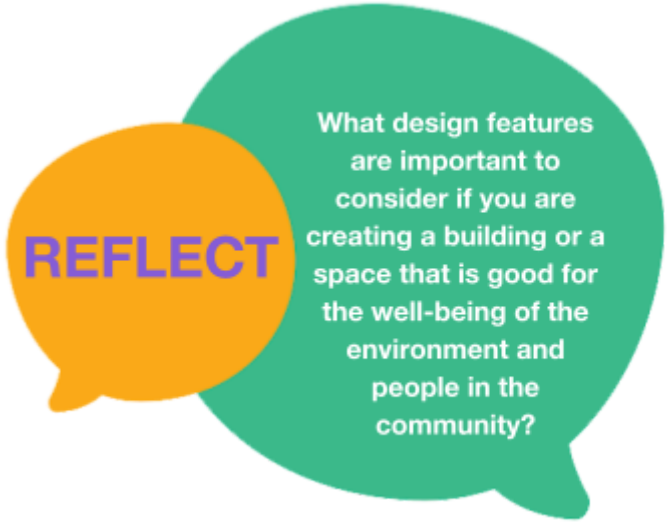
Imagine (30 minutes)

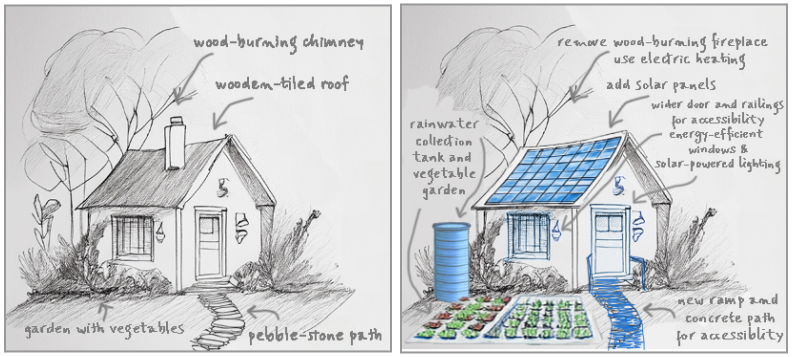
Buildings can tell a lot about a community and the people who created it, such as: what technology was available to help, what skills were needed to build it, and what materials were available and necessary to construct the building. But as time goes on, buildings can fall apart or need significant repair because they cannot withstand the environmental conditions. It is not sustainable.

Imagine a physical place that is important to you and people in your family or community. This can be a real building, your home or the home of someone you know, or even a place in your imagination that makes people feel welcomed and safe when they are inside. **Draw, sketch, doodle, or write** about this important place. Show what makes it important through your images or words. **Label or describe** the materials it is made of.

Now, imagine how you can design a more sustainable place? When something is sustainable, it:

- **uses energy in smart ways** to limit the impact on the environment
- **is nature-friendly** and does not harm what already exists within the environment
- **is designed and built to withstand conditions** of the environment in which it exists
- **is designed and built to be accessible** to individuals of all abilities and backgrounds





Sketch of a house showing labels for a wood-burning chimney, wooden-tiled roof, garden, and pebble-stone path. Then, a revised sketch with a rainwater collection tank, larger vegetable garden, energy-efficient windows and solar-powered lighting, solar panels on the roof, removal of the chimney for electric heat, and ramp, concrete path, wider door, and railings for accessibility.

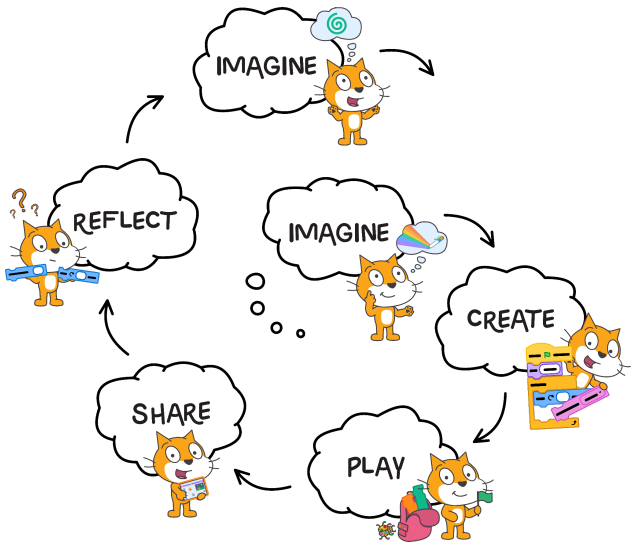
Looking at the space you imagined, identify the problem(s):

