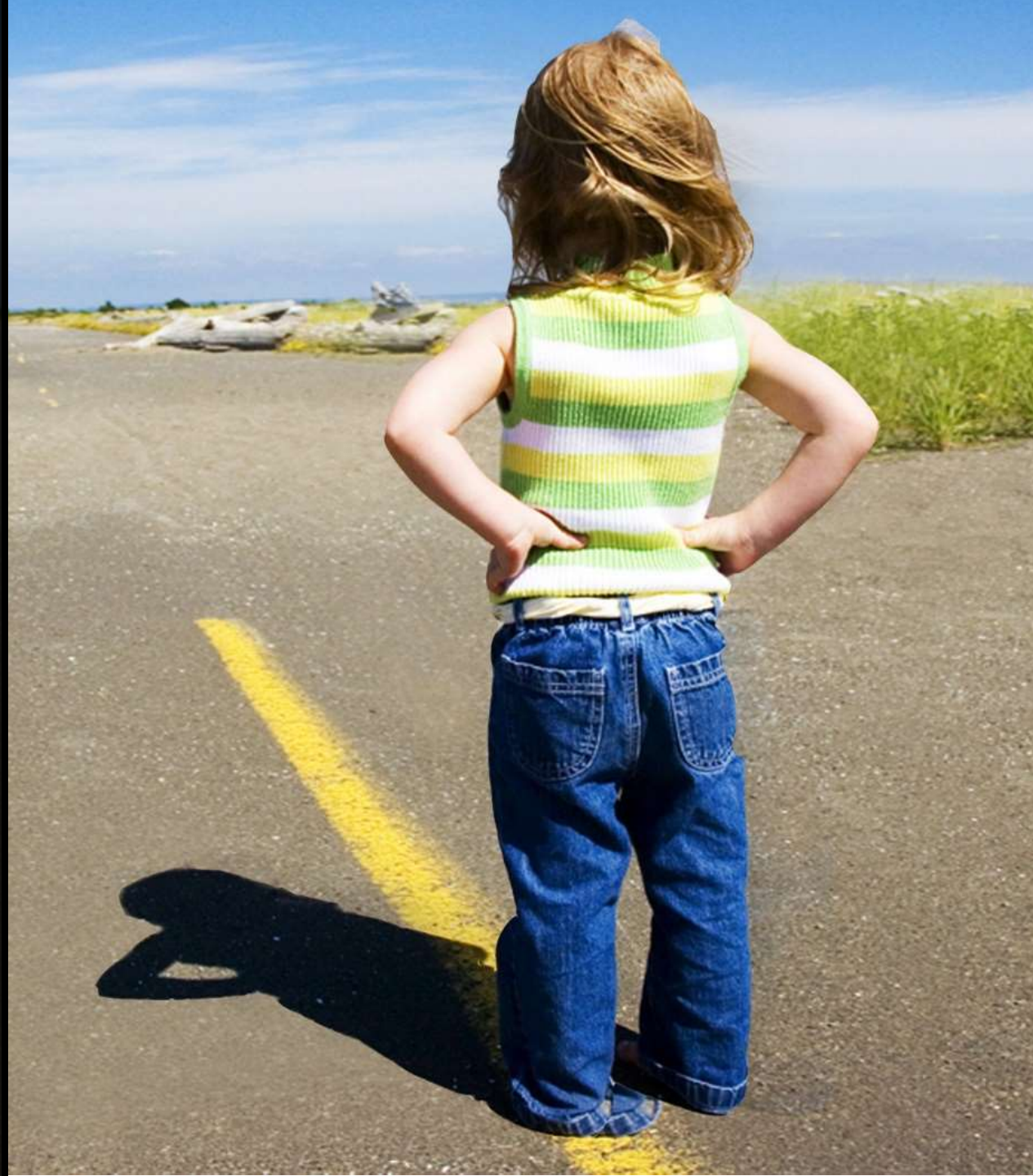
AFTER THE SCHOOL BELL RINGS:

