

girls who
code

Girls Who Code At Home

Accessible Design

Activity Overview



About 15% of the world's population has a disability, including but not limited to physical, cognitive, visual, hearing, or neurological disabilities. Over the next two activities we will learn the importance of accessibility when designing technology, and how we can incorporate simple, but impactful changes to expand the reach of a product. In **part 1** we will focus on where we might have encountered assistive technology in the physical world. (Spoiler alert: you might find that all technology is assistive.) Additionally, you will have the opportunity to modify an everyday object, a pencil! In **part 2**, we will explore accessibility in digital spaces, and learn how to make websites more accessible for people who use assistive technology like a screen reader, motion detector, voice to text software, etc.

Learning Goals

By the end of this activity you will be able to...

- ❑ describe different types of accessibility needs and design considerations.
- ❑ use the design process to redesign an everyday object to make it more accessible.

Materials

- Paper
- Pencils, Pens, or Markers
- Timer (phone, clock, microwave, etc)
- Optional: [Digital Copy of Prototype Feedback Form](#)

Prior Knowledge

- No prior knowledge needed!

Women in Tech Spotlight: Haiyan Zhang



Image Source: [Twitter](#)

Imagine what you could do if you could invent anything in the world. Where would you start? Who would you talk to? Haiyan Zhang asks herself similar questions each day. As a result, she's created innovative technology! Haiyan currently serves as the Innovation Director at [Microsoft Research](#). She also co-founded OpenIDEO and appeared on BBC's invention series Big Life Fix.

After researching Parkinson's disease, Haiyan invented a tremor-reducing watch called '[Project Emma](#)' to help people with Parkinson's write and draw. She drew inspiration from her conversations with people with Parkinson's and her previous experiences with creating biomedical applications.

Watch the [video about Haiyan's projects at Microsoft](#). In the clip, you'll watch Haiyan show off some of her creations that solve a particular issue, including a voice recording machine, a radiation sensor, and a video game for kids with cystic fibrosis. Haiyan also shares her tips on becoming a successful inventor!

Reflect

Being a computer scientist is more than just being great at coding. Take some time to reflect on how Haiyan and her work relates to the strengths that great computer scientists focus on building - bravery, resilience, creativity, and purpose.



CREATIVITY

Do you have any family members, friends, or neighbors with a special physical need? What might you build with technology to help improve their day-to-day life?

Share your responses with a family member or friend. Encourage others to read more about Haiyan to join in the discussion!

Step 1: Considering Accessibility (5 mins)

Warm Up (2 mins)

Before we begin learning about accessibility and how it affects your everyday life, take **2 minutes** to reflect on our question of the day and write out your response in the space below.

How do people use technology to adapt to different environments/spaces?

This open-ended question does not have a right or wrong answer. In fact we encourage you to share this question with friends and family and see how their responses differ from yours! At the end of this activity we will revisit the question to see how your answer might have changed.

What is accessibility? (2-3 mins)



The term **accessibility** can be broken down as the *ability* for everyone to *access*. When thinking about accessibility, many people often only think about modifying technology to benefit people with disabilities. This is a large misconception because accessibility benefits all of its users regardless of ability. In this activity, we will explore and compare different accessible designs and breakdown the key components of accessibility that creates a better experience for everyone.

Over the course of history, people have designed environments - physical or digital - based on what they believe is a “normal”, average person. This idea of “normal” comes out of research from 19th century scientists, most of whom were able-bodied men who used themselves as a baseline to define “normal”. If you think this sounds like a problem, you would be right! Accessibility is often not considered or minimally implemented in a design. Companies often provide excuses such as it is “too hard” or “too expensive”. These misconceptions arise because the importance of accessibility is not widely discussed.

In this activity we will use the terms “people with disabilities”. It's important to keep in mind that this includes a spectrum of different physical and/or cognitive abilities, some that might be permanent and some that might temporary. It is important to remember that each individual has their own preferences on how they would like to be referred to, so be sure to ask! In general when using language around others we focus on ability and not limitations. Remember that a disability does not define a person. Check out the [ADA's website](#) for guidelines for writing about people with disabilities.