- What materials are in use? What are some opportunities you see while thinking about making it more sustainable?
- What common environmental threats and problems does it face? How can you address those when designing and building in your community?
- Think about how you can make this place better for the environment with a more energy-efficient and nature-friendly design. How accessible is it for the community that uses it?

See our slides below to lead a discussion on buildings and sustainability. Then, you'll take learners through the creative learning spiral to imagine solutions and build a model/prototype.

Resources:

- Scratch Build the Change Slide Deck
- Build The Change - LEGO.com



The Creative Learning Spiral, a mindset for learning. For more on the Creative Learning Spiral, see Lifelong Kindergarten by Mitchel Resnick (or see the LCL site to read a free excerpt of chapter 1)

Research (Optional)

Goal 11 of the UN Global Goals for Sustainable Development: Sustainable Cities and Communities explores how we can design more resilient, inclusive, and environmentally friendly spaces. We encourage you to explore the UN Global Goals to connect learning to real-world challenges. By aligning projects with issues that are scientifically, socially, or politically meaningful to your communities, you empower young people to build the change they want to see in the world.



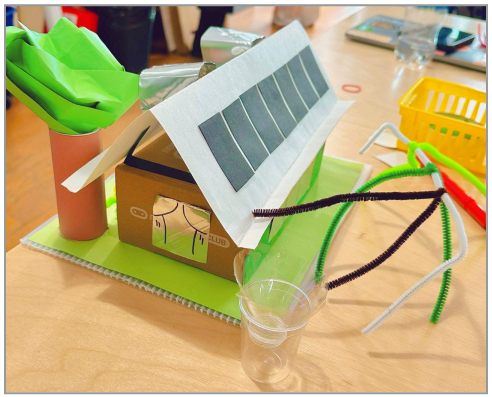
Construction Time (30 minutes)

Use materials you have around you to imagine, design, and build the change you want to see! Construct the building, community space, and surrounding areas you imagined using recyclable and craft materials (i.e., boxes, small sticks, paper, scissors, play doh, tape, etc.) and LEGO.

Take time after the build to reflect on your design choices:

- What real-world problems in your community did you design to address?
- How have you made your building or space more accessible for all?
- How is your building or space more energy efficient?
- What did you include/change to make your space more nature friendly and less harmful to the environment around it? For instance, what materials would you use?
- Share with others about why it is important to design and create things that are more sustainable.

Though learners may have designed individual spaces that address an environmental threat or problem for your community, imagine if you brought your sustainable buildings together to organize your buildings into one community.







Resources:

- Scratch Build the Change Slide Deck
- Creative Learning Supplies List - remix our list if requesting donated supplies, or use as a reference

Getting Started with Scratch

Scratch's mission is to provide young people with digital tools and opportunities to imagine, create, share, and learn.

Scratch pioneered block-based programming, enabling young people to learn to code creatively and interactively. It is a free platform where you can create your own interactive stories, animations, or games by dragging and dropping code blocks.

How does Scratch enhance/transform the learning experience? What affordances does Scratch offer? By bringing your unplugged build into Scratch you can:

- Migrate knowledge between the physical and digital worlds (Share what you've learned and your ideas asynchronously with others using a Scratch project.)
- Utilize an Interactive and expressive canvas to share ideas (Add sound, animation, and digital elements to enhance your project and add additional context and missing elements to your build.)
- Publish to an authentic audience of peers (Spread the word and your ideas to the global Scratch community, far extending your reach outside the classroom.)
- Cultivate digital citizenship in a safe, guided environment (Provide feedback and support on the builds and Scratch projects of others through comments and remixes.)

