

STEAMing UP

YOUR LIBRARY
PROGRAMS
BY LEAH HAMILTON



HOW
INNOVATIVE
IS YOUR
AVERAGE
BUMBLE
BEE?



DECLINING
POPULATIONS

IMPORTANCE
TO HUMANS

COMPLEX
NAVIGATIONAL
SKILLS

EXHIBIT
EMOTIONS

USE OF TOOLS

INTELLIGENCE



WHY?




PASSIVE

VS.

CRAFT

VS.

STEAM



STEAMing UP

YOUR LIBRARY
PROGRAMS
BY LEAH HAMILTON

KNOW YOUR

WHY



New Career Paths

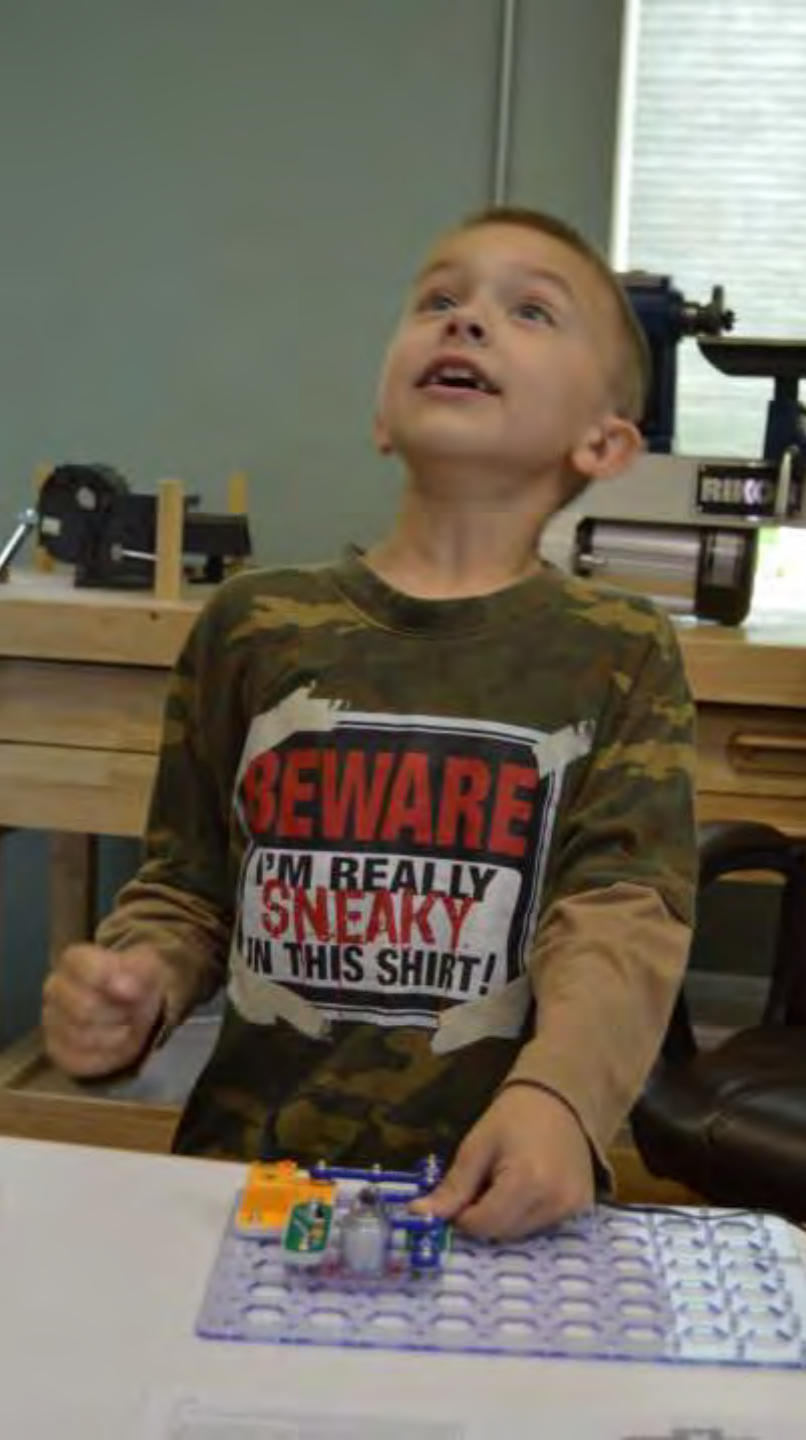
Problem-Solving

Empowerment

Practice for Life

Inspiration

Build Confidence





Careers in STEM: Science, Technology, Engineering and Math

The median wage of Central New York Region STEM occupations is **\$59,970** a year, which is 59 percent higher than the median annual wage of \$37,730 for all workers in the region.

Do you want to make the world a better place to live?

If you are concerned about changes in the environment, creating better medicines and building new gadgets to make everyday life easier, consider a Science, Technology, Engineering and Math (STEM) education. A STEM education can give you the tools to help solve some of today's most perplexing problems.

Do you wonder what puts the thrill in a roller coaster?