Step 2: Observe Accessible Designs (5-10 mins)



There are many pieces of technology (physical and digital) that were originally designed to accommodate individuals with disabilities. Many of these accessible designs have been transformed to everyday products that everyone uses. Let's take a look at two examples.

Pull-Down Door Handle



Image Source: [Henry & Co.](#) on [Unsplash](#)

To open this door, a person would only need to use a little force to push down the handle, then push or pull the door. Compare this to a door knob that a person has to rotate. This is much easier to use!

Automatic Door Opener

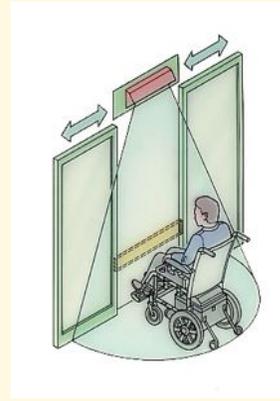


Image Source: [Nicolas Steenhout](#)

The automatic door opener was first introduced to make it easier for people who use a wheelchair or other assistive movement technology to enter and exit a place. However this automatic door opener has helped parents pushing a baby stroller, people with their hands full of groceries, etc.

Take a moment to reflect on the following statement:

When designers, engineers, programmers, etc. plan for accessibility at the start of a project, it benefits everyone.

Do you think this statement is true or false? Why? Think about the two examples of assistive technology and think about how these pieces of technology have changed your own personal life and how you interact with the environment around you.

Step 2: Observe Accessible Designs (cont.)



Take a look around your home, take a walk around your neighborhood, or simply think about the familiar spaces around you (i.e your school, park, or favorite store).

Set a timer for 2 minutes to jot down some examples of accessible design in these spaces.

→ *Example: Ramps, speech recognition technology , etc.*

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In each of the examples you wrote down, who do you see using these items? Is it a specific group of individuals? You may have noticed that items of accessible design are **inclusive** of all individuals regardless of ability.

Curious about other assistive technology? Check out Nicholas Steinhout's article on the [Evolution of Assistive Technology into Everyday Products](#).

Step 3: Learn about different types of disabilities (5 mins)



There are many different types of disabilities that can be grouped into five different categories: visual, auditory, motor, cognitive, and vestibular. It is important to note many generalizations have been made for different types of disabilities, but individuals may have different experiences that are unique.

| Type of Disability | Description |
|--------------------|--|
| Visual | Visual disabilities may include blindness, low-vision, and even color-blindness. Those who require glasses, or some sort of corrective lens also fall under this category. |
| Auditory | Auditory disabilities affect a person's ability to hear. They may use hearing aids or use a form of sign language to communicate. |
| Motor | Motor disabilities affect muscle control (i.e movement in the limbs). These are many various types of injuries or conditions that may affect motor control including injury to the limbs, spine, or brain. |
| Cognitive | Cognitive disabilities may have challenges with memory, attention, or learning differences. |
| Vestibular | People who have vestibular disabilities are sensitive to fast movement and/or lighting (i.e flickering, flashing, or strobing lights). |

We encourage you to learn more about the different types of disabilities and their unique strengths and challenges. Check out these resources:

- [Australian National University](#)
- [WebAIM: Web accessibility in mind](#)
- [Aruma](#)

Step 4: Take the Pencil Challenge (25-30 mins)



Let's take our accessible design knowledge to the next level and start re-designing an everyday object: the pencil. Did you know that the very first pencil was invented around the 1960s and was designed with a long rectangular graphite rod and wood that was stacked on top of each other. Since then, the pencil has changed significantly to its appearance now with

wood wrapped around graphite and the hexagonal shape to prevent pencils from rolling off the table! However, despite all of the modifications the pencil has had throughout the years, its design makes it still difficult to use for many people. Its slim profile requires fine-motor skills to hold and write with. Let's take a moment to focus on potential pain points or issues that someone might have when using a pencil.