Resources:

- Getting Started with Scratch Guide

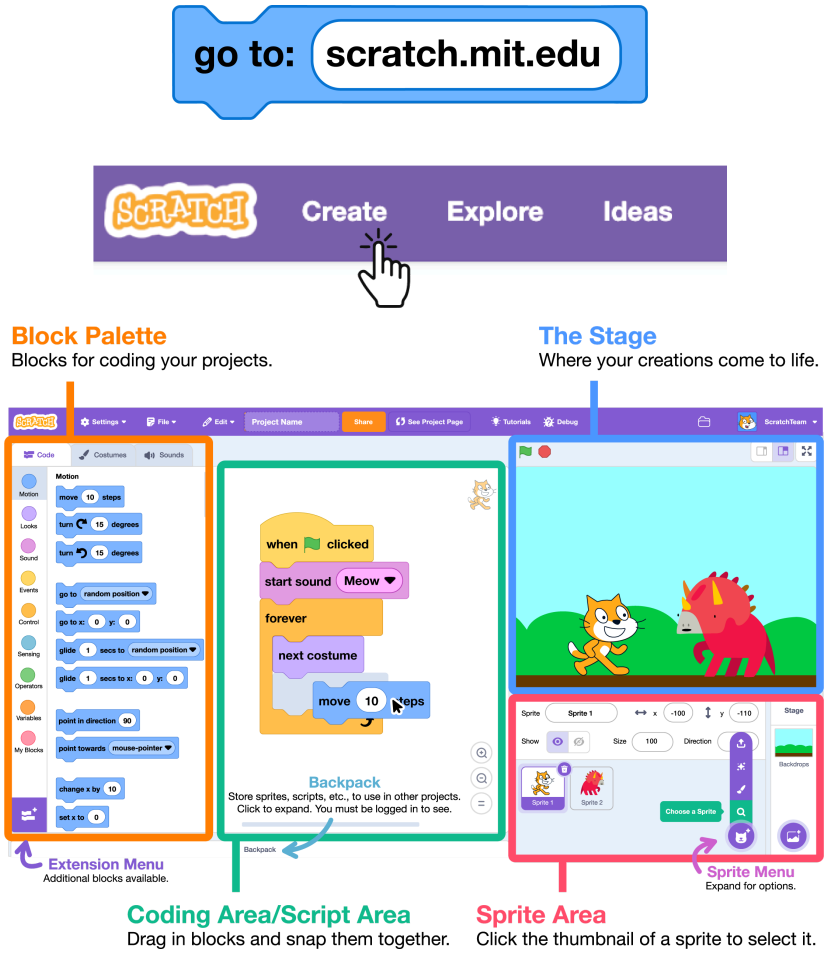


Diagram of the Scratch Project Editor.

Transitioning from Unplugged Activity to Scratch (45 minutes)

Before creating their Scratch project, you might encourage learners to use this script (to the right) to summarize the important factors that they focused on when creating their building design prototype. This information could later be shared in the Scratch project notes or within the project itself.

Then, they can **use the Scratch Design Journal to brainstorm a digital presentation** of their ideas. For example:

- What sprites will you need?
- What sounds can you add to bring the elements to life?
- How will you communicate information (text or speech)?
- Will this be an interactive project, for example users click to learn more? A narrative project, like a slideshow? An animation giving pieces movement and sound?

Students may transition from physical prototype to Scratch in a variety of ways. For example, by:

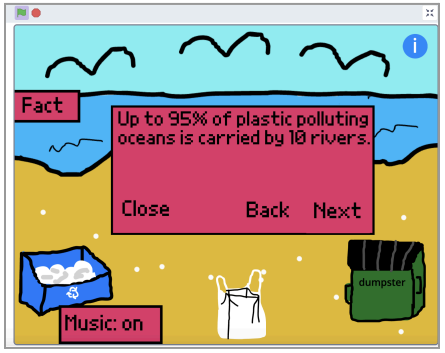
- **Bringing in images of their physical prototype to animate** and communicate their solutions to others
- Creating an i**nformational project** sharing their design process or the problem addressed and their solutions
- **Designing a game** where users collect materials to build clean energy sources, such as solar panels or wind farms
- Making an interactive **quiz** with facts about sustainable and eco-friendly building
- Creating **interactive artwork** that shows the difference between a sustainable community that supports people and the environment and one that does not

_____ *(your sustainable place)* is located in _____ *(area/location)*. My design/redesign is meant to address the problem of _____ *(insert environmental concern you designed your place to address)*.