It takes both design and engineering skills to develop a thrill ride. If you are curious about how things work and are a creative and original thinker, a STEM career could be for you.

Do you imagine solving crimes using the latest technology?

You could be a Forensic Science Technician in your local area or travel the world tracking the latest infectious disease. Professionals in STEM careers protect and serve people around the world.

STEM Careers Pay! Central New York Region

Occupation	Annual Median Wage*
Architects, Except Landscape and Naval	\$87,220
Athletic Trainers	\$47,440
Automotive Service Technicians and Mechanics	\$35,410
Chemists	\$69,210
Clinical, Counseling, and School Psychologists	\$69,340
Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	\$51,460
Dental Hygienists	\$66,630
Diagnostic Medical Sonographers	\$69,260
Electrical Engineers	\$91,240
Emergency Medical Technicians and Paramedics	\$33,200
Family and General Practitioners	\$198,990
Industrial Machinery Mechanics	\$55,360
Information Security Analysts	\$78,260
Licensed Practical and Vocational Nurses	\$38,850
Machinists	\$43,180
Medical and Clinical Laboratory Technologists	\$56,420
Network and Computer Systems Administrators	\$68,040
Nurse Practitioners	\$99,160
Pharmacists	\$132,730
Physical Therapists	\$75,720
Physician Assistants	\$108,430
Registered Nurses	\$62,420
Software Developers, Applications	\$81,790
Veterinarians	\$102,300

<https://www.labor.ny.gov/stats/PDFs/STEM-Factsheet-Central-NY.pdf>

LIBRARIES
ARE
EDUCATION





"THIS IS
A
BLAST!"

- GAIL, LIBRARY &
MAKERSPACE USER

WHERE DO
I START?



CHOICE MATERIAL GLASS OXIDE

PROJECT- BASED LEARNING (PBL)

More engaging

Increased knowledge retention

Builds success skills

More enjoyable classes for both student and presenter

Connects the Library to the Community

PERSONALIZED LEARNING

(PL)

