

AFTER THE SCHOOL BELL RINGS: STEAMING UP YOUR PROGRAMS

Leah Hamilton

Phelps Library
& STEAM Lab Makerspace
Phelps, New York





1. STEAM Initiative

2. Data

3. NGSS

4. Projects

5. Challenges



A workshop or classroom setting with a sewing machine, a mannequin, and various tools. The room has a wooden floor, a wooden table, and a wooden cabinet. A red ladder is leaning against the wall. A window is visible in the background.

STEAM INITIATIVE

BRIDGING THE TECHNICAL SKILLS GAP

STEAM Lab Makerspace





STEAM Lab Makerspace – Clean Technology



STEAM Lab Makerspace – Dirty Technology



HOW DOES THIS
APPLY TO LYONS CSD?

Makerspace vs. Maker Kits



THE AMAZING & WONDERFUL VANISHING CABINET

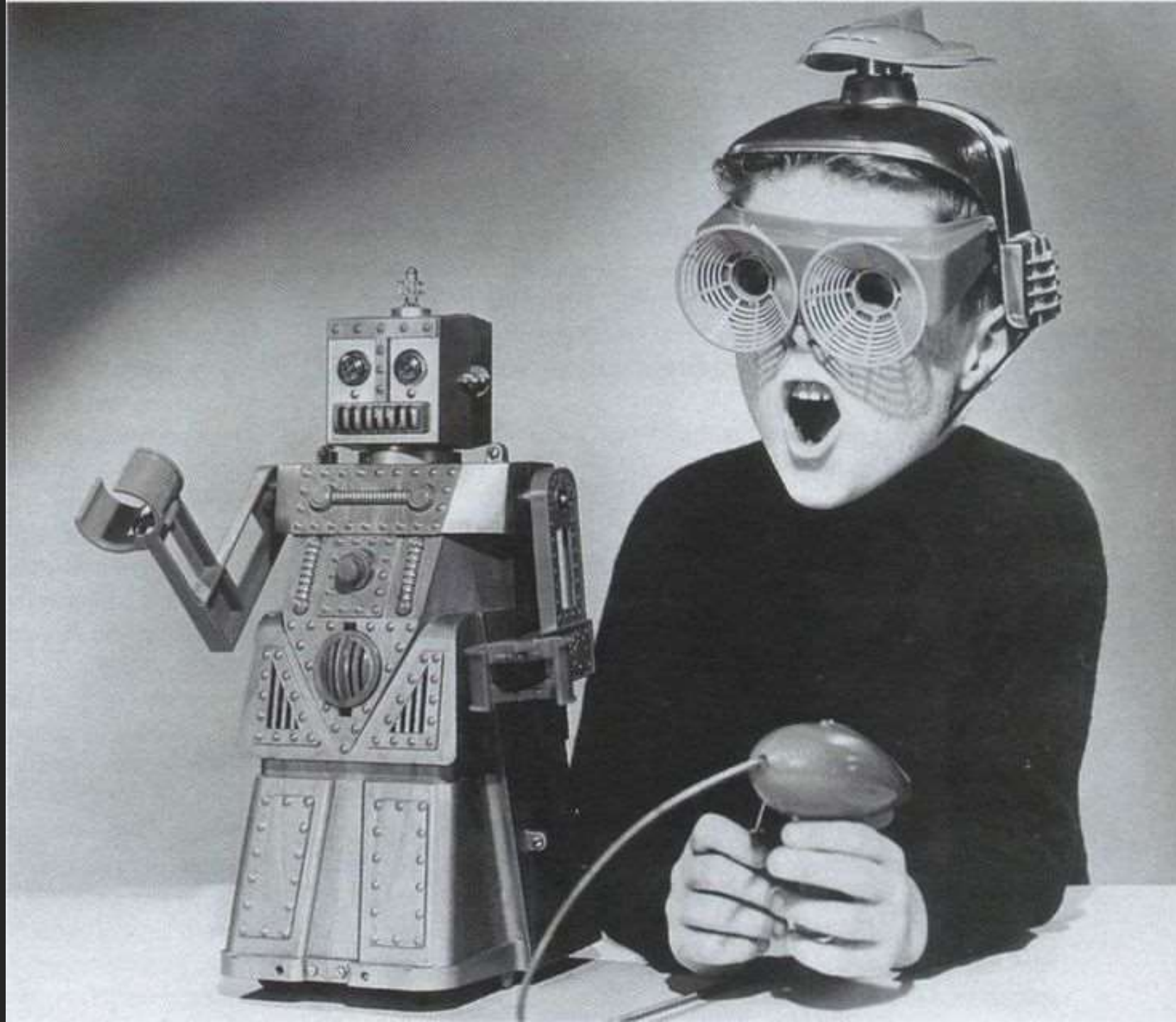




HOW DOES THIS
APPLY TO LYONS CSD?

Makerspace vs. Maker Kits

Dust Collector vs. Design Tool





HOW DOES THIS
APPLY TO LYONS CSD?

Makerspace vs. Maker Kits

Dust Collector vs. Design Tool

Overthinking vs. Realistic Need

STEAM Lab Makerspace

STEM Explorers





STEM Explorers



Water Jet Cutter



Field Trips and Job Shadowing



Augmented Reality Sandbox



HOW DOES THIS
APPLY TO LYONS CSD?

Library or Afterschool Projects



HOW DOES THIS
APPLY TO LYONS CSD?

Library or Afterschool Projects

Go on Field Trips & Promote Job Shadowing



HOW DOES THIS
APPLY TO LYONS CSD?

Library or Afterschool Projects

Go on Field Trips & Promote Job Shadowing

History/ELA/Science + Making

STEAM Lab Makerspace

STEM Explorers

STEAM Camps





STEAM Camps



Stream Monitoring







CITIZEN SCIENTIST

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



Accelerate

Increase

Decrease

Optimize

Adapt

Lighten

Elevate

Reinforce

Alleviate

Maximize

Eliminate

Stabilize

Condense

Minimize

Improve

Strengthen

ENGINEERING VERBS

AGGREGATE CLUSTER - MANUFACTURING

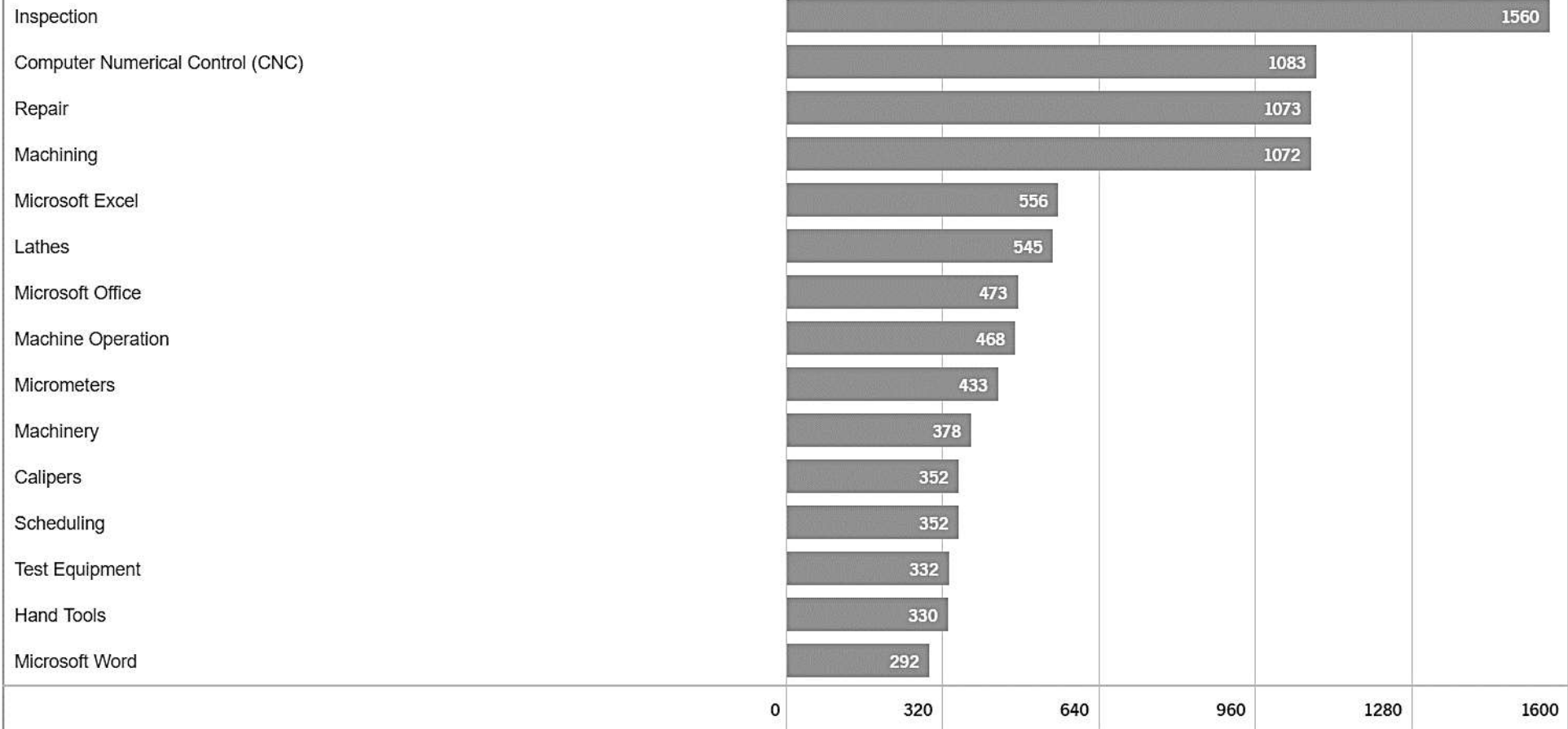
AGGREGATE CLUSTER - MANUFACTURING - FINGER LAK

1. OCCUPATIONAL GROUP
DEFINITION

2.