To address this problem, my design solution includes these features _____ *(share sustainable features, additions, updates, and materials).*



Example project by Scratcher algorithmar.



Plastic Pollution Simulation by Scratcher Action_project.

This may also be an excellent opportunity to **explore Pair Programming**, where one learner creates the code stacks and/or elements in Scratch while another learner(s) contributes ideas and suggestions. If you have a class with mixed experience levels in Scratch or who have focused on different aspects of sustainability, this may be a helpful solution that empowers your learners to be teachers/facilitators, too, and share their knowledge and experience with others.

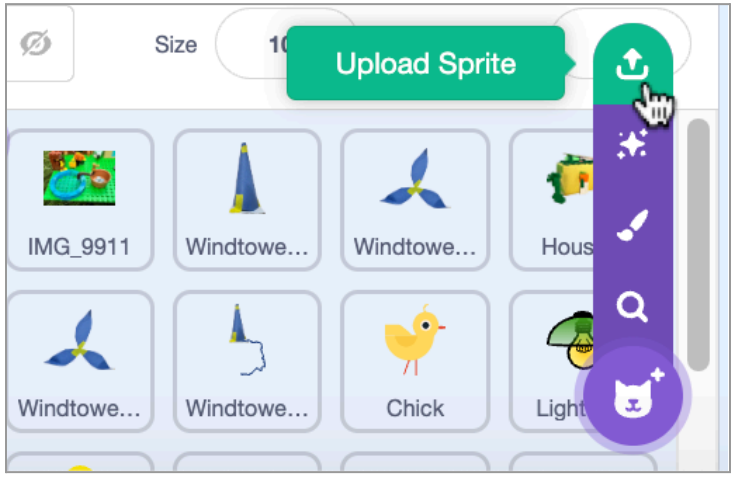
Getting Images Into Scratch

Take a picture of your physical prototype and upload it into Scratch as a sprite. You may want to take pictures of individual pieces to animate separately. Transfer images to your computer via AirDrop, cloud services like Dropbox, emailing to yourself, via cable, etc. To upload a photo as a sprite, **hover over the sprite menu in the lower-right corner of the sprite area and choose "Upload."** Then, select a file. See our Coding Cards for more tips about removing backgrounds, etc.

Alternatively, the facilitator can take all the photos and upload them to a single shared Scratch project. Learners can go to that Scratch project and backpack their image (or remix the whole project) to start creating their project. While waiting for their image to be available, participants can be engaged in creating any additional digital elements like creating a background, choosing sprites that may be speaking, etc.

Resources:

- Scratch Design Journal (Worksheet)
- Build the Change Coding Cards (Student-Facing Cards)



To upload a photo as a sprite, hover over the sprite menu in the lower-right corner of the sprite area and choose "Upload." See our Coding Cards for more tips about removing backgrounds, etc.



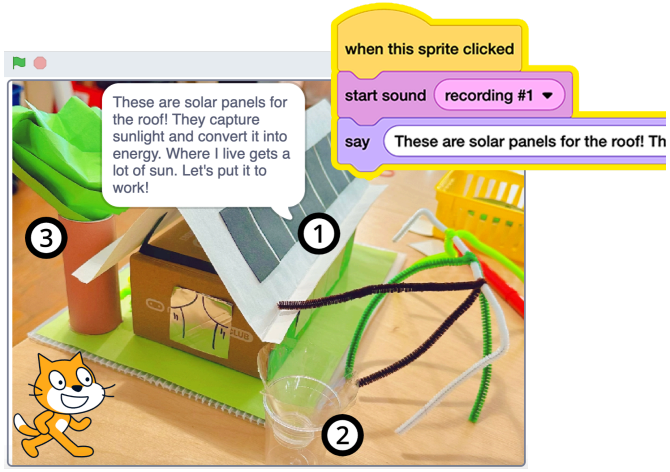
"Build the Change" Scratch coding cards for students.

