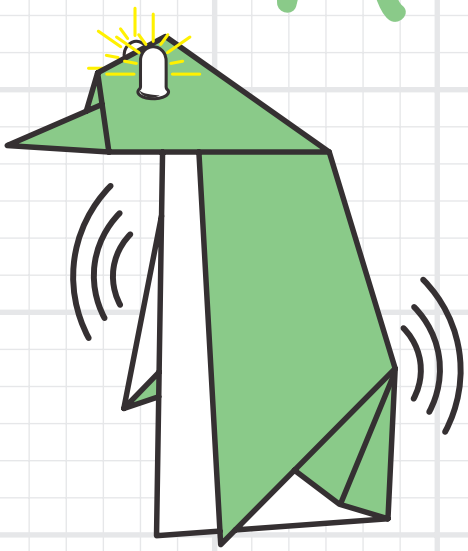
teknikio

Activating Origami

EDUCATOR GUIDE



WELCOME TO THE ACTIVATING ORIGAMI WORKSHOP BUNDLE!

Dear Educator,

Thank you for choosing the Tekniko Activating Origami Bundle! We are so excited that you have chosen to use Teknikio products in your classroom. At Teknikio, we are a playful, curious team of scientists, engineers, and designers, who love to dream, make, and think, and we hope that our products inspire you to try new things, challenge ideas, and share your knowledge.

Education is central to our mission. We strive to create products and resources that allow and enable people of all ages to design, engineer, and reimagine their world! Our goal with this guide is to give you the tools and resources you need to understand the concepts and potential of what you are teaching. We try to give you as many answers as possible and also show you how and where to look for more answers. (We welcome any other questions you might have to send to us directly, too!)

Please note that all of our parts are designed to be reusable. None of the circuits and building processes are permanent, all of the electronics can be taken out of projects and reused.

If you'd like to order more of the non-reusable materials, like conductive thread and fabric, just let us know, we've got you covered!

Although our sets are designed to be open-ended, they are easily adaptable to curriculum and learning standards. In this guide we share with you our own design process and how it can be translated and integrated into STEM education. We have researched the Next Generation Science Standards and Common Core Standards and demonstrate how to align our lesson plans to meet these requirements. We welcome any feedback (good or bad), ideas, and suggestions you have for us on how to improve the educator experience. You can send all feedback to education@teknikio.com.

Here's to all of your awesome inventions!

Deren Guler
Founder && Lead

NGSS ENGINEERING STANDARDS

The Next Generation Science Standards framework has three dimentions: scientific and engineering practices, crosscutting concepts and disciplinary core ideas in science.

Teknikio's workshop bundles are designed to help you integreate these practices into your curriculum. Below is list of part from each of the 3 dimensions that Teknikio's lessons work to fulfill:

1. Asking questions and defining problems
2. Constructing explanations and designing solutions
3. Engaging in argument from evidence
4. Cause and effect: Mechanism and explanation
5. Structure and functions
6. Motion and Stability: Forces and interactions
7. Engineering design
8. Links among engineering, technology, science, and society.

Below is a list of NGCS standards that are fulfilled by the projects in this bundle. Integration techniques are further detailed in the project guides

ELEMENTARY SCHOOL

3-5-ETS1-1
3-5-ETS1-2
3-5-ETS1-3
3-PS2-2
4-PS3-1
4-PS3-3
5-PS2-1
3-5-ETS1-1
3-5-ETS1-2
3-PS2-4
4-PS3-2

MIDDLE SCHOOL

MS-ETS1-1
MS-ETS1-2
MS-ETS1-3
MS-ETS1-4
MS-PS3-1
MS-PS2-2
MS-PS4-2
MS-ESS3-3
MS-ETS1-2
MS-ETS1-4
MS-PS2-5

Common Core standards

Teknikio also connects to Common Core standards such as literacy, math and reading. An important part of the design process involves creating a scenario for your design. In order to do this thoroughly we recommend having the students write short stories, or narratives about each project that answer the questions of :

Who is this for?
What is the day in the life of someone who uses your invention?
When would it be used?
How is it sold or introduced?