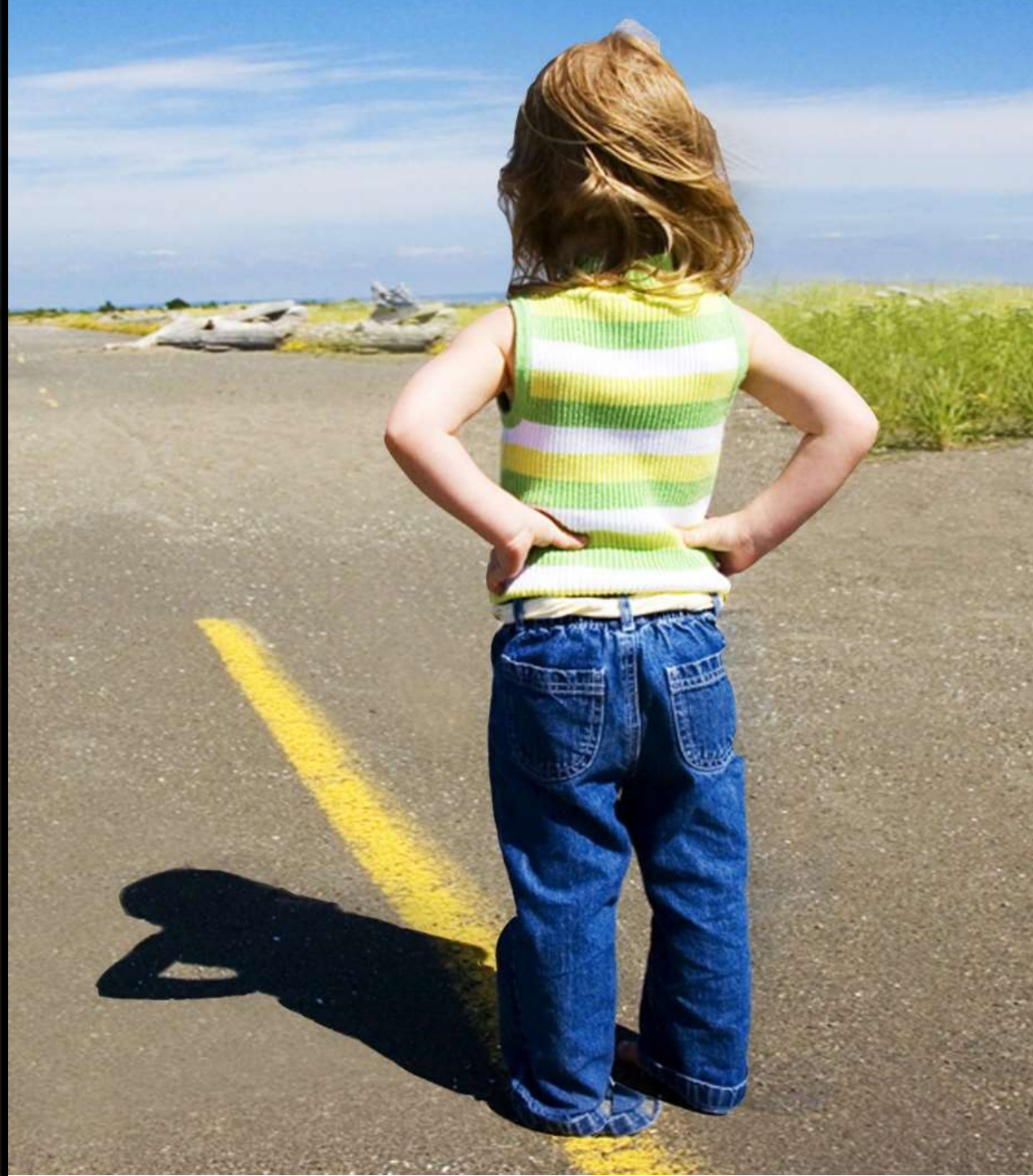
STEAMING UP YOUR PROGRAMS

Leah Hamilton

Phelps Library
& STEAM Lab Makerspace
Phelps, New York



1. STEAM Initiative
2. Data
3. NGSS
4. Projects
5. Challenges



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?