6. REAL-TIME LABOR MARKET
DATA

ABOUT





HOW DOES THIS
APPLY TO LYONS CSD?

Awareness & Curricular Incorporation of
Workforce & Economic Development Trends



HOW DOES THIS
APPLY TO LYONS CSD?

Awareness & Curricular Incorporation of
Workforce & Economic Development Trends

Change your Vocabulary (no matter the subject)



HOW DOES THIS APPLY TO LYONS CSD?

Awareness & Curricular Incorporation of
Workforce & Economic Development Trends

Change your Vocabulary (no matter the subject)

Cross-Industry Communication

STEAM Lab Makerspace

STEM Explorers

STEAM Camps

FLX Maker Fest



THANK YOU TO OUR 2018 FLX MAKERS!

Doppler-on-Wheels (DOW)
Mobile Weather Radar
with Hobart William Smith

GW Lisk & The SpaceX Program

Rocket Construction
How-Tos with
Upstate Research Rocketry Group

FIRST Robotics Team Tan[x] 3003

Empire Resource Recycling
Initiatives

Painting with Light with
Rochester Mini Maker Faire's
Dan Schneiderman

Learn to Solder
Electronic Components
with Dan Wheeler

3-D Printing in Manufacturing
with Harbec, Inc.

Create with Thermoplastic
with Interlock Rochester

Magnetic Slime

Build a Cigar Box Guitar

Sour Science with
the Clifton Springs Library.

3D Printing and Scanning
with the Phelps Library
& STEAM Lab Makerspace

Design and Manufacturing
with Nick Hargarther

Crocheting Classes
with Yarnthusiast

Roc City Laser's
Glowforge Laser Cutting

Healthy Science with
Clifton Springs YMCA

Felted Bookmarks
with Feathertree Felt

Exploring the Microscopic World
with Infinite Scope

STEM Challenges with
Pioneer Library System

Blockprinting

Music and Math with
CHORDTEACHER

Patriot Energy - Ambit
on starting a successful,
profitable small business

Engineering Paper
Windows Stars with
Victor Farmington Library

Jewelry Making
with Seamist Designs



phelpslibrary.org/flxmf-home



phelpslibrary.org/flxmf-home



HOW DOES THIS
APPLY TO LYONS CSD?

Have a Science & Engineering Fair
(funded by someone else!)

STEAM Lab Makerspace

STEM Explorers

STEAM Camps

FLX Maker Fest

STEAM Consultation





HOW DOES THIS
APPLY TO LYONS CSD?

Use your Peers



HOW DOES THIS
APPLY TO LYONS CSD?

Use your Peers

Build partnerships

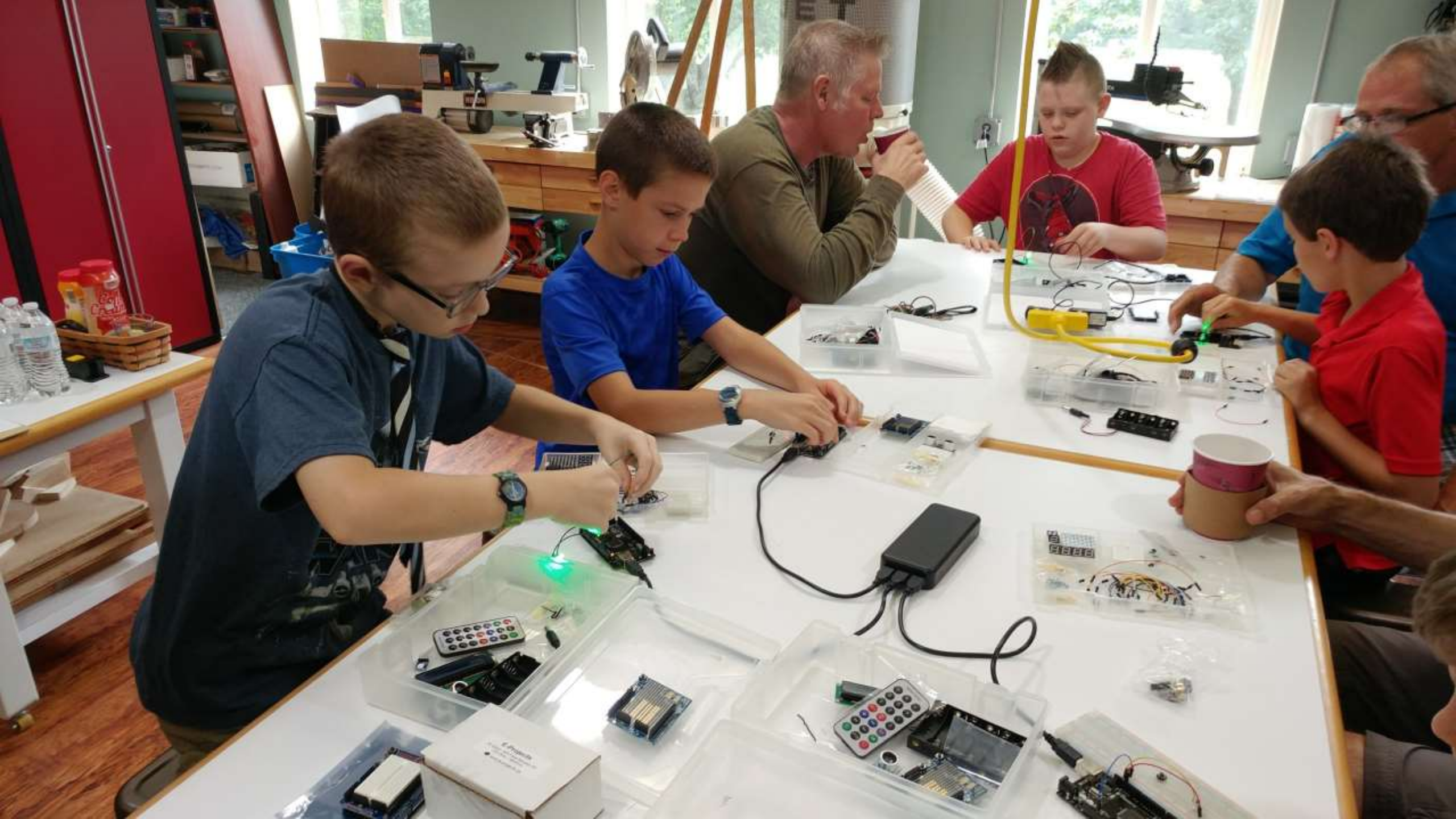


HOW DOES THIS APPLY TO LYONS CSD?

Use your Peers

Build partnerships

Parents





HOW DOES THIS APPLY TO LYONS CSD?

Use your Peers

Build partnerships

Parents

Call me anytime!

STEAM Lab Makerspace

STEM Explorers

STEAM Camps

FLX Maker Fest

STEAM Consultation

STEAM Scholarship





HOW DOES THIS
APPLY TO LYONS CSD?

Bring Awareness to CTE Pathways



HOW DOES THIS
APPLY TO LYONS CSD?

Bring Awareness to CTE Pathways

Parents, Advisors, Administrators, Manufacturers

The background of the image is a close-up, slightly blurred view of an open book. The pages are white with black text, and the book's spine is visible on the left. A semi-transparent white rectangular box is centered over the book, containing the quote and the attribution.

**“EDUCATION IS THE MOST
POWERFUL WEAPON WHICH YOU
CAN USE TO CHANGE THE WORLD.”**

~ Nelson Mandela ~

DATA

A NEW PATHWAY TO SUCCESS

1 . 2 . 7

Master's +

Bachelor's

Technical Skills

30%

(4+ YEARS
OF HIGHER ED)



82.7%





100 STUDENTS



17



WORKFORCE
MILITARY
BASEMENT MAN CAVE



30



WORKFORCE
MILITARY
BASEMENT MAN CAVE



53!