CRAFT STEAM

Paper Engineering

Beginner's Sewing

Wreathmaking

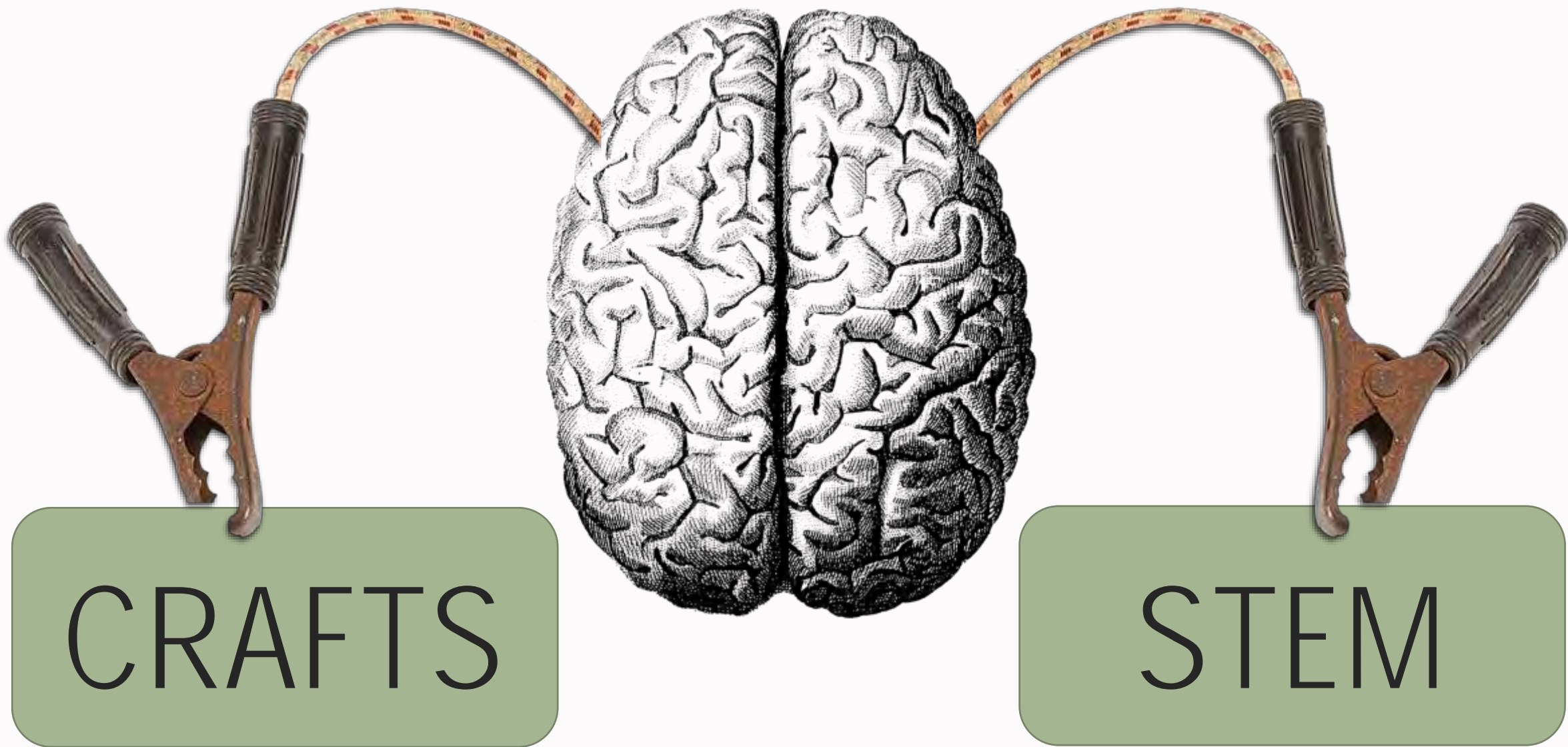
Fiber Dyeing

Object Painting

Gardening

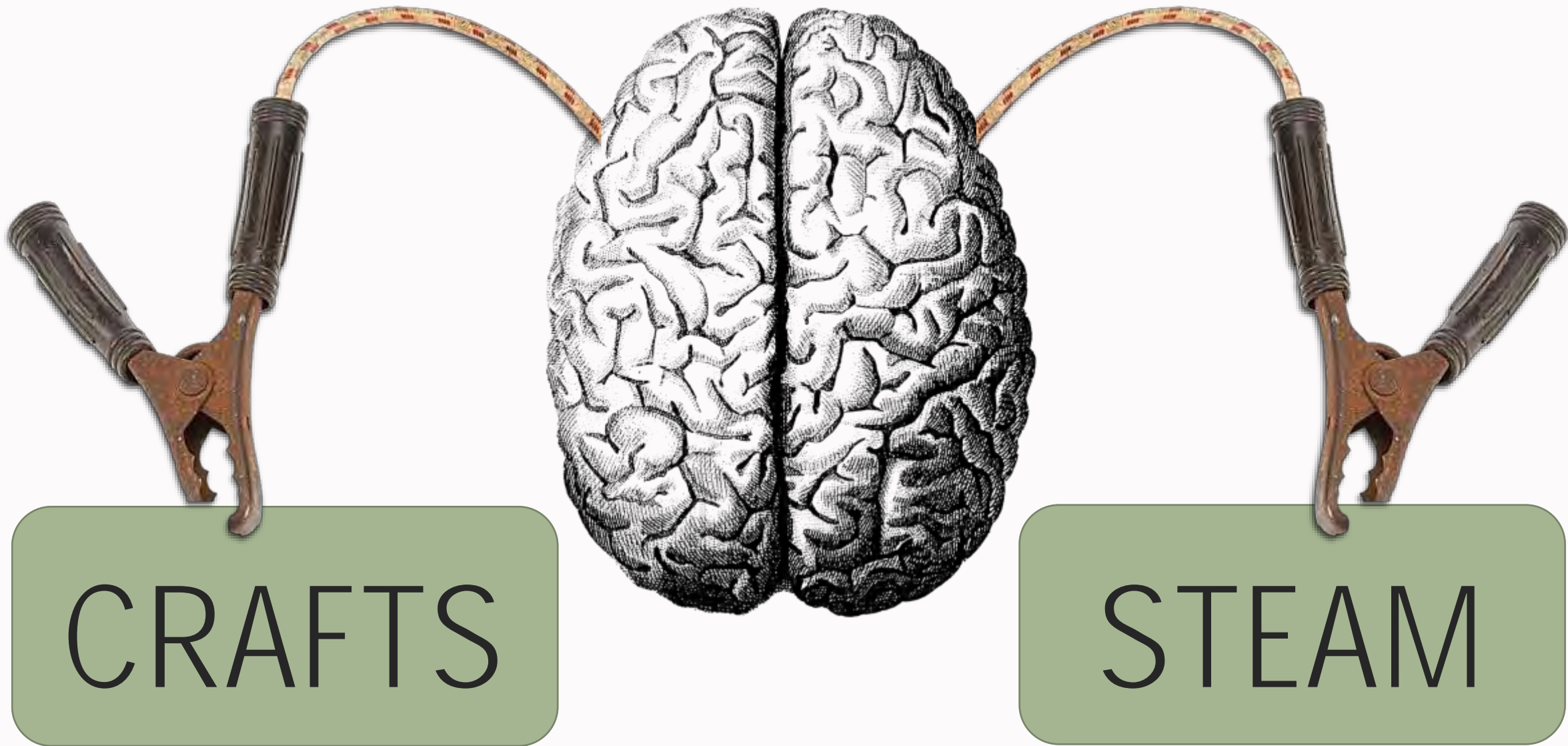
Fermented Foods and

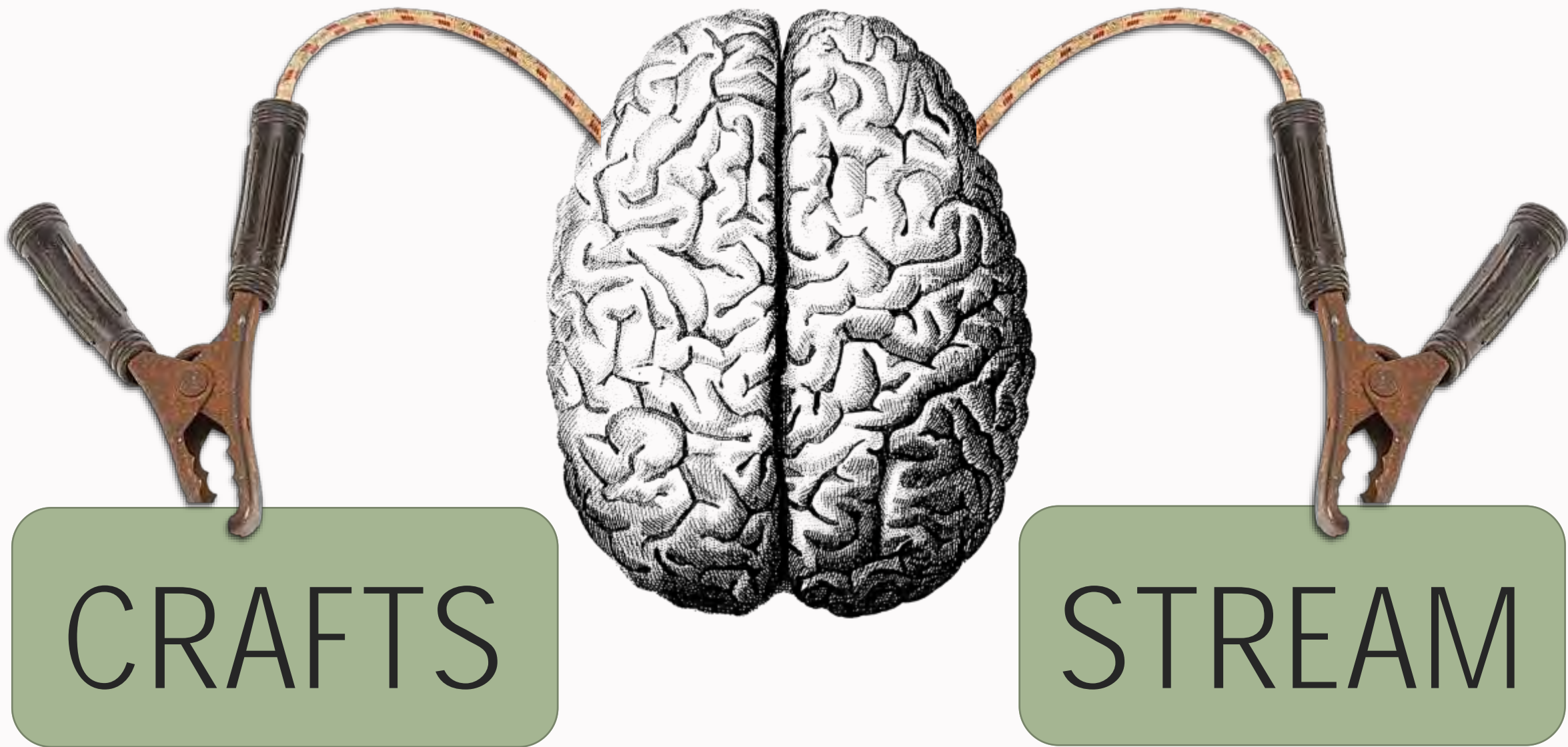
Cheesemaking



CRAFTS

STEM







PICK A COUPLE

YOU DON'T HAVE TO HAVE EVERY ASPECT OF STEAM



SCIENCE

ASKING THE QUESTIONS

Ask Questions
& Construct
Explanations

**WHAT
DO
I DO
NOW?**



What observations do you have?

What is the problem?

What can you change/do to help us answer this?

Do you have evidence/data to support this?

Can you communicate to the group what is going on?