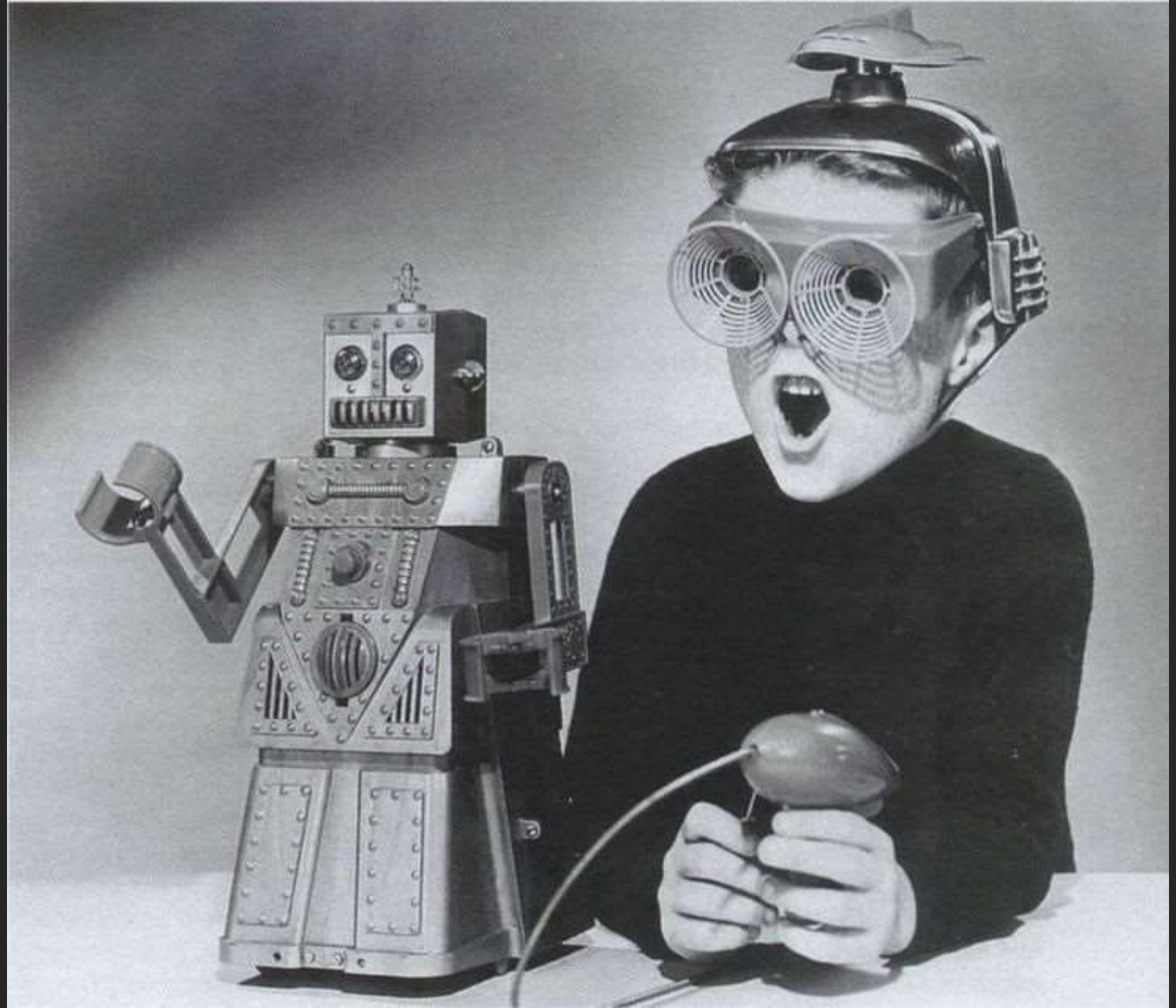
Makerspace vs. Maker Kits

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
Adapt
Alleviate
Condense

Increase
Lighten
Maximize