**Maybe
it's time
we rethink
things.**



HEADING TO
SCHOOL
60 COLLEGE
LOCATIONS

GW LISK Co. Inc **NOW HIRING**

Production Openings

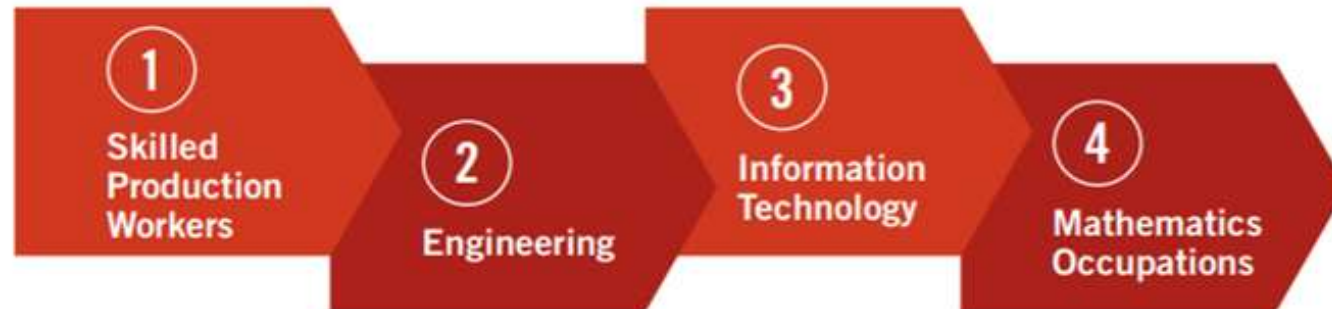
- CNC Machinists
- Assembly/Operators
- Skilled Trades

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Regions experiencing most difficulty filling jobs



STEM jobs hardest to fill currently, and projected to have shortages over the next 5-10 years



Bridging the STEM Skills Gap: Employer/Educator Collaboration in New York

Issued in 2017 by The
Public Policy Institute of
New York State

The Skills Gap in U.S. Manufacturing: 2015 & Beyond

Manufacturing Institute

Figure 1: Skills gap in the U.S. manufacturing industry, 2015-2025

The skills gap is widening

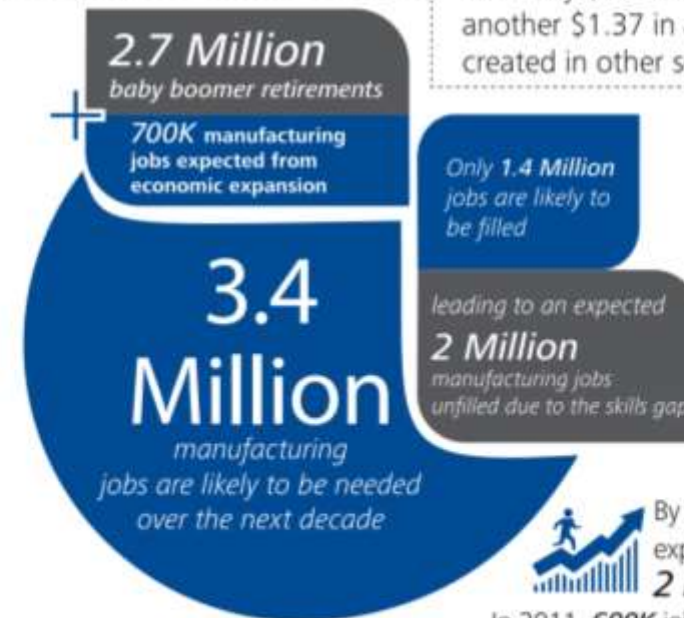
Over the next decade nearly 3 ½ million manufacturing jobs will likely be needed and



The implications are significant

Every job in manufacturing creates another 2.5 new jobs in local goods and services.

For every \$1 invested in manufacturing, another \$1.37 in additional value is created in other sectors.



Source: Deloitte analysis based on data from U.S. Bureau of Labor Statistics and Gallup Survey.

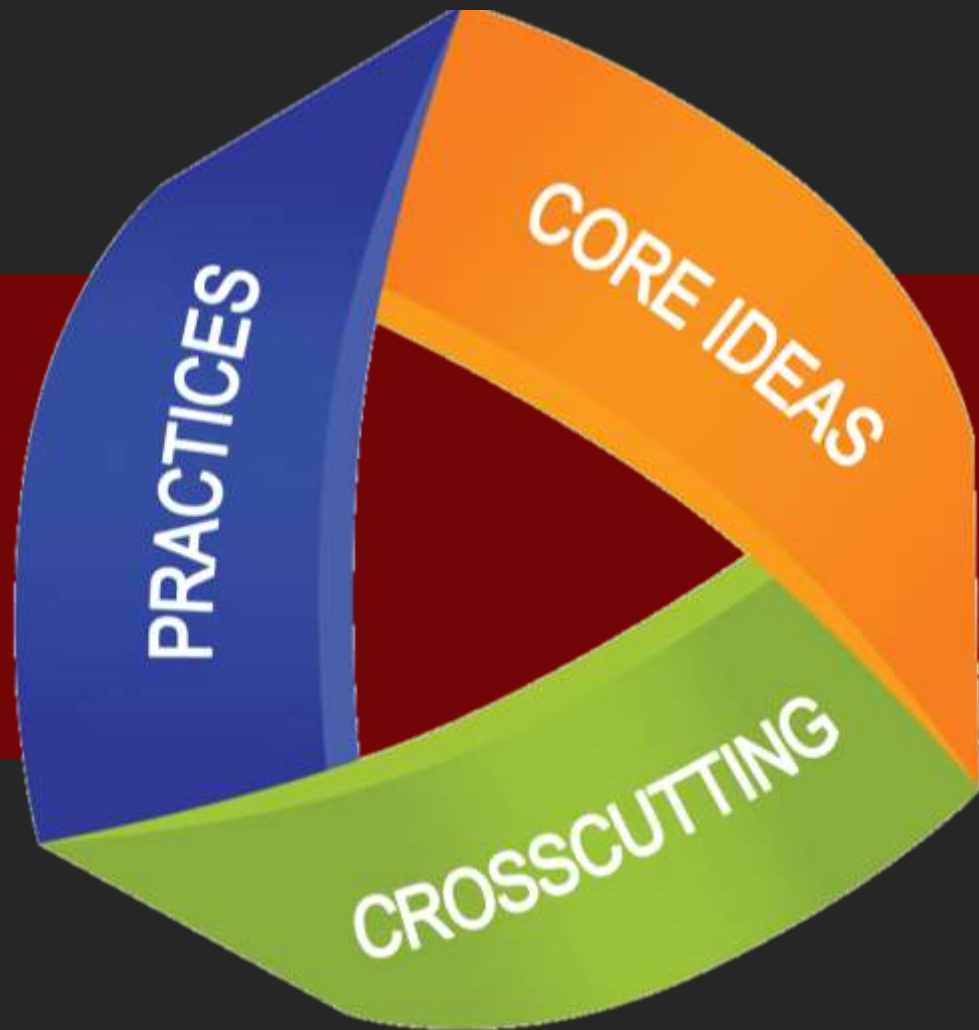
By 2025 the skills gap is expected to grow to **2 million**

In 2011, **600K** jobs were unfilled due to the skills gap

A large, rustic wooden wagon wheel is the central focus, partially obscured by a semi-transparent dark band. The wheel is made of weathered wood with several spokes. The background is a lush field of tall green grass and foliage, with some small white flowers visible. The overall lighting is warm and natural, suggesting a sunny day.

