

## Facilitation Guide: Level-up for Lefties

### Challenge

After researching the needs and barriers facing left-handed people, students will redesign an existing product to better support lefties. They will need to develop a product that is comfortable, functional, and easy to use.

### Rationale

In this challenge, students will learn about the ergonomic needs of left-handed users and apply principles of design thinking and engineering to redesign a product. Students will need to think creatively to problem-solve. By emphasizing empathy and user-centered design, students will gain a deeper understanding about design choices that improve lives.

Manufacturers and product designers weigh many factors as they refine their products, including , ergonomic comfort, durability, functionality, and ease of use. Following [ergonomic design](#) principles, students will redesign a product to better serve left-handed users.

Glowforge is an ideal tool for experimenting with physical prototypes. It can cut, engrave, and score thousands of materials, giving students a wide range of options as they research. The powerful, easy-to-use software lets them quickly refine designs and try out new ideas. It's flexible and adaptable, limited only by what students can imagine.

### Standards

#### Common Career Technical Core Standards

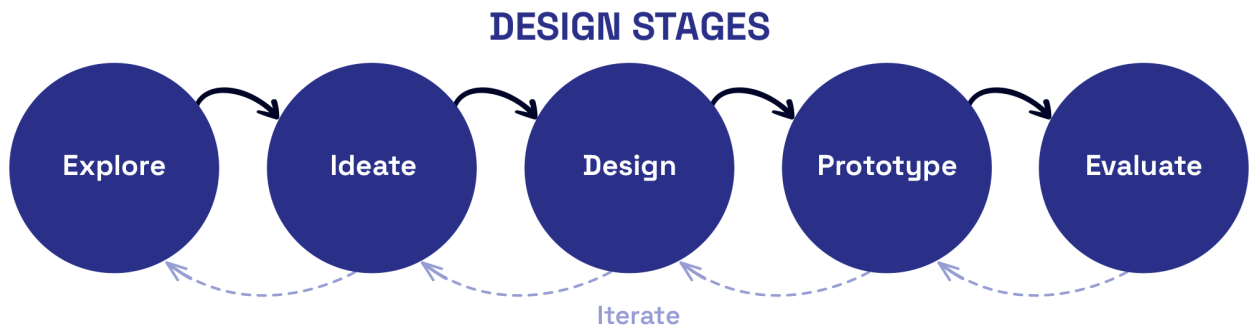
- MN-PDD 1 Produce quality products that meet manufacturing standards and exceed customer satisfaction.
- MN-PDD 5 Develop procedures to create products that meet customer needs.

#### ISTE Standards for Students

- Innovative Designer 1.4.c Students develop, test and refine prototypes as part of a cyclical design process.
- Innovative Designer 1.4.d Students exhibit a tolerance for ambiguity, perseverance and the capacity to work with open-ended problems.

- Creative Communicator 1.6.b Students create original works or responsibly repurpose or remix digital resources into new creations.

## Facilitation Steps to Support the Design Process



[Image: Design\_stages\_graphic.png]

### Explore

In the Explore stage, students research and investigate common products that challenge left-handed people. They will also research empathetic design and the principles of ergonomics.

To prepare students for this stage, follow these steps:

1. Provide students with question prompts to help inspire their research.
2. Provide resources and a brief introduction to the needs of left-handed people and designing for empathy.
  - Teach students the principles of [empathetic design](#) and [ergonomic design](#), focusing on how these principles apply to products for left-handed people.
  - Encourage students to try using common products with their non-dominant hand. Emphasize factors such as ease of use, comfort, and unintended consequences.
  - Invite a left-handed guest speaker or a product designer who specializes in ergonomics or empathetic design. They can share their experiences and expertise with the class. Students could also create surveys for left-handed people to share their experiences about using products designed for right-handed people.
  - Have students [watch this video](#) or [read this article](#) to better understand the life of left-handed people and check out some existing products for lefties.
3. Ask students to share their findings and discuss what they learned.
  - Encourage students to share both in small and large groups. If students are working in groups, have different groups partner to discuss what they discovered.
  - Facilitate a class discussion about how left-handed people use different products.

At the end of this stage, students will reflect on their research. Encourage them to consider how current products may be redesigned to better meet left-handed people's needs.

Before moving on, students should consider if there are any other resources that would be helpful to explore. Then students will proceed to the Ideate stage, where they will brainstorm different techniques and ideas for their left-handed product redesign.

## Ideate

In this stage, students brainstorm and experiment around their left-handed product redesign. This stage allows students to explore as many ideas as possible without judgment. Remind students to use empathetic design thinking to come up with ideas. To prepare students for this stage, follow these steps:

1. Provide students with question prompts.
2. Encourage them to brainstorm ideas using one or more methods.
  - Let them brainstorm individually or in small groups to hear multiple perspectives.
  - Provide [different ideation strategies](#) to help them begin.
3. Inspire students to experiment with common tools that could be redesigned for left-handed people.
  - Support students creating a mind map or concept map to visualize and organize their ideas by technique, theme, or other category.
  - Provide [a list of everyday tasks that lefties struggle with](#) to help students get started.

At the end of this stage, students will have multiple ideas and can focus on one or two designs to develop.

Before moving on, students should consider which ideas are most feasible to produce. Once finished, students will continue to the Design stage, where they will select one or two ideas to develop further.