Minimize

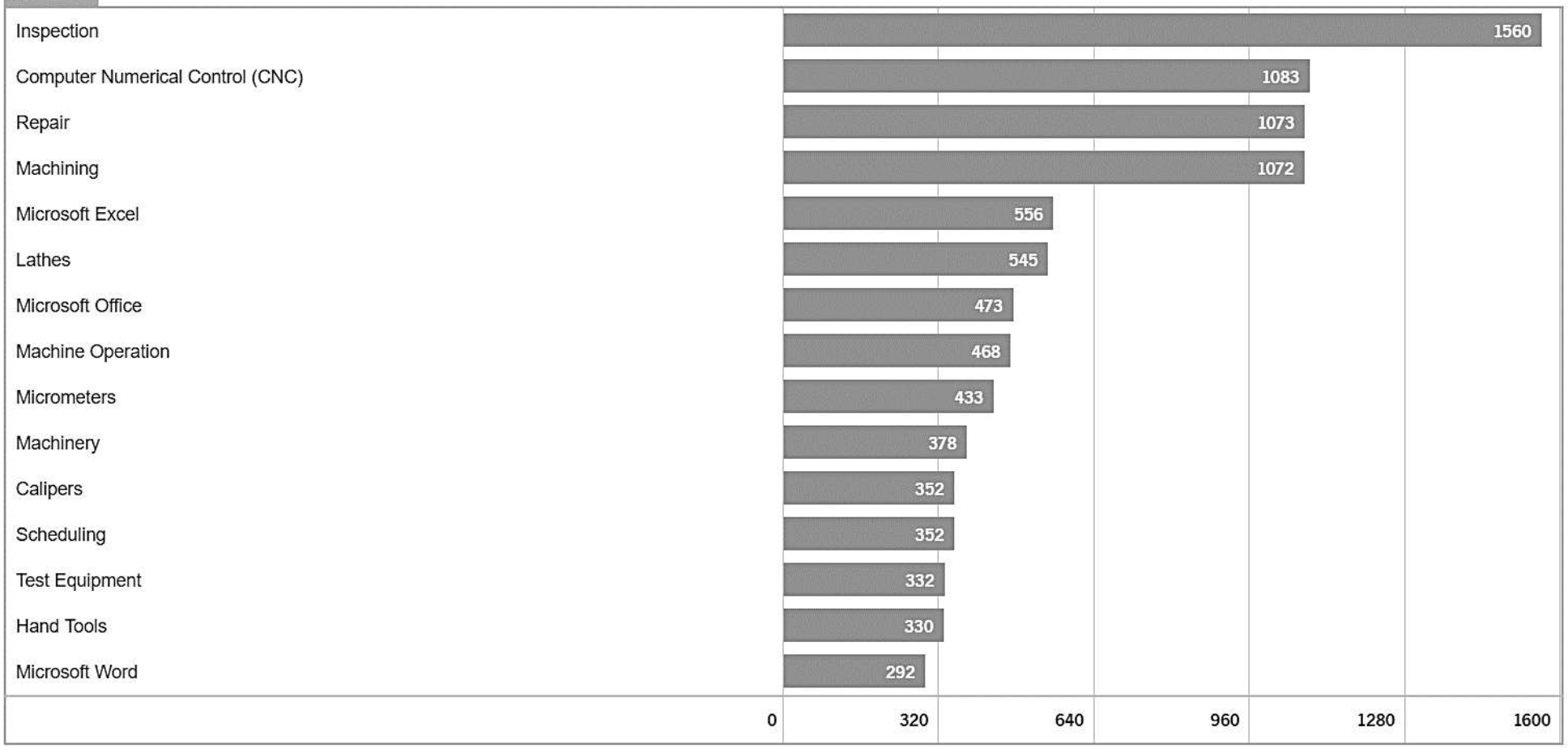
Decrease
Elevate
Eliminate
Improve

Optimize
Reinforce
Stabilize
Strengthen

ENGINEERING VERBS

AGGREGATE CLUSTER - MANUFACTURING