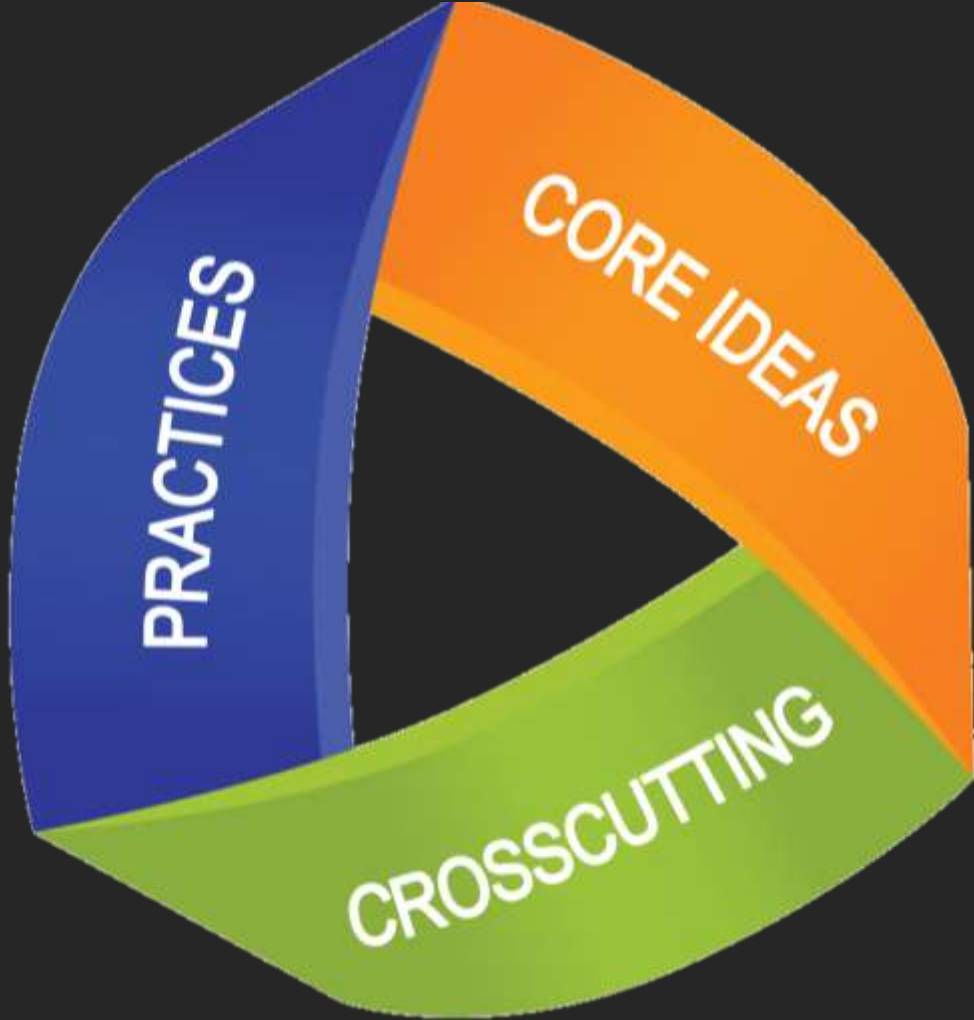
METHODS

THREE DIMENSIONAL TEACHING & LEARNING



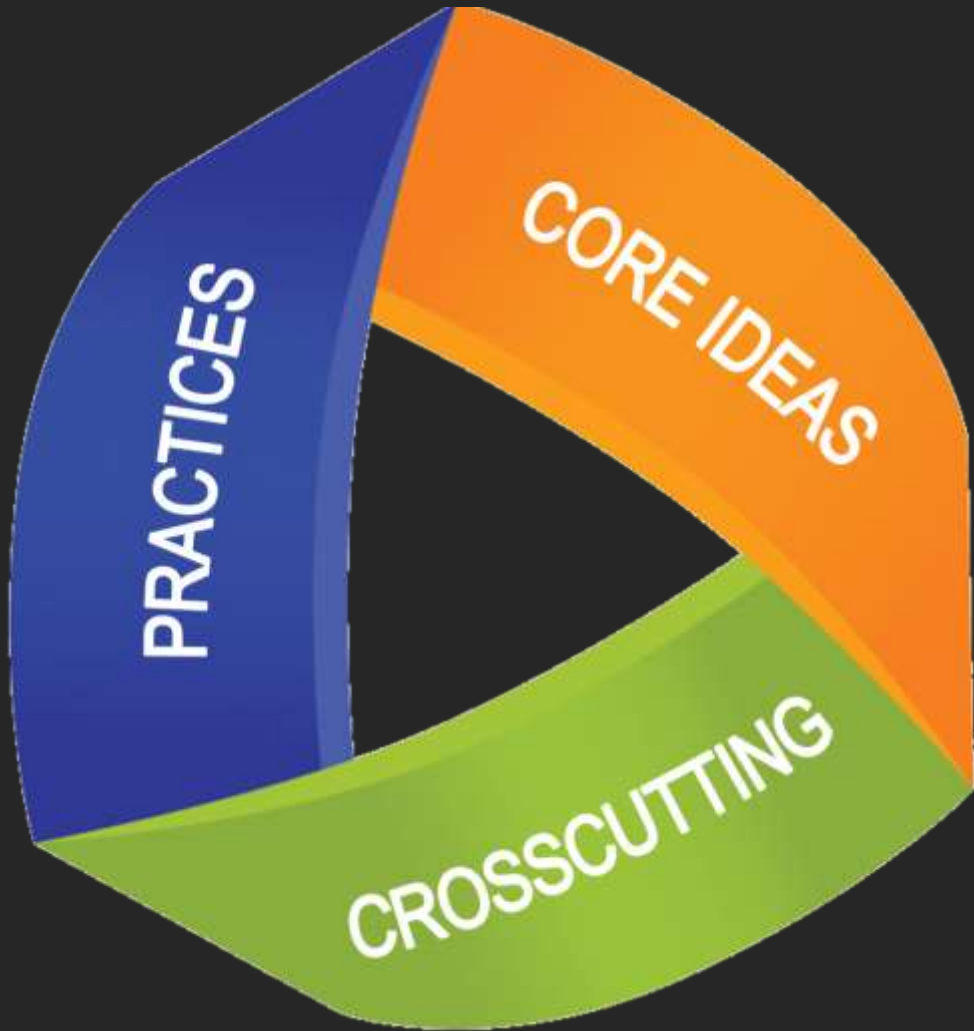
THREE DIMENSIONAL LEARNING

**NEXT GENERATION
SCIENCE STANDARDS (NGSS)**



DO IT

Build something
Design a solution
Job Shadowing
Take something apart
Fail
Try Again

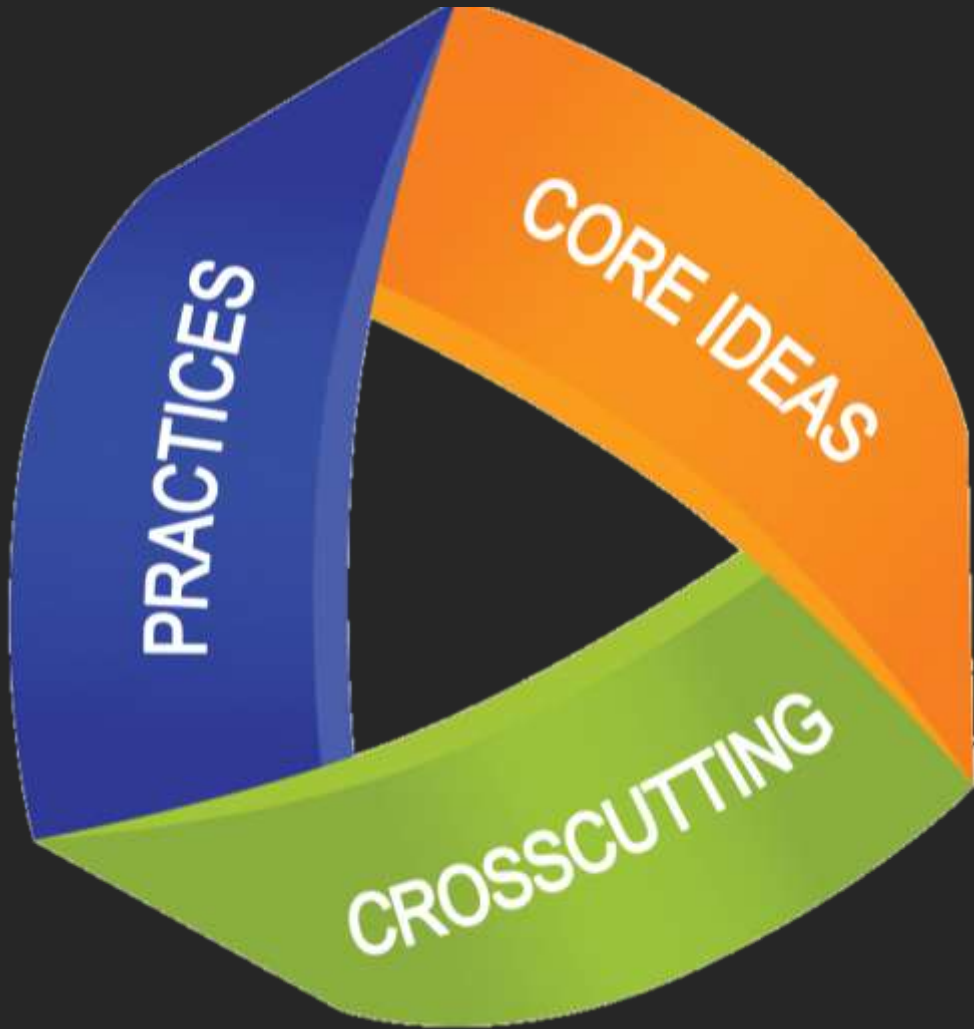


SEE IT

Go on field trips
Learn how things work
Discover
Explore



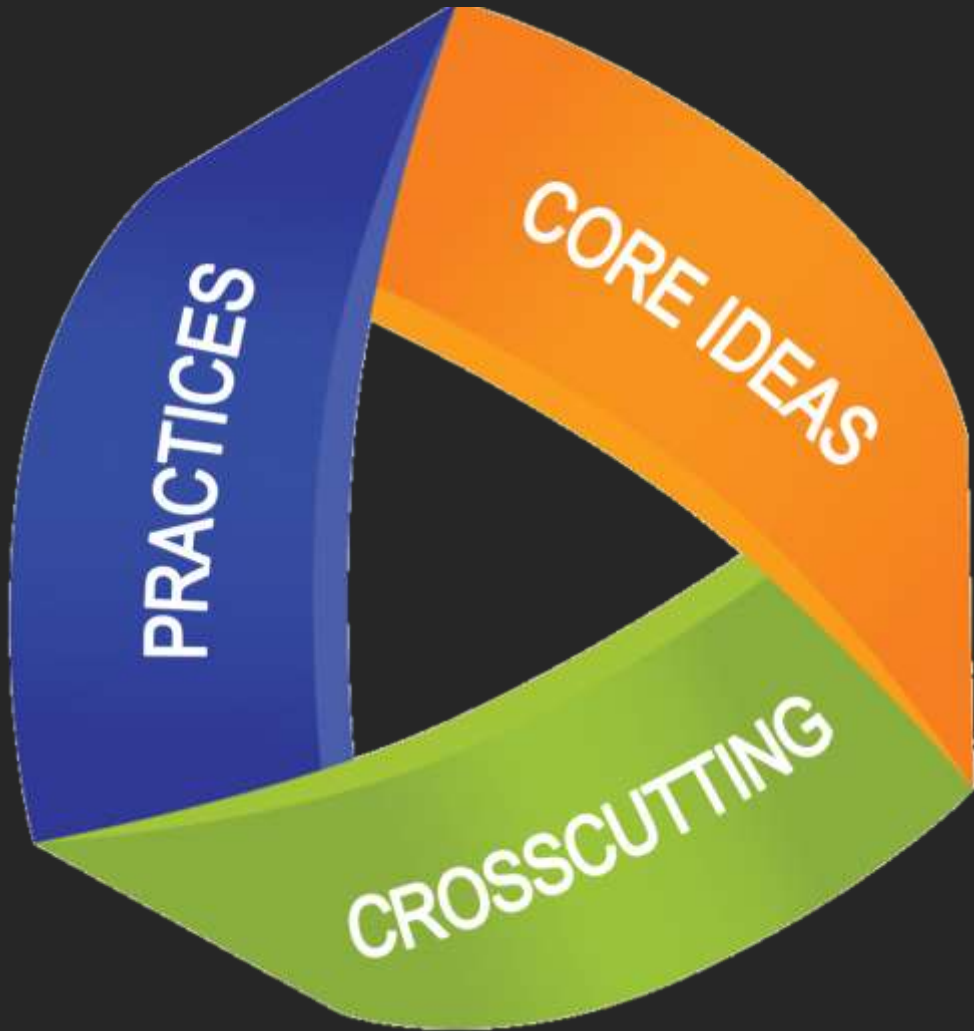
Field Trips and Job Shadowing



TALK IT

Ask Questions:

- 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 what is going on?