Multiple Pathways to Incorporate the Prototype

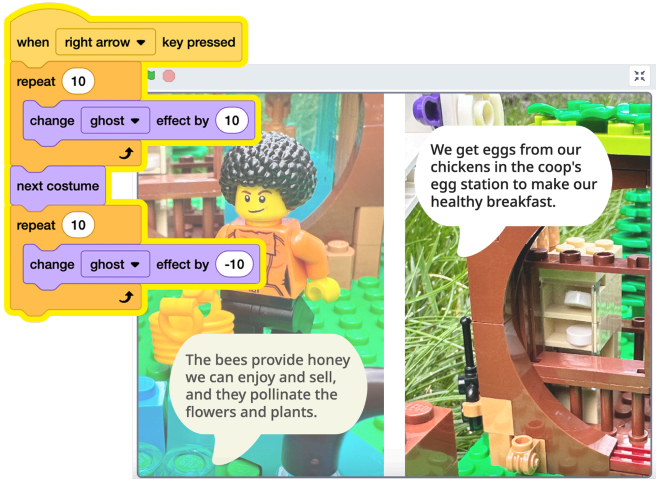
When designing for creative learning, we want to allow for a wide diversity of projects and room for Scratchers of different experience levels to engage with the activity and discover something new. We describe this as “Low Floors, Wide Walls, High Ceilings” (for more information, see “Designing for Wide Walls” by Mitchel Resnick, co-founder of Scratch).

Here are a few examples of the multiple pathways learners might take to incorporate their prototype in the project (and see Resources below for project examples and cards with more):

- **LOW FLOOR**: Upload a photo of your build as a backdrop (no need to remove the background) and add clickable sprites. When users click on each sprite, play a recording or display text on the screen.
- **LOW FLOOR to HIGH CEILING** (depending on code complexity): Create an informational slideshow. Upload a series of photos of your build (photos could include closeups of individual items, different views of the build, etc.). Text could be overlaid via the costume editor, a recording could play as each slide shows, etc. A “low floor” version could simply change costumes when a keyboard key is clicked, while a “high ceiling” version might involve a more complex transition animation.
- **WIDE WALLS**: Animate items on your build using stop motion techniques. Upload a series of photos of your build, moving pieces a bit at a time.



Example of a “low floor” project option with clickable sprites that display information.

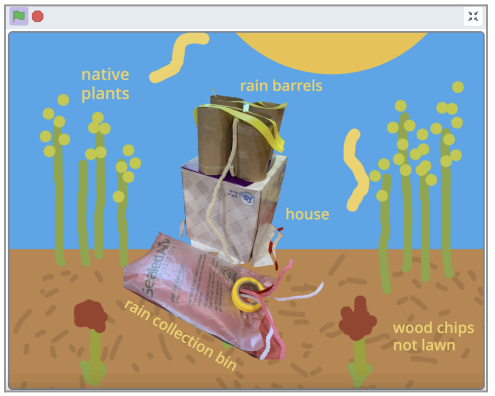


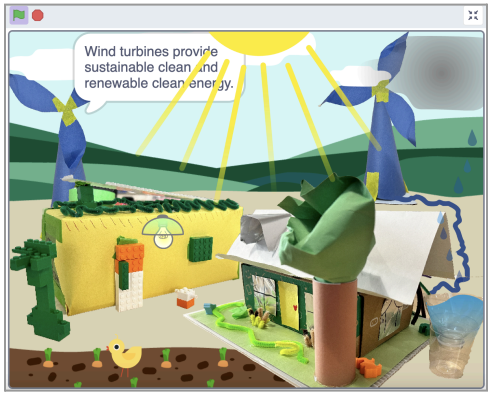
Example of a slideshow project.