CORSE WOOL

FINE WOOL

ALPACA

CASHMERE

SILK

LINEN

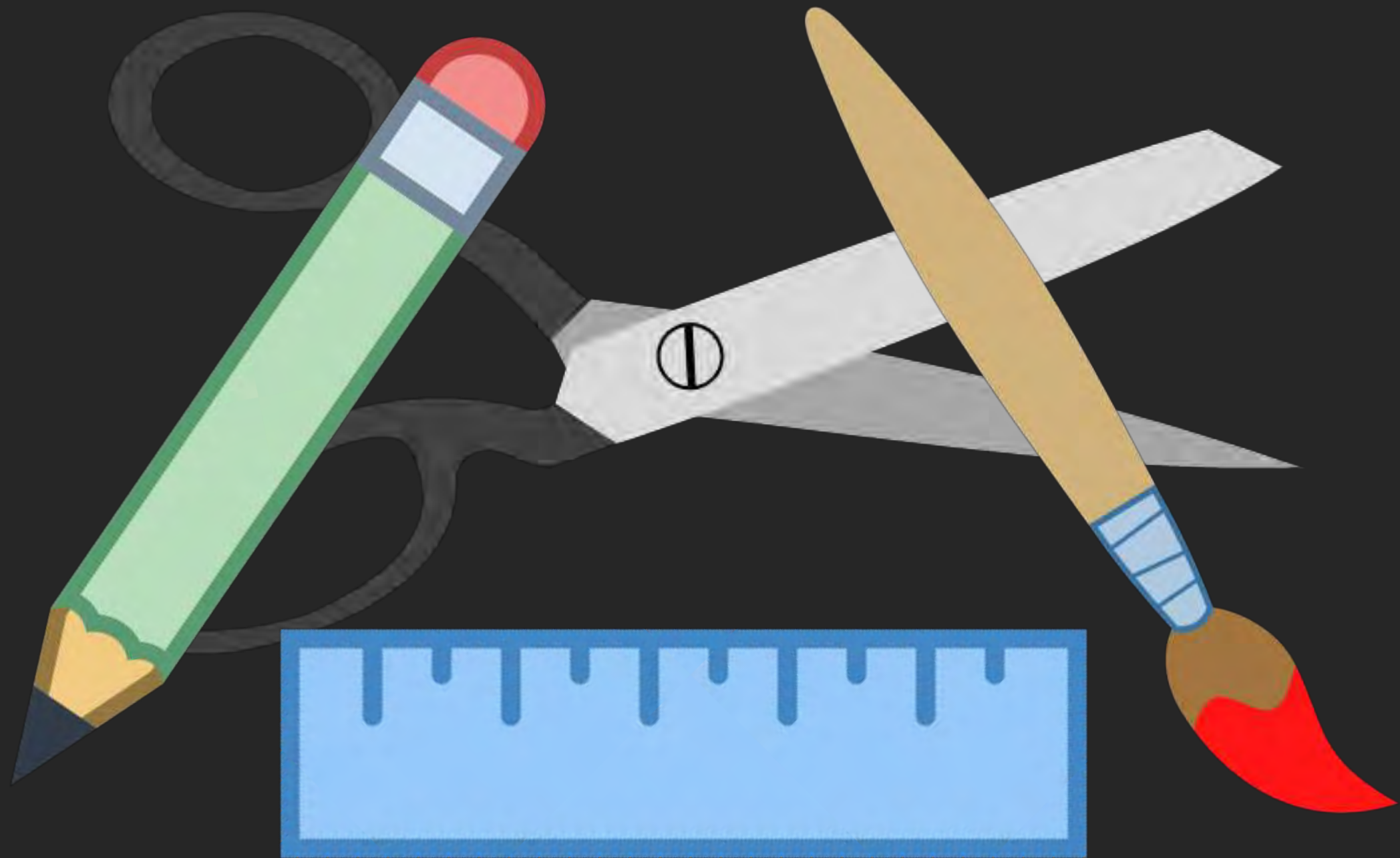
COTTON

POLYESTER



TECHNOLOGY

THIS ONE IS THE EASIEST!



A person is holding a dark blue book with both hands. The book's spine is visible, showing a gold-colored label that reads 'IF WINTER COMES' and 'J.K. ROWLING'. The person holding the book has dark, curly hair and is wearing a white shirt with a colorful pattern. The background is a blurred, light-colored wall.

READING

YOU'VE GOT THIS ONE COVERED!

The background of the image is a close-up, slightly blurred view of a workspace. It features a spiral-bound notebook with a black metal spiral binding on the left. A crumpled blue piece of paper sits in the center. The notebook pages are covered with various hand-drawn sketches and diagrams in black ink, including circles, arrows, and some text fragments like 'What'. The overall lighting is soft and focused on the central elements.

ENGINEERING

SOLVE A PROBLEM

Define Problems & Solutions

**WHAT
DO
I DO
NOW?**

What's the problem?

How have others
approached it?

What are your
constraints?

THE
ENGINEERING
PROCESS

ASK



What are some of your
ideas or solutions?

Brainstorm ideas.

What one will work best?

THE
ENGINEERING
PROCESS

IMAGINE

2

Draw it!

Make a list of materials
that you'll need.

THE
ENGINEERING
PROCESS

PLAN

3

Go for it!

Make it!

Try it out!

THE
ENGINEERING
PROCESS

CREATE

4

What works?
What didn't?

Try it again, and
make it even better!

THE
ENGINEERING
PROCESS

IMPROVE

5

THE ENGINEERING DESIGN PROCESS

https://www.youtube.com/watch?v=MAhpfFt_mWM

COMMUNICATE
your solution



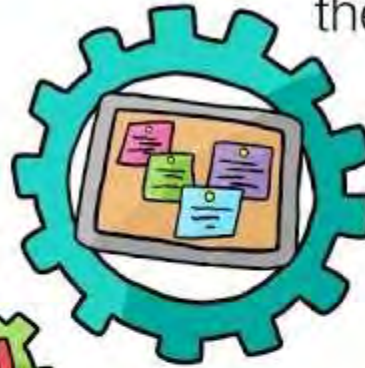
ITERATE
to improve
your prototype



TEST
and evaluate
your prototype



DEFINE
the problem



IDENTIFY
constraints on your
solution (e.g. time, money,
materials) and criteria
for success



BRAINSTORM
multiple solutions
for the problem



SELECT
the most
promising solution



PROTOTYPE
your solution





ARTS

INFUSE YOUR UNIQUE CREATIVITY

MATH

NO PROBLEM!