## Design

In this stage, students will develop their ideas from the Ideate stage. Students should focus on one or two ideas. Encourage students to consider the functionality, ergonomic comfort, and efficiency of the redesigned product. To prepare students for this stage, follow these steps:

1. Use question prompts from the Design stage of the challenge to help students design.
2. Introduce, review, or model available design software options, including [the Glowforge App](#).
  - Assist students to create sketches or digital mockups. CAD software like [SketchUp](#) or [AutoCAD](#) can help students create detailed 2D and 3D designs.
  - 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 that they already use, convert it to one of the supported file types, and print using Glowforge.
  - Review page 28 in the [Glowforge Educator Guide](#) for more software tools and information.
3. Assist students as they begin redesigning a common product.

- Help students identify what they need to create a functional prototype.

At the end of this stage, students will have a detailed plan for their product redesign, including sketches or digital mockups.

Before moving on, students should consider revising their redesign. Once finished, they'll continue to the Prototype stage, to select and test one of their fully developed design plans.

## Prototype

In this stage, students create a physical product. Students will select a plan, print necessary elements on the Glowforge, and test their product. To prepare students for this stage, follow these steps:

1. Model how to use Glowforge in a safe and efficient manner.
  - Review the [Glowforge safety guidelines](#).
  - Remind students of any applicable classroom or school policies.
  - Use this [video](#) to show students how to use Glowforge.
2. Provide students with question prompts from the Prototype stage of the challenge to help them develop their prototype.
3. Once their prototype is ready, encourage students to test its functionality and usability.
  - Let students print their prototypes using Glowforge.
  - Provide any additional supplies or materials they may need.

At the end of this stage, students will have a finished product that eliminates barriers for left-handed people.

Before moving on, students should review their finished product for functionality, comfort, and durability. Students may need to test their product multiple times or return to earlier stages of the design process before moving on. Once finished, students will proceed to the Evaluate stage, where they will receive feedback.

## Evaluate

In this stage, students will evaluate their product redesign and receive feedback. Feedback can be provided in pairs, small groups, or as a whole class. Encourage students to reflect on their process and consider their alignment to the needs of left-handed people. To prepare students for this stage, follow these steps:

1. Provide students with question prompts from the Evaluate stage of the challenge to help them evaluate their product redesign.
2. Encourage students to share and discuss their product redesign to generate feedback.
  - Students can use the question prompts from the Evaluate stage to guide their discussions.
  - Use a peer-feedback model, such as a gallery walk, exhibition hall reviews, or business pitch panel, to support students as they work together.

- Consider conducting a focus group consisting of left-handed staff, students, and trusted community members.
3. Facilitate a class discussion on the effectiveness of using empathetic design to redesign commonly used products.
    - Encourage students to share their reflections and lessons learned from the challenge. Ask students how they used empathetic design to meet the needs of left-handed people.
    - Inspire students to think about their redesigns from different perspectives, including ergonomics, functionality, ease of use, durability, and effectiveness.

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

## Supplemental Supports

- For newer Glowforge users, demonstrate how to use Glowforge and its design features, including the design software, engraving capabilities, and cutting functionality. Check out the [Glowforge Educator Guide](#) for more ideas.
- Need more ideas? There are a number of online stores that sell products exclusively for left-handed people. Check out [Lefty's](#) to review products that already exist.
- For students with limited experience with joinery or movable elements, show [The Miracle Hinge](#) or [Noticing Patterns](#) lessons to help develop an understanding of hinges and gears. The [Simple Marble Run Discussion](#) may also give students a better idea of how to connect parts to create functional products.

## Assessment Suggestions

### Overall Learning Reflection

Learning reflections allow students to reflect on their learning experiences, identify key concepts, and explain how they have grown. Ask students to write or record a video about what they learned and how their learning will impact them in the future. 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. Consider providing criteria at the beginning of the challenge that can be used by the student to reflect on their progress. The criteria may include:

- Empathetic Design: How well did I consider the needs and preferences of left-handed people in my redesign?
- Functionality: How well did my redesigned product function?
- Ease of Use: How easy is my redesigned product to use with my left hand?

## Educator or Peer Assessment

Educator or peer assessments allow educators or students to review the finished product. The assessment can be based on specific criteria, such as ergonomics, functionality, and durability, or use a more open approach, like a product showcase. Some criteria to consider may include:

- Ergonomics: Did the redesigned product follow ergonomic principles?
- Functionality: Did the redesigned product function as intended?
- Durability: Was the redesigned product developed to be durable?

## Extension Activities

Design challenges often inspire students to think about what's next. For some, this could mean connecting with industry experts or applying their skills in new ways. Here are a few ideas for how you can help students extend this challenge:

- Encourage students to redesign or create new products that meet the needs of others who are differently abled. Check out how [designer Joe Ikareth, founder of Movability Clothing, used empathetic design](#) to create inclusive clothing solutions.
- Host a manufacturing trade show event or [Pop-Up Shop Showcase](#) where students can showcase their redesigned products for industry experts. Students can network with manufacturers and related businesses to determine how to enhance their products and consider next steps.

If your students enjoyed this challenge, they might also enjoy [Accessible Innovation](#), also about making objects more accessible and inclusive.

Ready to take students to the next level? Try the Capstone Challenge: [Sustainable Strategies for Circular Design](#), where students redesign a disposable product to incorporate circular design principles.