# Facilitation Guide: Reinventing the Ordinary, an Upcycling Challenge

## Challenge

Students will develop their creativity and innovation skills by reimagining everyday items and transforming them into new, useful, and innovative products. They will take an item or material destined for the landfill and give it a new life using Glowforge to customize their design.

## Rationale

The Upcycling Challenge is a valuable learning opportunity for students that can help them develop a range of essential skills. Students will learn about sustainability, creativity, innovation, design, collaboration, communication, and project management by participating in this challenge. These skills are all essential for success in various academic, personal, and professional contexts.

This challenge is a fun and engaging way to promote sustainability and ecological awareness in the classroom. By encouraging students to upcycle and repurpose materials, they are empowered to actively reduce waste, encourage a circular economy, and foster innovation through environmental consciousness. Throughout this challenge, students will gain hands-on experience in sustainable practices and develop a sense of responsibility towards our planet. It is a fun and engaging way for educators to help their students develop valuable skills and to promote sustainability and ecological awareness in the classroom.

Glowforge is an innovative tool that allows students to create custom parts for their upcycled products, repair broken components, and experiment with various new design techniques. Additionally, the Glowforge App provides an intuitive interface that is easy for students to use, helping them to develop valuable design skills that can be applied in a range of contexts. Integrating Glowforge into the Upcycling Challenge can help students to take their designs to the next level and to create truly innovative and sustainable upcycled products.

# Standards

## Common Career Technical Core Standards

- AR-VIS 2. Analyze how the application of visual arts elements and principles of design communicate and express ideas.
- AR-VIS 3. Analyze and create two-and three-dimensional visual art forms using various media.

## ISTE Standards for Students

- 1.4a: Students know and use a deliberate design process for generating ideas, testing theories, creating innovative artifacts, or solving authentic problems.
- 1.4c: Students develop, test and refine prototypes as part of a cyclical design process.

# Facilitation Steps

**DESIGN STAGES**

Explore → Ideate → Design → Prototype → Evaluate

Iterate
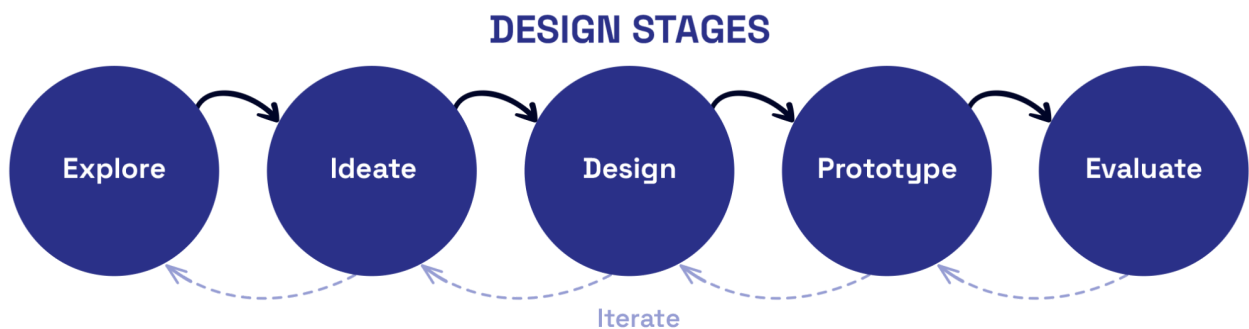
## Explore

In this stage, students focus on researching and investigating what upcycling is and understanding the importance of sustainability and environmental responsibility. To ensure that students have the knowledge and skills they need to complete this stage, use the following steps.

1. Provide students with question prompts from the Explore stage of the challenge to inspire their research and help them consider the importance of sustainability and environmental responsibility by repurposing materials that would otherwise be discarded.
2. Provide students with resources and a brief introduction to upcycling.
   - Encourage students to engage with articles, websites, and videos to learn more about upcycling.
   - Pinterest and Etsy are great resources for inspiration. Consider putting together your own board of upcycled products or item ideas or a Wakelet of links to help your students get started.

- The Glowforge design catalog might also inspire possibilities! Encourage students to look through Tools & Organization or Art & Decoration for inspirational designs.
3. Ask students to share their findings and discuss what they learned during the Explore stage.
    - Encourage students to share both in small and large groups. If students are working in groups to complete this design challenge, have different groups partner together to discuss what they discovered.

At the end of this stage, students will reflect on the research they did to learn more about upcycling. Encourage them to consider the functional, aesthetic, and environmental aspects of the materials or items they are considering upcycling.

Before moving on, students should consider if there are any other resources or techniques that would be helpful to explore. They should also consider the availability of materials. Once they are finished, students continue to the Ideate stage where they will brainstorm available materials and create a new product using upcycled items.