Change Your Vocabulary

**WHAT
DO
I DO
NOW?**

Accelerate

Adapt

Alleviate

Condense

Decrease

Elevate

Eliminate

Improve

Increase

Lighten

Maximize

Minimize

Optimize

Reinforce

Stabilize

Strengthen

ENGINEERING VERBS



COLLABORATE

FIND YOUR LOCAL EXPERTS



EMPIRE STATE STEM LEARNING NETWORK





A photograph of four female students in school uniforms (grey short-sleeved shirts and blue pleated skirts) standing in front of a green chalkboard. They are all facing away from the camera, with their arms raised as if drawing or writing on the board. On the chalkboard, there are faint white chalk drawings of a crown, a cat face, and a butterfly. The scene is lit with soft, warm light, creating a focused and creative atmosphere.

TRAINING

LEARN FROM YOUR LOCAL EXPERTS



Thursday, May 24, 2018

Personalizing Learning:

Technology-Enhanced Instruction &
Practices to Meet the Needs of All
New York State Students

Schedule

FREE
CONFERENCE
SPONSORED BY
NYSCATE
NYSED

A large, rustic wooden wheel is positioned in the center of the frame, partially obscured by a horizontal band containing text. The wheel is made of dark wood with several spokes radiating from a central hub. It sits on a field of tall, dry grass in the foreground. Behind the wheel, there is a dense patch of green plants with long, narrow leaves, possibly irises. The overall lighting is soft and natural, suggesting an outdoor setting during the day.

RESOURCES

NO NEED TO REINVENT THE WHEEL



Style & Eat
Emma Kungu

Globetrotting
Gabe Trionfi

Fashion Magic
Anna Lee

Food & Travel
Emma Kungu

Recipes to try
Marlene Adenigbo

Style for Him
Alexandra Bond

Delicious Eats
Anna Trionfi



"STEM ACTIVITY"
"ALUMINUM FOIL"

Know Your **WHY**

Why connect with the maker community?

"Through working with the community maker space, we have been able to bring new ideas and skills to our school.

We've been able to transfer the expertise of the many skilled makers who work and play there into our school. It has also increased our confidence as makers.

As we've become more confident makers, our students and colleagues have become more engaged learners. They've taken more risks and stepped outside their comfort zones with us. We look forward to sharing everything we've learned with the community at large."

-Carrie Speranza & Jennifer Jacobson

CREATEMAKELEARN. BLOGSPOT.COM/



HTTP://TRYENGINEERING.ORG

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 Find a University

Over 3100 universities in over 75 countries



 Lesson Plans

135 PDFs
22 million downloads



Ages

4 - 7 | 8 - 12 | 12 - 14 | 14 - 18

Category

Select a Category 


 New Lesson Plans

 Most Popular

 All Lesson Plans

TEACHENGINEERING.ORG

Narrow Results



Curriculum Type

☒ Activity

☐ Lesson

☐ Curricular Unit


☐ Sprinkle

☐ Maker Challenge

What's the difference between lessons, activities, units, sprinkles, and maker challenges?

Grade Level

Grades K - 12



Subject Area

All Subject Areas

Engineering Category


☐ Relating science and/or math concepts to engineering

☐ Partial design

☐ Full design

Time Required

0 to 1200+ minutes



clear all filters



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Standards Source Organization

Select an organization ▾

Montana
National Council of Teachers of Mathematics
National Science Education Standards
Nebraska
Nevada
New Jersey
New Mexico
New York
North Carolina
North Dakota

To get started, select the standard.
Only organizations for which TeachEngineering has aligned content are listed.

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Common Core Math

International Technology and Engineering Educators Association

Next Generation Science Standards

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Integrated Teaching & Learning Program
UNIVERSITY OF COLORADO BOULDER