LITERACY

CCSS.ELA-LITERACY.W.6.1
CCSS.ELA-LITERACY.W.6.2
CCSS.ELA-LITERACY.W.6.7
CCSS.ELA-LITERACY.W.6.10

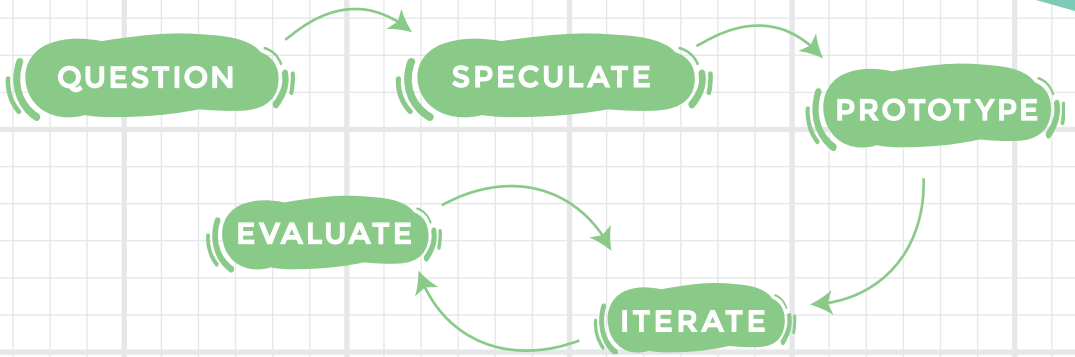
COMMUNICATION

CCSS.ELA-LITERACY.SL.6.1
CCSS.ELA-LITERACY.SL.6.2
CCSS.ELA-LITERACY.SL.6.4
CCSS.ELA-LITERACY.SL.6.5

MATHEMATICS

MP.5
MP.2
7.EE.3

TEKNIKIO INVENTION PROCESS FOR EVERDAY ENGINEERING



QUESTION

It all starts with asking the right questions. In order to start asking questions, you must observe. When obseriving a situation you'll find yourself noticing things that don't quite make sense and start asking why? how? In this steps students will identify a problem.

SPECUALTE

The next question is naturally: "What if?" Design begins with speculation. As students start to speculate, have them sketch out their imagined solutions.

PROTOTYPE

Now it's time to build. Have students choose which one of their speculative designs is most practical given the limits of the project (materials, time, theme, etc) and create a prototype.

ITERATE

Things don't always work out the first time. In fact, they usually do not. That's why it's imporant to remix and iterate on a design until it feels like it is truly a solution to the porblem they set out to solve.

EVALUATE

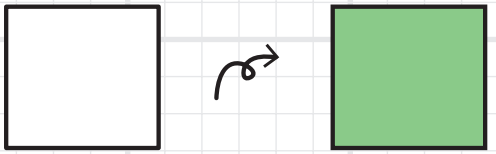
This is perhaps the most challenging part of the process. Students will now think of ways to test their ideas in the real world. If they have not already, have them identify their potential audience and user and create a survey or testing procedure for evaluating their projects.

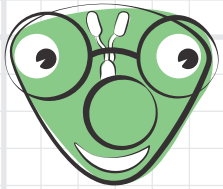
* If time permits you can have them gather this feedback and interate on the design again, taking into consideration what they have learned from the evaluation.

ORIGAMI VOCABULARY

1 FLIP MODEL

Turn the whole model over so that the underside now faces you. Origami paper is colored on one side, white on the other.





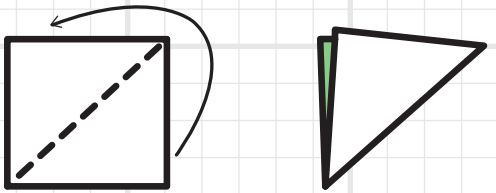
White is the inside of the paper, green is outside

2 VALLEY FOLD

Fold the paper towards yourself, along the dashed line.

3 MOUNTAIN FOLD

Fold the paper away from yourself (underneath) along the dashed line.



VOCABULARY

Circuit: composed of individual a power source, conducting path, switch a load

Resistor: A physical property of materials. If a material has a highresistance, it opposes the passage of a steady electric current. The lower the resistance, the easier it is to force electrons to leave atoms and move through the material.

LED: A Light-Emitting Diode; often used as the load, or output, in a circuit; has a positive and negative leg.

Output: What outcome results from an electrical circuit; ex. LED lights up, buzzer sounds, motor vibrates.

Input: What puts an electrical circuit into action; ex. switches, pressing a button or keypad.

Power: A supply of moving electrons.

Electron: Small, negatively-charged particles of atoms.

Current: The flow of electrons through a material.

Load: A component that consumes power supplied by a power source.

Switch: A device that enables you to turn current on and off

Sensor: Anything that senses an outside force (such as pressure) and sends a signal; ex. switches.

Conductor: Creates a pathway for electrons.

Insulator: Also called a nonconductor. Prevents the flow of electrons.