- **HIGH CEILING**: Upload a photo or series of photos of your build. Create additional sprites using the Scratch paint editor that, when triggered, animate an element and provide additional context.
- **HIGH CEILING**: Take individual pictures of different elements of your build, remove the background, then animate with code blocks to turn or change color, etc.
- **WIDE WALLS**: Use a Makey Makey to bring your project to life by triggering recordings, animations, etc.
- **ALTERNATE OPTION**: If uploading photos isn't possible, re-create digital versions of elements to animate.

Resources:

- Build the Change Coding Cards (Student-Facing Cards)
- Build the Change Scratch Studio (Example Studio)
- scratchlycaterton's "How to Create a Tutorial Slideshow" (Scratch Project) - remixable slideshow template
- Example Projects:
  - algorithmar's "Build the Change - Clickable Numbers"
  - algorithmar's "Build the Change Example - Animated"
  - pixelmoth's "Build the Change"
  - algorithmar's "Build the Change - Slideshow"
  - algorithmar's "Build the Change - Unplugged Materials Examples"
  - algorithmar's "Stop Motion - Making Faces" - an example of using stop motion to share information
- Sprite Creation Cards (Student-Facing Cards)
- You may also find these student-facing cards helpful for more experienced coders: Conditional Statements Coding Cards and Variables and Lists Coding Cards





Examples of projects that combine photos with digital elements.



Example of an alternative project using vector drawing recreations.

Reflect (15 minutes)

The purpose of learner reflection is to encourage students to think critically about their learning process, helping them to understand their learning, identify strengths and areas for improvement, encourage self-awareness and ownership, deepen understanding, and foster continuous growth. Learners can reflect on their project creation and process as they complete a Sharing Sheet. Next, their peers are encouraged to leave feedback or comments on the sheet for the creator as they view the shared projects.

Resources:

- Build the Change: Sharing Sheet (Worksheet)

Extension Ideas

Sustainability goes beyond individual buildings—it's about how spaces connect to create thriving communities! Consider these extension activities to deepen learning and engagement:

Community Mapping
Bring your sustainable buildings together to **design a connected, eco-friendly community.** Use Scratch to animate how people interact with these spaces.

Collaborative Storytelling
Create an **interactive story** in Scratch that **showcases how your redesigned space positively impacts the community.**

Local Action Plan
Research challenges in your area and **propose a plan to advocate for sustainable changes inspired by your design**.

Global Connections
Compare your ideas with sustainable projects from around the world. What solutions can be adapted to your own community?

Resources:

- Designing for Creative Learning Prototype to Scratch Cards (Student-Facing Cards)
- Create a Story Cards (Student-Facing Cards)

Share Option #1: Create a Class Studio to Gather Shared Projects

Studios are a space on Scratch where users can come together to make, share, and collect projects related to a particular theme, idea, or prompt. Set up a class studio* for your learners and add their Build the Change Scratch projects. Learners are encouraged to take time to look at projects and read/listen/interact with them to learn more.

Resources:

- Teacher Account Guide (Written Guide) - This resource contains information on setting up teacher accounts and student accounts, managing classes, and class studios.
- Scratch Studios Guide (Written Guide) - General information on setting up and managing.

**Note: Learners need a Scratch account and access to the online editor to participate in this option.*

Share Option #2: Gallery Walk

Have each participant's project open on their computer or other device.* Participants can walk around a room, or take turns sharing their screen in a virtual space, to experience each other's creations. Or display one project at a time on a large screen. Learners are encouraged to take time to look at projects and read/listen/interact with them.

Resources:

- How to Replicate an Event Studio in an Offline Scratch Environment (Written Guide)

**This option can work for both users of online Scratch or users of offline/downloadable Scratch.*

LEGO's Build the Change initiative aligns with Scratch Foundation's commitment to equity by empowering young people to creatively address real-world challenges that matter to them. Both emphasize that innovation thrives when shaped by diverse perspectives, cultural knowledge, and lived experiences. The co-designed Scratch and Build the Change lesson further encourages localization, prompting participants to tackle issues relevant to their communities using Scratch, LEGO bricks, or locally available materials.