NEW YORK STATE P-12 SCIENCE & ENGINEERING LEARNING STANDARDS

New York State P-12 Science Learning Standards		
P. Physical Sciences		
Students who demonstrate understanding can:		
P-PS1-1.	Ask questions and use observations to test the claim that different kinds of matter exist as either solid or liquid. [Clarification Statement: Emphasis should be on observing and describing similarities and differences between solids and liquids based on their physical properties. Solids and liquids can be compared and categorized (sorted) based on these properties.]	
P-PS2-1.	Use tools and materials to design and build a device that causes an object to move faster with a push or a pull.* [Clarification Statement: Emphasis should be on developing an interest in investigating forces (pushes or pulls). Examples of forces could include a string attached to an object being pulled or a ramp to increase the speed of an object.] [Assessment Boundary: Assessment is limited to relative measures of speed (slower, faster)]	
P-PS4-1.	Plan and conduct investigations to provide evidence that sound is produced by vibrating materials. [Clarification Statement: Examples of vibrating materials could include percussion instruments (e.g. drum, triangle), string instruments (e.g. guitar, piano), wind instruments (e.g. recorder, whistle), and audio speakers.]	
The performance expectations above were developed using the following elements from the NRC document, <i>A Framework for K-12 Science Education</i> .		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Asking Questions and Defining Problems Asking questions and defining problems in grades PK-2 builds on prior experiences and progresses to simple descriptive questions that can be tested.</p> <ul style="list-style-type: none"> Ask questions based on observations to find more information about the designed world. (P-PS1-1) <p>Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in PK-2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.</p> <ul style="list-style-type: none"> With guidance, plan and conduct an investigation in collaboration with peers. (P-PS2-1), (P-PS4-1) <p>Analyzing and Interpreting Data Analyzing data as PK-2 builds on prior experiences and progresses to collecting, recording, and sharing observations.</p> <ul style="list-style-type: none"> Record information (observations, thoughts, and ideas). (P-PS1-1) Analyze data from tests of an object or tool to determine if it works as intended. (P-PS2-1) 	<p>PS1.A: Structure and Properties of Matter</p> <ul style="list-style-type: none"> (NYSEED) Different kinds of matter exist and many of them can be either solid or liquid. Matter can be described, categorized, and sorted by its observable properties. (P-PS1-1) <p>PS2.A: Forces and Motion</p> <ul style="list-style-type: none"> Pushes and pulls can have different strengths and directions. (P-PS2-1) Pushing or pulling on an object can change the speed or direction of its motion and can start or stop it. (P-PS2-1) <p>PS3.C: Relationship Between Energy and Forces</p> <ul style="list-style-type: none"> (NYSEED) A push or a pull may cause stationary objects to move, and a stronger push or pull in the same or opposite direction makes an object in motion speed up or slow down more quickly. (necessary to P-PS2-1) <p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> Sound can make matter vibrate, and vibrating matter can make sound. (P-PS4-1) <p>ETS1.A: Defining Engineering Problems</p> <ul style="list-style-type: none"> A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have many acceptable solutions. (P-PS2-1) 	<p>Patterns</p> <ul style="list-style-type: none"> Patterns in the natural and human-designed world can be observed and used as evidence. (P-PS1-1), (P-PS4-1) <p>Cause and Effect</p> <ul style="list-style-type: none"> Simple tests can be designed to gather evidence to support or refute student ideas about causes. (P-PS2-1), (P-PS4-1)
<p>-----</p> <p>Connections to Nature of Science</p> <p>Scientific Investigations Use a Variety of Methods</p> <ul style="list-style-type: none"> Scientists use different ways to study the world. (P-PS2-1), (P-PS4-1) 		
<p>Connect these to other DCIs in crosscutting concepts: P-PS1.A (P-PS2-1), P-PS1.D (P-PS4-1)</p>		

Yellow = New

Blue = Practices

Orange = Core Ideas

Green = Concepts

**LET'S
STEAM
IT UP**



- A. Two personal goals
- B. Two professional goals
- C. Schedule Activities
- D. Choose Resources

TO DO LIST

Know that you don't need to be
an expert in any technologies.

TO DO LIST

Start meaningful conversations.

TO DO LIST

Change your vocabulary.

TO DO LIST

Promote scientific inquiry.

TO DO LIST

Remove all preconceived notions
of what you can and/or can't do as
a library or as an individual.

TO DO LIST

Look for grants & organizations
focused on women and girls
in engineering and sciences.

TO DO LIST

Advocate for tech programs
within your school district.

TO DO LIST

Collaborate.

Collaborate.

Collaborate.

TO DO LIST

The background of the image is a close-up of an artist's palette and a row of paint swatches. The palette at the top shows various colors of paint, including reds, oranges, yellows, and blues, with some paint smeared and mixed. Below the palette is a row of several rectangular paint swatches, each containing a different color of paint, such as yellow, red, dark brown, black, and blue. The overall image has a textured, artistic feel.