TALK IT

Ask Questions

Work in groups

Brainstorm

Presentation

Introduce vocabulary

Accelerate

Increase

Decrease

Optimize

Adapt

Lighten

Elevate

Reinforce

Alleviate

Maximize

Eliminate

Stabilize

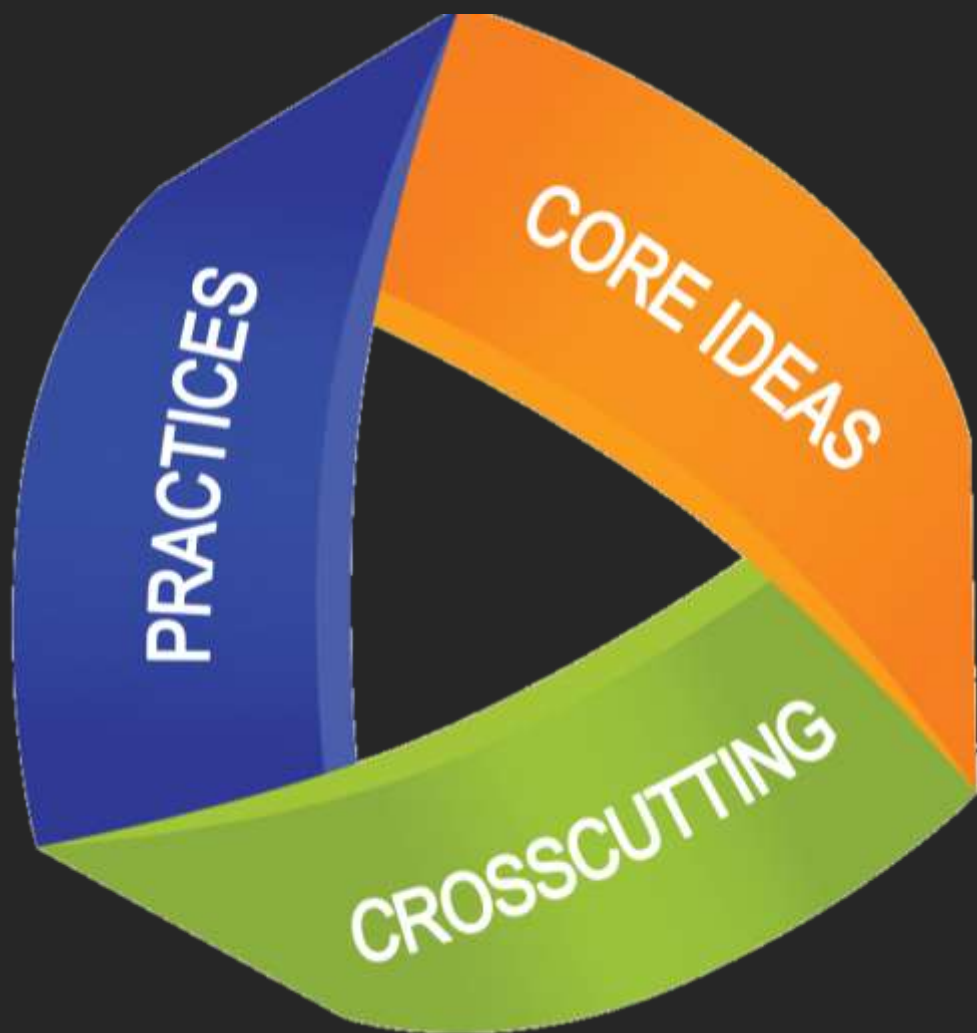
Condense

Minimize

Improve

Strengthen

ENGINEERING VERBS

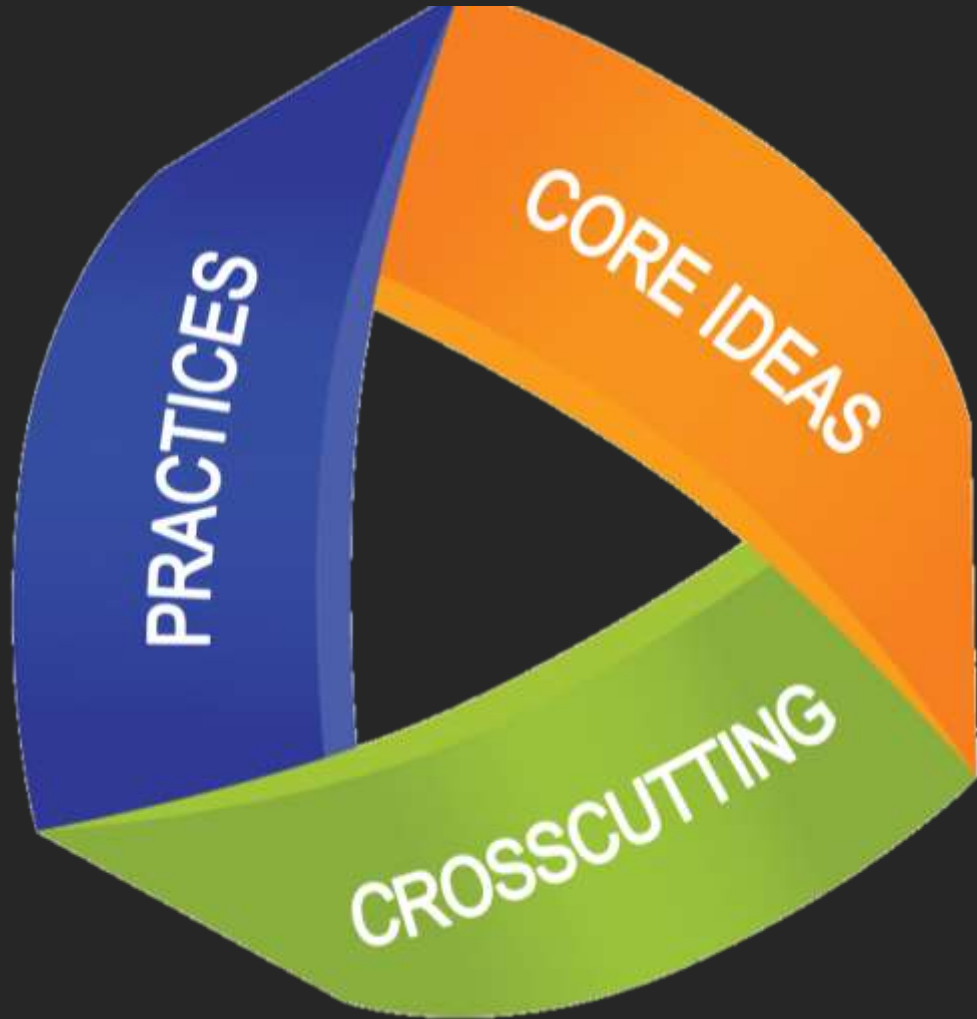


READ IT

Non-fiction

Picture book

Online research



WRITE IT

Make a list of materials

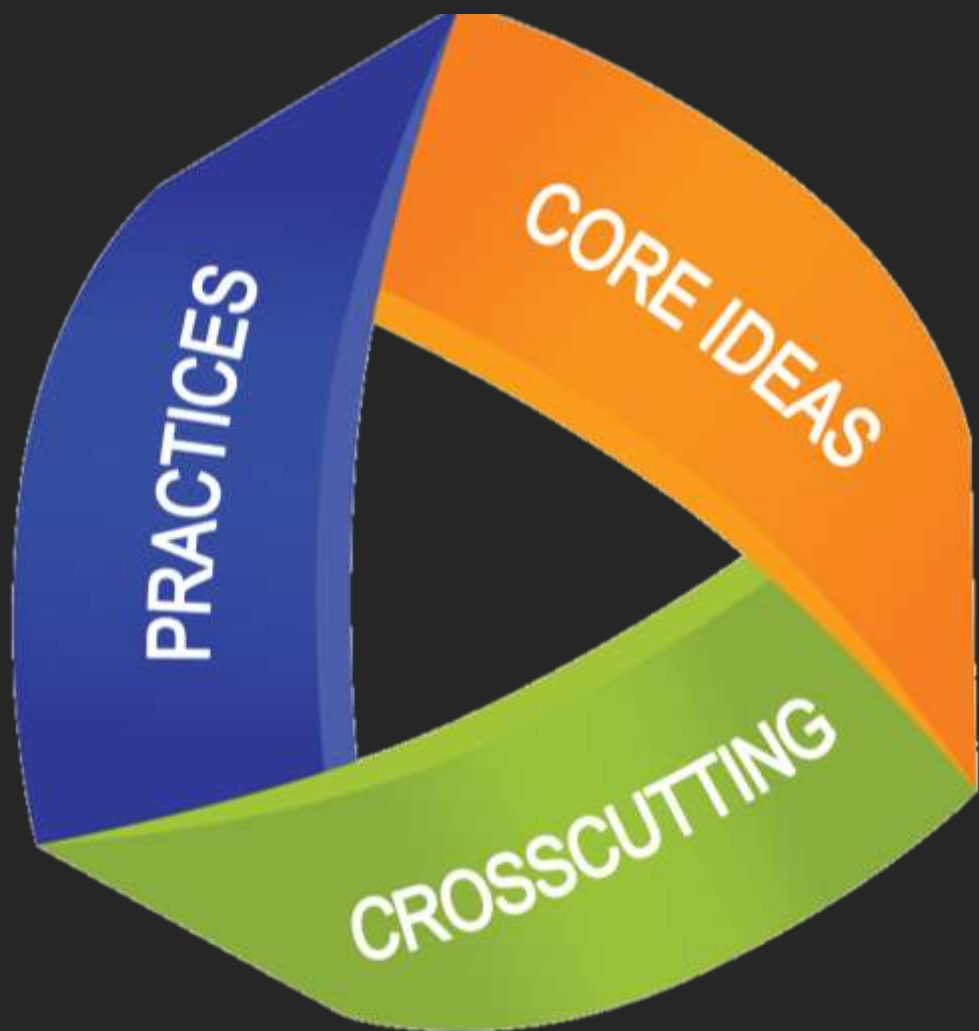
Draw a design

Color a picture

Compose a story or song

Make a video

List the steps that made it
successful



DO IT
SEE IT
TALK IT
READ IT
WRITE IT

Medical Man's Midnight Friend.



GUTTA PERCHA SPEAKING TUBE.

Testimonials.

From HENRY ASHTON, Esq., Surgeon.
Walton, near Preston, Dec. 11th, 1850.

I have had Gutta Percha Tubing carried from my front door to my bedroom, for the transmission of communications from my patients *in the night*. I have it brought to my pillow, and am able with the greatest facility to hold any communication with the messenger in the street, without rising to open the window, and incurring exposure to the night air. It gives me great satisfaction in being able to recommend to my medical brethren, an article so cheap and easy of adoption, which will save them from the injurious effects of being exposed to a current of cold air from an open window the moment they rise from their beds.