Image Source: [Brain Pickings](#)

Know your audience (5-8 mins)

When designing or redesigning an object, you want to keep in mind who you are designing for and the reason you are designing it. Take a moment to think about the different types of disabilities you learned about in the last step. Choose one to focus on, then answer the questions below

Tip: As you think about designing for accessibility, it might be more helpful to think of it as asking questions instead of solving a problem that a person has.

- **Who are you designing for?** Describe the person you have in mind - it can even be someone you know. You can be as detailed as including their age, interests, hobbies, etc.

- **How often do they use a pencil?** Why might they need to use a pencil? How do they use the pencil in its current state?

- **What properties or characteristics make the pencil difficult to use?** What are their current pain points? Is there a product out there that they use as an alternative instead?

- **Which sense(s) does this person rely on the most?** Touch, sight, smell, hearing, or taste?

Step 4: Take the Pencil Challenge (cont.)

Brainstorm ideas (8-10 mins)



In this section, you will consider possible issues or struggles that your audience has when they use the pencil, then brainstorm ideas to make these issues better. Keep in mind that the sky's the limit! Don't just think about technology you are familiar with or have invented already. Think big and focus on what type of functions your new ideas will introduce.

Follow the steps below:

1. **Set a timer for 2 minutes** to fill in the first column of the table below to brainstorm issues your audience might have using a pencil. Write down as many as you can!
2. **Set a timer for 1 minute** to review what you have written. Make note of issues that are related, then make edits to your descriptions and add any additional information.
3. **Set a timer for 5 minutes** to fill in ideas on how you might address each of the issues in the last column. If your design solution addresses multiple issues, be sure to make a note of this in your table. Feel free to also write multiple ideas for a single issue!

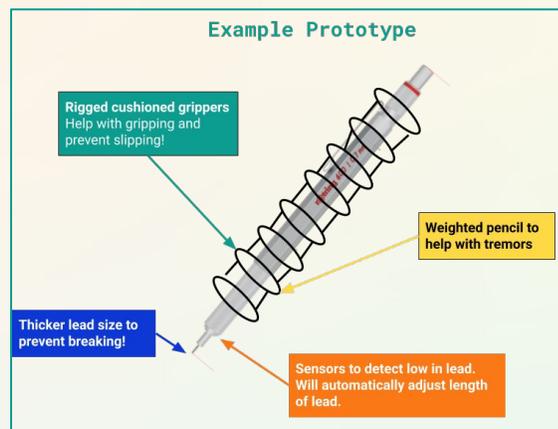
| | Issues | Design Solutions |
|-----|--|--|
| | <i>What parts of the design of the pencil makes it difficult to use?</i> | <i>What can you design to address the issue? What functionality would be helpful? How can you highlight the use of their dominant sense?</i> |
| 1. | <i>Example: Thin and slender body</i> | <i>Example: Create a thinking cushion around the body of the pencil that will allow for easier grip and require less motor skills to grab.</i> |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |
| 7. | | |
| 8. | | |
| 9. | | |
| 10. | | |

Step 4: Take the Pencil Challenge (cont.)

Design it! (8-10 mins)



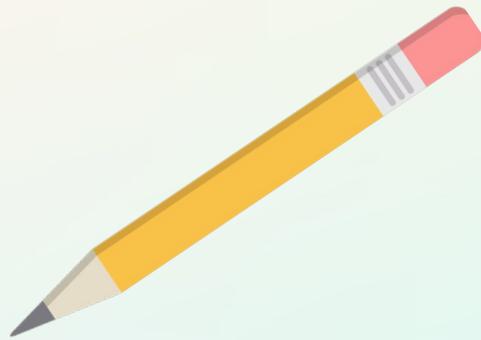
It's time to start sketching up a prototype. A **prototype** is an early representation of a product that allows designers to test an idea quickly. This can be in the form of a quick sketch on paper, a digital model of the product, or even a physical model of the product. You will create a prototype of your pencil on a piece of paper to share with others.



Remember, that your ideas may use technology that may not have been invented yet, but don't let that stop you! Include descriptions of what the technology does and how you envision it might look. Depending on your ideas, you may choose to use the pencil sketch on page ___ as a base of your prototype or start completely fresh with a blank piece of paper on page ___. It is up to you!