## Ideate

In this stage, students will take what they learned in the Explore stage and brainstorm and experiment with different ideas for their upcycled product. This stage allows students to explore as many ideas as possible without judgment. Remind students to incorporate digital tools in the making of their upcycled design. To ensure that students have the knowledge and skills they need to complete this stage, use the following steps.
1. Provide students with question prompts from the Ideate stage of the challenge to help them brainstorm.
    - Consider using brainstorming techniques such as SCAMPER to help students come up with new ideas.
2. Ask students to choose their top three designs and sketch them out in more detail.
    - Encourage students to consider how they can incorporate digital tools into their designs to enhance the functionality or aesthetics of the upcycled product.
3. Inspire students to experiment and modify materials or items for their own purposes. Prompt students to think about:
    - What materials could replace fabric or embellishments?
    - What materials or items could be used for structure or support?
    - What items could be broken down and used in new ways?

At the end of this stage, students will have generated multiple ideas for their upcycled product and be able to narrow their focus in order to develop a product that brings their vision to life.

Before moving on, students should consider which parts, components, or embellishments they will need to design using Glowforge. Examples of these items might be buttons, engraved plates, hinges, legs, handles, or other parts. Once they are finished, students will continue to the Design stage, where they will select one or two ideas that they will develop further.

## Design

In this stage, students will develop their ideas from the Ideate stage to draft a detailed plan for their upcycled product. Students should focus on one or two ideas better to understand their needs and final design before printing. Encourage students to consider how they can use Glowforge to create items for their products from new and recycled materials. To ensure that students have the knowledge and skills they need to complete this stage, use the following steps.

1. Provide students with question prompts from the Design stage of the challenge to help them design.
2. Inspire students to experiment with Glowforge to create parts or embellishments they might need for function or visual appeal. Ask students to:
   - Consider various materials they could use with Glowforge to create interesting textures or surface treatments for their upcycled product.
   - Explore the [Glowforge design catalog](#) to modify or enhance designs that might be useful to their new upcycled product.
3. Introduce, review, or model available design software options, including the [Glowforge App](#).
   - Assist students as they create sketches or digital mockups of their designs.
   - Review page 28 in the [Glowforge Educator Guide](#) for more software tools and information.
   - Remind students that Glowforge can engrave from JPG or PNG image files and cut or engrave from SVG and PDF files. This means students can create something in popular software they already use, convert it to one of the supported files, and print it.

At the end of this stage, students will have a detailed plan for their upcycled product and any designs for parts, components, or embellishments they will be using the Glowforge to create. They should be able to explain how these materials work together to create a functional and innovative new product.

Before moving on, students should have detailed designs created for their product, including a list of materials, tools, and techniques that they will use to create a prototype. Once they are finished, students continue to the Prototype stage, where they will select and test one of their fully developed design plans.

## Prototype

In this stage, students will use their design plan to create and assemble their upcycled product and the parts they will need to physically print. Students will select one of their fully developed design plans, print necessary elements using Glowforge, and assemble and test their design. To ensure that students have the knowledge and skills they need to complete this stage, use the following steps.

1. Model how to use your Glowforge in a safe and efficient manner.

- Review the [Glowforge safety guidelines](#).
- Use this [video](#) to show students a demonstration of how to use Glowforge.
- Remind students of any applicable classroom or school policies.
2. Prompt students with questions to help them develop their prototypes. These might include:
   - What are the pros and cons of using different materials and techniques? What materials will you use to achieve your desired aesthetic?
   - Are there other abundant materials that might work better or offer opportunities for more sustainability and customization?
   - Encourage students not to be afraid to make changes and adjustments as they go and use each prototype iteration as an opportunity to learn and improve their design.
3. Give students the time and resources needed to produce their costume element on Glowforge and test the creation of their print.
   - Provide students with access to Glowforge using a classroom print schedule to ensure that all students are able to produce the elements they need efficiently.

At the end of this stage, students will have a finished prototype of their upcycled product.

Before moving on, students should review their finished design to ensure it aligns with their vision and is both functional and innovative. Students may need to test multiple times or return to earlier stages of the design process before moving on. Once they are finished, students continue to the Evaluate stage, where they will receive feedback on their upcycled product prototype.

## Evaluate

In this stage, students will evaluate their upcycled product design and receive feedback from others. Feedback can be provided in pairs, small groups, or as a whole class. Encourage students to reflect on their process and consider their alignment with their original intent. To ensure that students have the knowledge and skills they need to complete this stage, use the following steps.
1. Invite students to compare the original design ideas with the final product. Ask students:
   - How does their final product compare to the original goals and objectives of their design?
   - How did using digital tools and Glowforge enhance their final print?
2. Encourage students to share and discuss their ideas to generate feedback and suggestions from their peers to refine and enhance their print.
   - Students can use the question prompts from the Evaluate stage to guide their discussions.
   - Use a peer feedback model, such as a gallery walk, affinity mapping, or a concentric circle discussion, to support students as they work in pairs, small groups, or as a whole class.