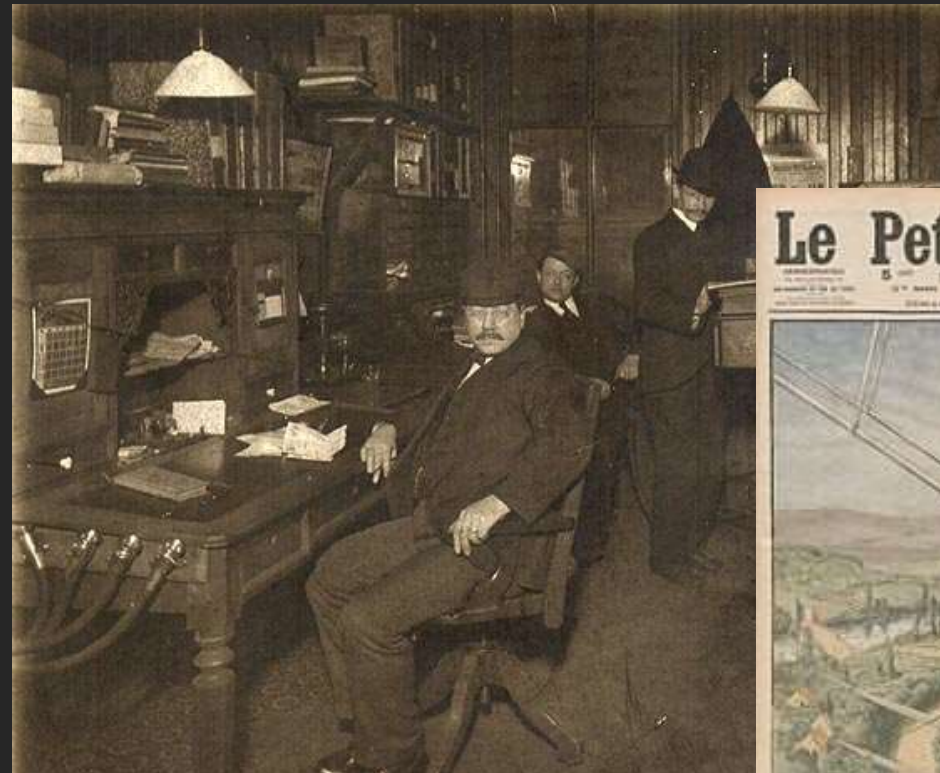
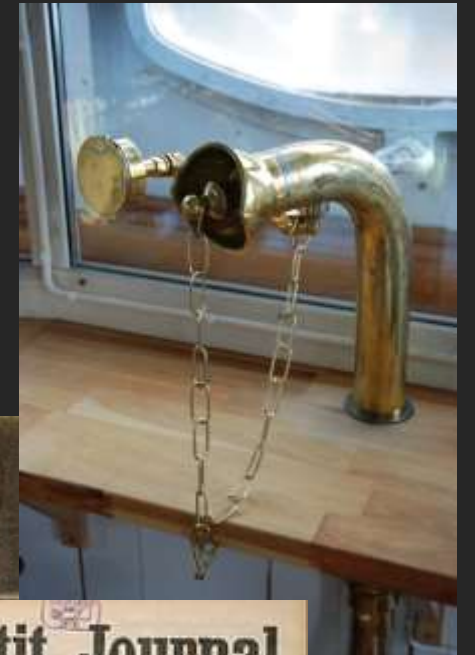
From Messrs. WALL & TROUNCER,
SURGEONS, &c.

6, Mount-st., Grosvenor Square, Jan. 22, 1851.

We state, with satisfaction, that the Gutta Percha Tubing fitted up by Mr. H. C. Dulley, 18, Wilderness Row, communicating between the street and the bed chamber, answers our expectation as a conductor of sound, and that the necessity of going down stairs, or opening the window to receive messages from our nightly visitors, is thus obviated. It is, therefore, with confidence we recommend all exposed to this inconvenience of our profession to adopt a similar plan.

THE GUTTA PERCHA COMPANY, PATENTEES,
18, WHARF ROAD, CITY ROAD, LONDON.

19th Century Speaking Tubes



READ IT

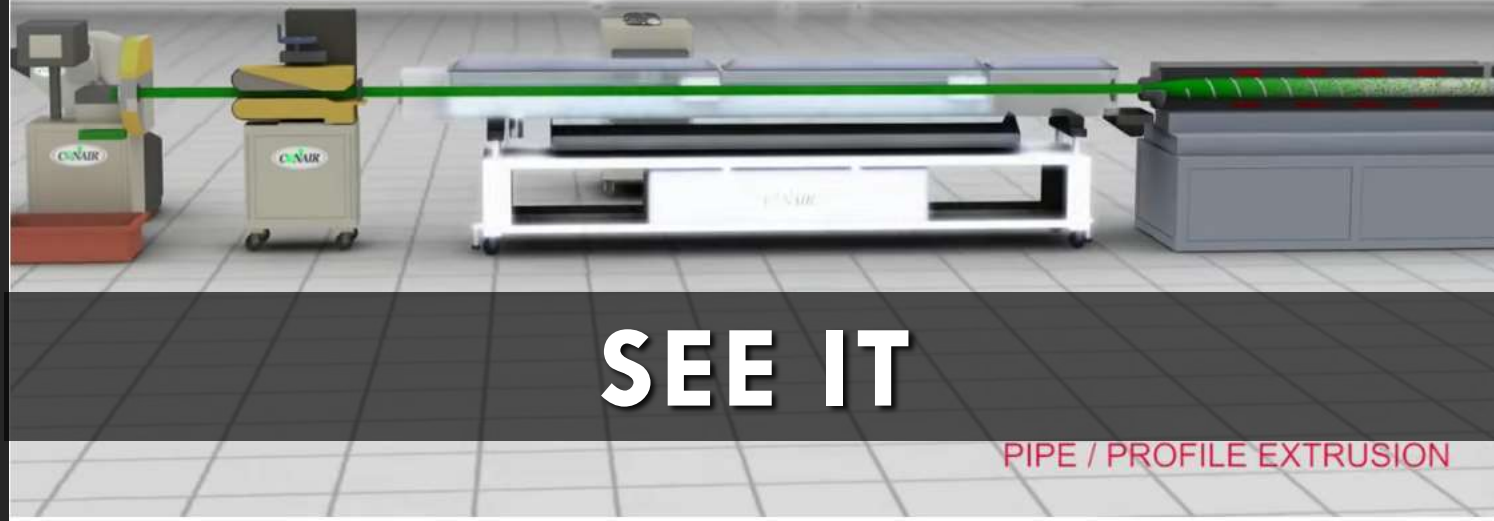


TALK IT



WRITE IT

An overview of
Plastic Processes



SEE IT

PIPE / PROFILE EXTRUSION



DO IT

- HISTORY OF SPEAKING TUBES
- PLASTICS MANUFACTURING
- PLASTIC AROUND US – HOW WAS IT MANUFACTURED?
- ENVIRONMENTAL IMPACT OF PLASTICS
- MANUFACTURING WASTE AND REGRINDING
- DISPOSABLE SOCIETY DISCUSSION
- DESIGN & SKETCH A DESIGN IN AREA
- SPACE PLANNING WITH MEASURING TAPES
- CALCULATE LENGTH OF PVC PIPE/# OF ELBOWS
- BUILD DESIGNS FROM STRAWS AND TAPE
- PRESENT DESIGN TO CLASS: WHERE TO INSTALL? WHY? WHAT UNIQUE FEATURES? ISSUES?
- WITH SAFETY GLASSES ON, MEASURE PIPE, PLACE IN VISE, USE HAND HACKSAW TO CUT PVC



