LearningBlade® - DESIGN THINKING
Digital Security - Hack Attack

Design Thinking is a way of solving complex problems through a creative process that integrates brainstorming, collaboration and the possibilities of new technologies. In this exercise, students will use Design Thinking to explore ways that improving Internet safety can change the world.

TEACHER GUIDE

This exercise will help students to develop their own skills in design thinking. You can use this as a capstone project for the Learning Blade Hack Attack mission.

In the Hack Attack mission, students considered the people and technologies that might be involved in preventing and repairing hacking on a school website. In this design thinking exercise, students will be asked to consider they might design new and novel ways to educate people to be more secure when they are online.

Instructions are shown below, along with handouts that students can use to document their progress in the project. You may decide to extend this project over several class periods in order to let students work in depth to develop their own solutions to problems like those they studied in the Learning Blade missions.

This design challenge should take anywhere from 2 to 4 or more hours, depending on the age level and how detailed you expect the results to be. Students may select from the suggested scenarios below, or come up with their own ideas for improving online safety.

💬 DISCUSSING IDEAS IN DIGITAL SECURITY

Have the students separate into teams of no more than 5 students and discuss the following questions:

🌐 BACKGROUND KNOWLEDGE ON DIGITAL SECURITY

Have your students watch several short videos or spend up to 30 minutes researching several current methods for improving digital security. The videos listed on the next page can help students explore and understand ways to increase their online security. Read the introduction paragraph to the students, then have them research on the Internet or views some videos on the suggested website. After students have viewed the videos, you can use the included questions to encourage discussion.

➕ DESIGN THINKING EXERCISE

Have the students read the design exercise handout, then complete the worksheets as directed.

STUDENT HANDOUTS

In the Hack Attack mission, you considered the people and technologies that might be involved in preventing and repairing hacking on a school website. In this design thinking exercise, you will be asked to consider how you might design new and novel ways to educate people to be more secure when they are online.

Separate into teams of no more than 5 students and discuss the following questions:

- *How many different ways do you or your family use the Internet, social media or other digital resources?*
- *Create a list of things that you do online.*
- *What would be the effect to your or your family if you could not do these things? What if someone else could take control of your accounts and pretend to be you?*
- *Do you think your family is at risk for being hacked online? Does your family take any actions or precautions to stop this from happening?*

Discuss these questions in your group and assign a team member to take notes below:

🌐 BACKGROUND KNOWLEDGE AND RESEARCH
IMPROVING DIGITAL SECURITY

Ways to Improve your Digital Security

The Internet was built to encourage the free flow of information. But why does this mean that this information is not secure? What could be done to change this?

You can search for many different videos or other websites on Internet security. Here is one video that provides a brief history of why the Internet is built like it is, and why it has security issues:

https://bit.ly/1HSe7Kk

- *What was the Internet originally designed for?*
- *How has this contributed to some of the security issues we have today?*
- *What would make the Internet totally secure?*
- *How would a totally secure Internet limit that things that you could do with it? What things that you do today would you not be able to do?*

Discuss these questions in your group, and write notes on your discussion below:

Educating Others on Digital Security

One of the best ways to avoid hacking is to use good habits online, such as using secure passwords and not downloading files from people you don't know. However, many people still do not follow these good habits. How could you teach others to be safer online?

There have been many attempts to encourage safe behavior on the Internet. Here is a website with a collection of funny videos that highlight ways to keep data safe:

https://bit.ly/2ADilMP

- *How can humor be used to help people understand Internet safety?*
- *What are some of the biggest things that people can do to make their data safer?*
- *Do you think that people post too much data about themselves on social media?*

Discuss these questions in your group, and write notes on your discussion below:

DESIGN THINKING EXERCISE

In the Haiti Orphanage mission, you learned about the people and technologies that might be involved in creating a safe home for children left homeless after an earthquake in a remote location. The new home should be more resistant to damage from natural disasters, use less electricity and water to live in, and use less materials and be easier to build.

In this exercise, you will design ways to do one or more of the following:

- *Design or modify something on your phone, computer or other device that would improve the security of the device or some application or software on that device.*
- *Design or modify a public education material that would educate others to improve their security habits.*

You will create your solution using the Design Thinking Process. In this process you explore the problem, create ideas to solve the problem, and test your solution by showing to others.

You can choose one of the following situations to design a solution, or come up with your own problem to use.

- You want to make using the Internet safer. This might be through your phone, your computer, you home or school network, or any other device that uses digital communication. How could you make it more difficult for others to steal information from this device?

  Use your creativity to come up with ideas. It could be a better way to secure access to the device so that only you can use it, a way to keep you from losing the device, or a way to keep others from stealing information going to or from the device. You could also change some of the software or apps on the device.

  Make a sketch, drawing or presentation of your plan and explain how this would make the device safer.

- You want to teach others to use the Internet more safely. How could you tell or convince others to use good practices that keep their information safe?

  It might be a class you teach, a flyer or pamphlet you write, an Internet or TV ad, an online group, a billboard, or any other method you could use to reach other people effectively. What is the particular group of people you are trying to reach? What would you want to say or show? What would it look like?