3. Provide students with question prompts to help them reflect on the feedback that they received. These might include:
    - How can you further improve and refine your design?
    - If making additional changes to your upcycled product, which of the design process stages will you return to?
4. If applicable, provide students with time to complete a learning reflection, self-assessment, and/or peer critique.
    - Use the provided Assessment Suggestions for more ideas.

At the end of this stage, students will be able to reflect on the strengths and areas of improvement for their finished upcycled product. Students should determine whether revisions are needed and return to the appropriate stage in the design process to adjust their design. Consider assessing student work using one of the Assessment Suggestions or extending the challenge using provided Extension Activities.

## Supplemental Supports

- If you are looking for a shorter activity or an introduction to this challenge, check out our R3Design Studio activity which asks students to consider their carbon footprint in a community-minded way.
- The Circular Design Guide from the Ellen MacArthur Foundation and IDEO has lots of great resources to help students consider Circular Innovation and dive deeper into making sustainable items or redesigning current items to be more sustainable.
- The Ellen MacArthur Foundation also has Teaching Resources to help you explain both sustainability and Circular Economy to students.

## Assessment Suggestions

### Overall Learning Reflection

Learning reflections allow students to reflect on their learning experiences, identify key concepts, and explain how they have grown throughout the upcycled product design process. Ask students to write or record a video about what they learned about sustainability and environmental responsibility through this challenge and how their understanding of these issues changed, and how they might apply what they've learned to their own life or community. Students can incorporate feedback elements from the Evaluate stage to describe their strengths and areas for improvement.

### Self-Assessment

Self-assessments allow students to reflect on their learning through portfolios, presentations, or learning journals that involve evaluating their own progress and identifying areas for improvement. Consider providing specific criteria prior to beginning the challenge and used by

the student to assess their progress over the course of the challenge. The criteria may include elements related to:

- Form and function: Did my design meet the intended functional and innovative requirements? Does my upcycled product meet the needs and preferences of my intended user?
- Sustainability: Did my upcycled design address issues of sustainability and environmental responsibility? How do my choices about the materials, the manufacturing process, and my design impact the environment now and over time? Are there ways that I could improve my design to make it more sustainable or minimize its environmental impact?
- Use of technology: What were some of the biggest challenges that I faced during this project, and how did I overcome them? What did I learn about myself and my abilities through this process?
- Use of the design process: What did I learn about the design thinking process, and how did I apply it during this challenge? What were some of the most important skills that I developed, and how might I use them in future projects?

## Educator or Peer Assessment

Educator or peer assessments allow educators or students to review the quality and effectiveness of the finished costume element. The assessment can be based on specific criteria, such as visual design or messaging, innovation, and creativity, or use a more open approach, like a gallery walk or artist showcase. Explore suggestions for criteria below:

- Design: Is the upcycled product functional and innovative? Does it help address the sustainability issue by using materials or items in a way that prolongs their use?
- Technical skill: Does the student demonstrate a strong technical skill set in the execution of their design, including the use of digital tools?
- Attention to detail: Has the student paid close attention to the details of their upcycled product design, including the finish and overall quality of the final product?
- Innovation: Has the student demonstrated a high degree of creativity and innovation in the design of upcycled products?

# Extension Activities

Design Challenges often inspire students to think about what's next. For some, this could mean wanting to connect with people within an industry or applying their skills in new ways. Here are a few ideas of how you can be a catalyst.

- Host a community exhibition of student upcycled products. This could involve inviting community members to visit the school or even taking the exhibition to other venues around the community. Have students practice public speaking skills by presenting their designs and explaining their processes to reduce waste. Additionally, they could sell their creations and use the funds to create more sustainable practices in the community or give to a nonprofit working toward sustainability.

- Explore the principles of entrepreneurship and marketing by creating a business plan and promotional materials for their upcycled product. This could involve developing a brand identity, creating a website or social media campaign, and even pitching their ideas to potential investors or customers.
- Research the larger policy and advocacy issues surrounding sustainability and environmental responsibility and develop advocacy campaigns to raise awareness and promote change in their community or at the state or national level. This could involve researching and developing policy proposals, creating public service announcements, and even lobbying elected officials or participating in public demonstrations.

If your students enjoyed this challenge, they might also enjoy Waste to Wealth, a business management design challenge that encourages students to adapt and adjust a product's design to maximize its profitability by minimizing waste.

Ready to take students to the next level? Try the Capstone Challenge Celebrating Arts and Community, where students plan and promote a Community Art Celebration that includes an art installation to showcase student work and engage with the community.