The background of the image is a close-up of an artist's palette and a row of paint containers. The top portion shows a palette with various colors of paint, including red, orange, yellow, and blue, some of which are smeared and mixed. Below the palette is a row of several rectangular paint containers, each filled with a different color of paint, such as green, dark blue, brown, purple, and light blue. The overall image has a textured, artistic feel.

PROJECTS

MAKING IT COME TO LIFE



Globe Trotting
Gabe Trionfi



Fashion Magic
Annie Lee



Recipes to try
Marlene Adeniga



Style for Him
Alexandra Bond



Delicious Eats
Ana Tassi



"STEM ACTIVITY"



"STEM ACTIVITY"
"ALUMINUM FOIL"

code.org

C

O

D

E

Dance Party



Dance Project

By: J Age: 18+



Hey Ya Dogs!

By: B Age: 18+



Down to the Beat

By: D Age: 18+



So Fast Clapping

By: G Age: 18+

[View more Dance Party projects >](#)

Game Lab



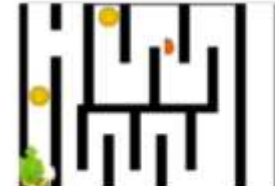
cranberry man fight

By: B Age: 13+



Balloon Collector

By: A Age: 13+



By: J Age: 13+



YouTube All Star Batt...

By: Z Age: 13+

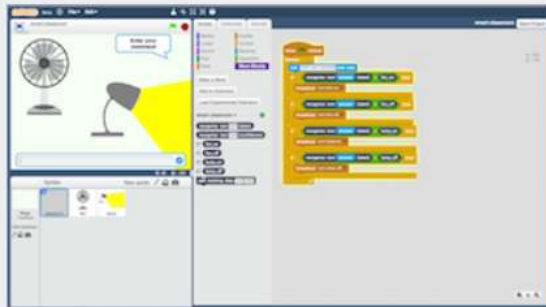
[View more Game Lab projects >](#)

machinelearningforkids.co.uk

Smart classroom

Create a smart assistant in Scratch that lets you control virtual devices.

Teach a computer to recognise the meaning of your commands



Difficulty: Beginner

Recognising: **text**

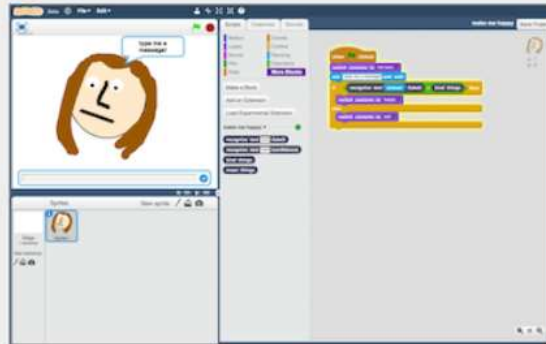
Tags: digital assistants, supervised learning

[Download](#)

Make me happy

Create a character in Scratch that smiles if you say nice things to it and cries if you say mean things to it.

Teach a computer to recognise compliments and insults



Difficulty: Beginner

Recognising: **text**

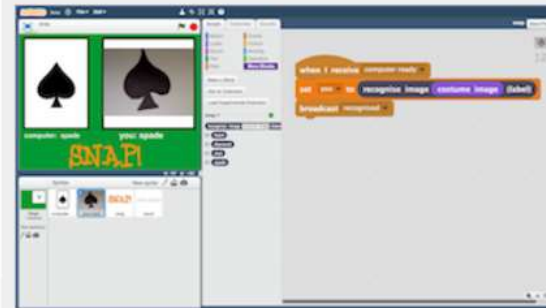
Tags: sentiment analysis, supervised learning

[Download](#)

Snap!

Make a card game in Scratch that learns to recognise pictures of your card.

Teach a computer to recognise what icons look like



Difficulty: Beginner

Recognising: **images**

Tags: image classification, supervised learning

[Download](#)

Mailman Max

Make a postal sorting office in Scratch that can recognise handwritten postcodes on envelopes.

Teach a computer to recognise handwriting



Difficulty: Beginner


Recognising: **images**

Tags: optical character recognition, handwriting recognition, image classification, supervised learning


[Download](#)


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Lesson Plans


135 PDFs
22 million downloads





Ages


[4 - 7](#) | [8 - 12](#) | [12 - 14](#) | [14 - 18](#)

Category



 [New Lesson Plans](#)

 [Most Popular](#)

 [All Lesson Plans](#)

teachengineering.org

The screenshot shows the TeachEngineering website interface. At the top, the logo reads "TeachEngineering STEM curriculum for k-12". Navigation links include "BROWSE", "ABOUT TE", "SOCIAL", "ABOUT ENGINEERING", "GET INVOLVED", and "EDUCATIONAL STANDARDS". A search bar is located on the right. The "EDUCATIONAL STANDARDS" dropdown menu is open, listing options: "Browse by Educational Standards", "Common Core Math", "International Technology and Engineering Educators Association", and "Next Generation Science Standards". The main content area is titled "Browse by Standards" and features a "Narrow Results" section with a "Standards Source Organization" dropdown menu. This menu is open, showing a list of organizations including Montana, National Council of Teachers of Mathematics, National Science Education Standards, Nebraska, Nevada, New Jersey, New Mexico, New York (highlighted), North Carolina, and North Dakota. A blue box provides instructions: "To get started, select the standards source organization. Only organizations for which TeachEngineering has aligned curricula are listed." The footer contains links for "Policies", "Contact Us", "Sponsors", and "Sitemap", along with a disclaimer: "and this website constitutes acceptance of our Terms of Use and Privacy Policy". The University of Colorado Boulder logo and "Integrated Teaching & Learning Program" are also present.

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

Engineering Category

- ☐ Relating science and/or math concepts to engineering
- ☐ Partial design
- ☐ Full design

Time Required

0 to 1200+ minutes

clear all filters

www.nsta.org/

[\[Log In \]](#)

[Home](#) [About NGSS](#) [The Standards](#) [Curriculum Planning](#) [Classroom Resources](#) [Professional Learning](#) [NGSS News](#)

Curriculum Planning



Introduce a different way of thinking to your classroom

- › **Planning an NGSS Curriculum**
- › **Designing Units & Lessons**
- › **Selecting Materials**
- › **Conducting Assessments**

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/



Primary



PRIMARY COMPUTING

A guide to the best resources to support primary computing aligned to the English National Curriculum.



PRIMARY MATHEMATICS

A guide to the best resources to support primary mathematics aligned to the English National Curriculum.



PRIMARY SCIENCE

A guide to the best resources to support primary science aligned to the English National Curriculum.

ESERO-UK

Use the context of space to inspire and engage pupils with STEM subjects.

MEETING THE TEACHERS' STANDARDS

Inspirational ideas, guidance and ready-to-use resources to help you meet the Teachers' Standards.

TEACHING SCIENCE THROUGH CROSS-CURRICULAR TOPICS

Explore our series of resources supporting the teaching of science through cross-curricular topics.

TEACHING SCIENCE THROUGH STORIES

From Charlie and the Chocolate Factory to The Gruffalo, children's stories provide a great context for learning science.

BRING ENGINEERING INTO YOUR PRIMARY SCHOOL

There are plenty of ways you can inspire your pupils with the world and wonder of engineering.

THE SCIENCE OF LEARNING

The science of learning draws upon educational neuroscience and psychology to help you gain an insight into how students learn.

STEM CAREERS SUPPORT

A selection of resources, programmes and guidance to help you provide the best possible support to young people.