  Make a sketch, drawing or presentation of your plan and explain how this would make people use the Internet more safely.

The Design Thinking Process

Use the Design Thinking process to help to figure out ways to build a safer Internet. In the Design Thinking process, you use your imagination to come up with ideas that can help the situation.

Step 1: Gather Inspiration. In this step you work to understand the challenges faced in this home design project. Imagine that you are on a team to make the Internet safer.

- Who do you think is at risk while use the Internet? What group of people are you thinking of?
- What specific problem are you trying to solve? How is this group of people at risk? What information could they lose or other problems could they have?
- How specifically do hackers or other people cause the problems that your group of people are having?

Step 2: Define the Problem. Narrow down the problem to one or two specific issues that you are focusing on in your design.

- Find an aspect of the problem that you could improve. Are you trying to change the devices they use to access the Internet, or are you trying to education them to use the Internet more safely? (You can choose to do both.)
- Clearly define the problem from the point of view of your Internet user.
- If possible, state the specific issues that need to be solved.

Step 3: Create Ideas.   Create a list of ideas of how your design could help to solve the problem defined.

- Use brainstorming with other classmates to come up with as many ideas as possible.
- Narrow down the ideas to one or two designs to help the home be more efficient and effective.
- Imagine how your solution would be customized for the particular situation and problem you are considering. What features would it have that make it unique?

Step 4: Prototype a Solution. Generate specific sketches, drawings or models of how to improve the situation.

- Use the sketches, drawings or cardboard or other simple materials to model or illustrate the home design to show how the idea would work.
    - If it is a physical device, make a simple model or sketch of what it would look like.
    - If it is a new piece or a change to a piece of software, make a sketch of what it would look like. Make several sketches if multiple screens or pages are involved.
    - If you are teaching others to be more safe, write or sketch what and how you would communicate it.
- Make reasonable assumptions about the solution to estimate the benefits. How many people could be helped with this solution?

Step 5: Test the Solution. Test your idea by showing it or describing it to others.

- Prepare a report or multimedia presentation on the unique features of your design the would help to improve the safety of the Internet, and what steps should be taken to implement this new design.
- Present to your teacher or classmates the number of people that could be helped using your solution.
- Gather comments and suggestions from your classmates, and consider how these could be used to improve your ideas.

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EDUCATOR RUBRIC

ITEM	Does Not Meet Expectations	Meets Expectations	Exceeds Expectations
Understanding the Assignment – Consider This	Student does not express opinions or could not describe how a person could be at risk using the Internet.	Student is able to describe how a person could be at risk using the Internet.	Student can detail how a person could be at risk, and express one or more ideas for improving safety while using the Internet.
Creating a Solution	Student was unwilling or unable to describe an idea for improving Internet safety.	Student described an idea for improving Internet safety using conventional means.	Student demonstrated original creativity by an original idea for improving Internet safety.
Presenting the Solution (optional)	Student was unwilling or unable to give a presentation on how the proposed solution would improve Internet safety.	Student was able to give a presentation on how the proposed solution would improve Internet safety.	Student demonstrated original creativity in giving a presentation on how the proposed solution would improve Internet safety.
Discussing the Solution	Student was unwilling or unable to explain how the proposed solution would improve Internet safety.	Student explained how the proposed solution would improve Internet safety.	Student demonstrated original creativity in explaining novel aspects of how the proposed solution would improve Internet safety.
Internet Safety in the Real World	Student did not express or understand how people in different careers work to make the Internet safer.	Student is able to express how people in different careers work to make the Internet safer.	Student is able to express how people in different careers work to make the Internet safer, and how this creates a measurable impact on society.

📋 STANDARDS ALIGNMENT

This project is most closely aligned with the middle school engineering standards in the Next Generation Science Standards (MS-ETS1-1 and 1-4).

> **MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.**

> **MS-ETS1-4.   Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.**

Students design, develop and then refine their own solutions for data security. They test and improve their designs.

Keep in mind that the performance expectations shown in Middle School Engineering Design couple particular practices with specific disciplinary core ideas. Instructional decisions allow for use of many practices that lead to the performance expectations.

This lesson allows students to focus on a two-stage process of evaluating the different ideas that have been proposed. By using a systematic method to determine which solutions are most promising and by testing different solutions, students combine the best ideas into new solutions that may be better than any of the preliminary ideas. Improving designs at the middle school level involves an iterative process in which students test the best design, analyze the results, modify the design accordingly, and then re-test and modify the design again. Students may go through this cycle two, three, or more times in order to reach the optimal (best possible) result. Connections with other science disciplines help students develop these capabilities in various contexts.

The discussion and communication elements of this lesson can lead to instruction on the following cross cutting concepts –

> **Connections to Engineering, Technology, and Applications of Science Influence of Science, Engineering, and Technology on Society and the Natural World:**
>
> > **-The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.**
> >
> > **-Technologies extend the measurement, exploration, modeling, and computational capacity of scientific investigations.**