1. Print off **at least 2 of each** of the prototype papers (page ___ or page ___) we will be drawing multiple sketches.
2. Open up to your ideas table on page ___. We will be using this table to add components onto our prototype.
3. **Set a timer for 5 minutes.** These are quick sketches just to get your brain flowing with ideas! Try to complete at least 2-3 sketches during this time. They do not have to include full ideas and descriptions.
4. Look back and reflect. Take a look at all of your prototypes and pick on that you like the most. Think about why you are drawn to this prototype in general, maybe because the design is more sleek or maybe it addresses the most issues.
5. **Set a timer for 3 minutes.** It's time to refine your prototype. During this time check back with your ideas table to see if there is more you can add. Maybe there were parts of your other prototypes that you want to incorporate in your design as well. Add notes to your prototype about function if it is not clear in your drawings. Feel free to also add color!

Inclusive Design: Pencil Prototype



Inclusive Design: Pencil Prototype

Step 4: Take the Pencil Challenge (cont.)

Test it! (5 mins)

Now that your first prototype is completed, the next step is to get feedback on your design.



1. **Start off by giving context.** Discuss who you were designing for and how you envision they would use your product.
2. **Show don't tell!** Don't explain too much about your product, it's best to let your prototype speak for itself. Ask your testers to explain what they are thinking as they view your prototype.
3. **Follow up with questions.** Create a list of questions that you want to know more about from your testers. Here are some starting questions you might want to include:
 - Do you feel like this product would be easy to use?
 - What parts of the design do you think would be difficult for people to use?
 - Are there other products out there that might be good to compare with? What are some of the pros and cons of these products compared to this design?
4. **Thank your tester and reflect on their feedback.** After interviewing your tester don't forget to thank them for their time! Take an opportunity to reflect on their feedback and take down notes on how you might use their feedback to improve your design.

Tip: It is important to get a variety of testers and not just one group of people that have similar experiences. It is equally important to test with people who will be using your design whenever possible!



Don't forget to take notes as you interview your testers. We recommend using a similar template like the one on page 14. Feel free to also edit this [digital copy of prototype feedback form](#).

Prototype Feedback Form

Optional: [Digital Copy of Feedback Form](#)

Design: Pencil Modification

Date:

Tester:

Comments During Testing:

Questions:

- Do you feel like this product would be easy to use?

- What parts of the design do you think would be difficult for people to use?

- Are there other products out there that might be good to compare with? What are some of the pros and cons of these products compared to this design?

Reflection:

- Did any of the feedback surprise you? Why or why not?

- How will you integrate the feedback into a future iteration of your design?

- Did you get the feedback you wanted? Why or why not?

- How would you run your testing differently next time?

Step 5: Wrap Up (2-4 mins)



Thinking about accessible design as we create new products is extremely important. Let's take a moment to revisit our question from the beginning of the activity. **Set a timer for 2 minutes** and answer the question below..

How do people use technology to adapt to different environments/spaces?

Take a moment to reread your response from the beginning of the activity and compare it to your response now. Think about how your response may or may not have changed and why. Remember that when designers, engineers, programmers, etc. plan for accessibility at the start of a project, it benefits everyone.

In this activity we explored inclusive design by redesigning an everyday object, the pencil. We highly encourage you to check out ongoing design challenges posed by the [Adaptive Design Association](#) (ADA). This non-profit organization helps to create custom adaptations for people with disabilities, develop a nurturing community, and educate others about adaptive design. Check out their [#AlwaysAdapting activity](#), especially their [clear masks activity](#) and [all about easels challenge](#).

Step 7: Share Your Girls Who Code at Home Project! (5 mins)



We would love to see your work and we know others would as well. Share your prototype sketch and feedback questions with us! Don't forget to tag [@girlswhocode](#) [#codefromhome](#) and we might even feature you on our account!

Look out for our next Code at Home activity on Website Accessibility!

Stay tuned for more Girls Who Code at Home projects!