[www.stem.org.uk/
resources](http://www.stem.org.uk/resources)



www.engineergirl.org



Ford Partnership for
Advanced Studies

Teachers' Domain
Intel's Design and
Discovery Webpage
Design Squad Online
Workshop







Engineering Education
Service Center
Teacher Geek
Family Engineering

Discovery Education
Link Engineering



Siemens SustainU

SustainU Programs

Programs for Grades K-12	STEAM Learning	Sustainability Learning	For Grades
Career Exploration Students need to see what real world jobs look and feel like. Allow us to plan these out with your district, according to what your individual goals are. This could mean career days, field trips, job shadowing, and other unique ideas.			K-12
Energy Awareness You can promote sustainability and energy efficient practices in your schools with this collection of posters, light switch covers, stickers, and more!			K-12
Energy Enforcers Audit Siemens engineers take students through a building audit of their school; complexity varies based on grade level.			4-12
FUSE Studio FUSE is made up of interest driven challenges that focus on STEAM topics and the development of 21st century skills. FUSE has 25+ challenges in the areas of robotics, electronics, biotechnology, graphic design, 3D printing, Android app development and more. This exciting program was developed in partnership with Northwestern University OSEP.			5-12



www.careerinstem.com



CAREERS BY STEM DISCIPLINE

ENGINEERING

MATH

SCIENCE

TECHNOLOGY

urban planner

electrical engineer

landscape architect

automotive engineer

chemical engineer

computer hardware engineer

agricultural engineer

biomedical engineer

mechanical engineer

civil engineer

aerospace engineer



www.cpb.org/americangraduate

AMERICAN **GRADUATE**

— *GETTING TO WORK* SM



Corporation
for Public
Broadcasting

THE ENGINEERING DESIGN PROCESS

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

TEST

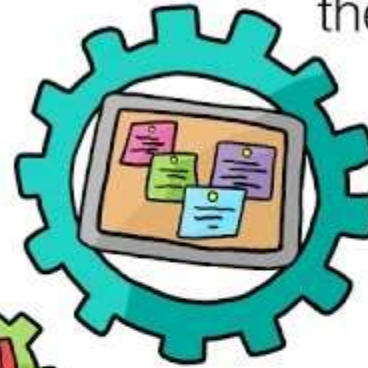
and evaluate your prototype

ITERATE

to improve your prototype

COMMUNICATE

your solution



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



A spiral-bound notebook with a light blue grid pattern is shown. A blue pen with a silver tip and clip is resting diagonally across the notebook. A dark grey horizontal band is overlaid across the middle of the notebook, containing the text.

CHALLENGES

MAKING IT ALL HAPPEN

Know that you
don't need to be an

Expert





Promote scientific inquiry.



**Change your
vocabulary.**

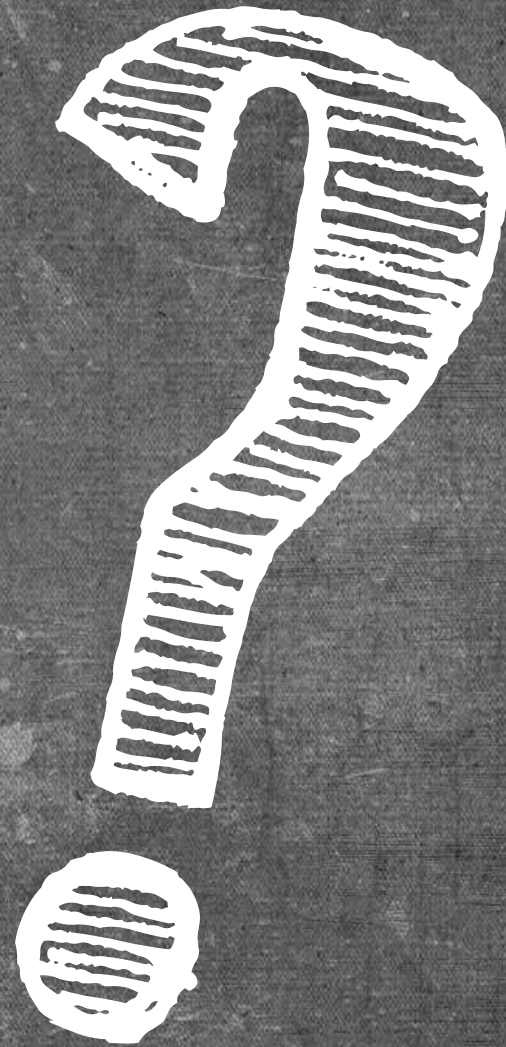
“The biggest challenge and the biggest opportunity
for the maker movement is to
transform education.

My hope is that the agents of change will be the
students themselves.”

- Dale Dougherty, Founder of *MAKE* magazine

<https://llk.media.mit.edu/courses/readings/maker-mindset.pdf>

Ask
WHY





**Be aware that not
everyone is as open
to change as
you
might
be.**



**Be aware that not
everyone is as open
to change as
you
might
be.**

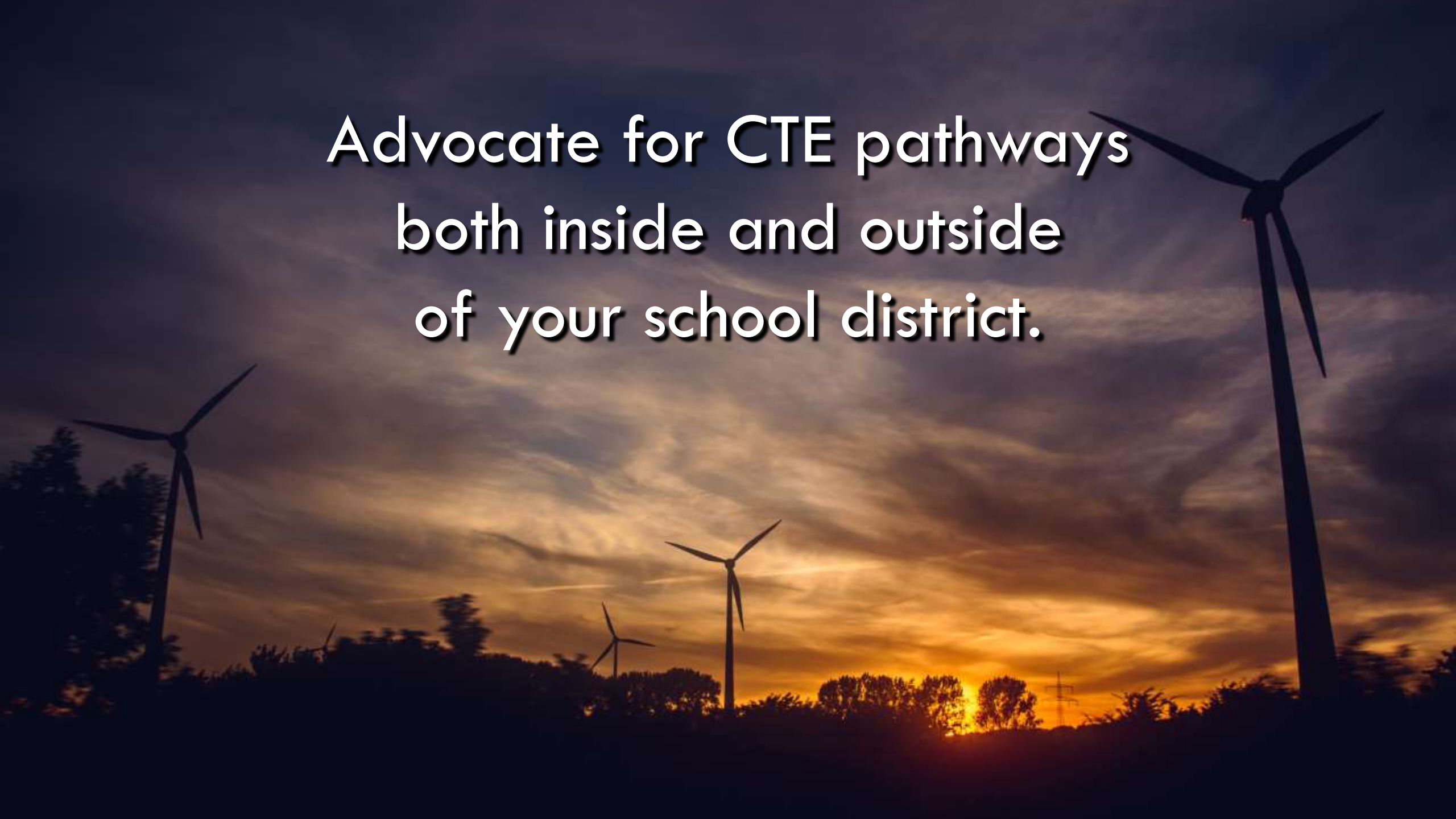


Remove all
preconceived
notions of what
you can
and/or can't
do as an
educator.

Think beyond
the outside of that
proverbial box.



Advocate for CTE pathways
both inside and outside
of your school district.





Start
meaningful
conversations.



Start
meaningful
conversations.

Advocate.

**REAL-
WORLD
APPLICATION!**



Enter through the back door.

A person in a dark jacket and orange pants stands on a dark, mossy rock formation, looking out over a massive, powerful waterfall. The water is white and turbulent as it falls into a pool below. The surrounding landscape is rugged and green, with hills in the background under a cloudy sky. The text "Be brave." is overlaid on the left side of the image.

Be brave.

A close-up photograph of a person's hand holding a small, white rectangular card. The hand is positioned on the left side of the frame, with the thumb and index finger gripping the card. The card is held horizontally and features the word "Collaborate." printed in a bold, black, sans-serif font, repeated three times in a vertical stack. The background is out of focus, showing a dark suit jacket on the left and a light-colored shirt with buttons on the right.

Collaborate.
Collaborate.
Collaborate.

MACGYVER

HIS MIND IS THE ULTIMATE WEAPON





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