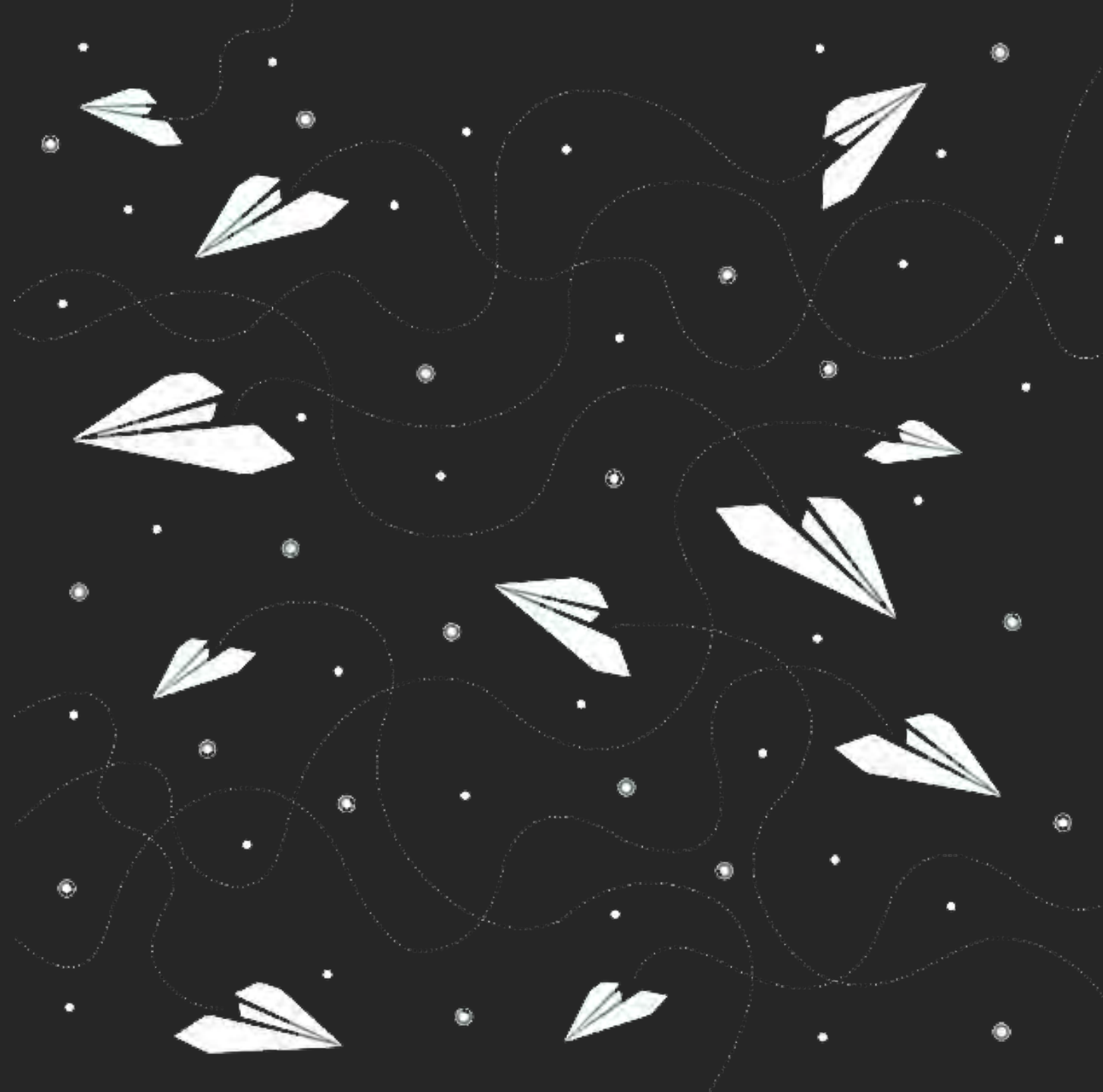
PROJECTS

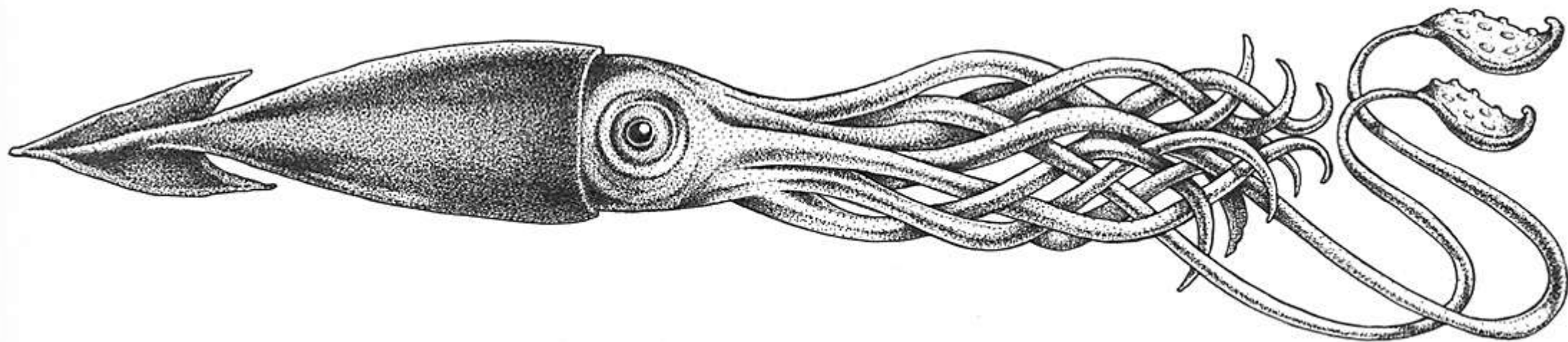
GETTING HANDS-ON











CITIZEN SCIENTIST

Scientific research
conducted, in
whole or in part,
by an amateur
(or non-professional)
scientist



1/6/94

is more fun
than you think.



Leah Hamilton, Executive Director

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Presentation:

<https://www.phelpslibrary.org/clrc>