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

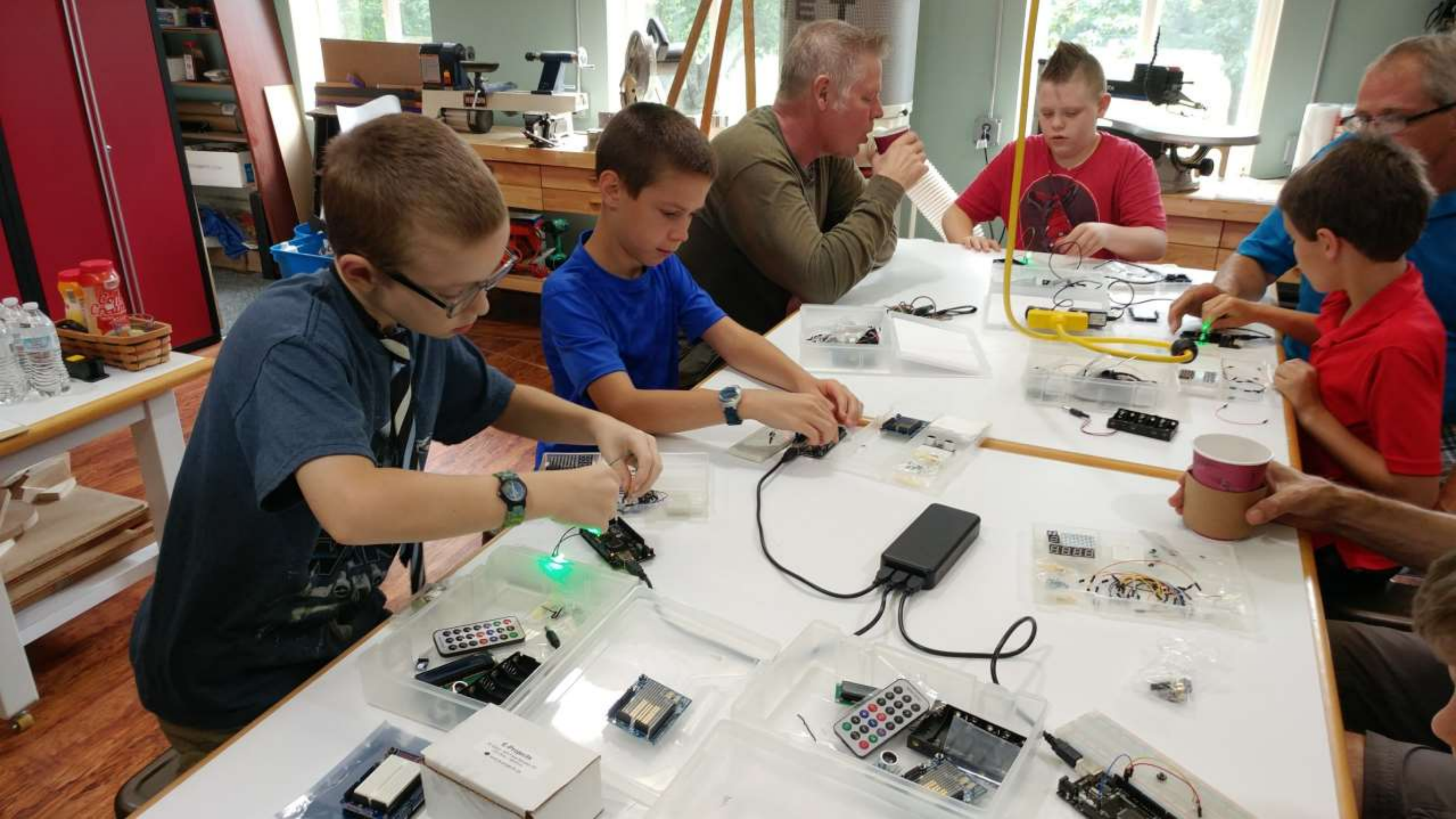
Build partnerships

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

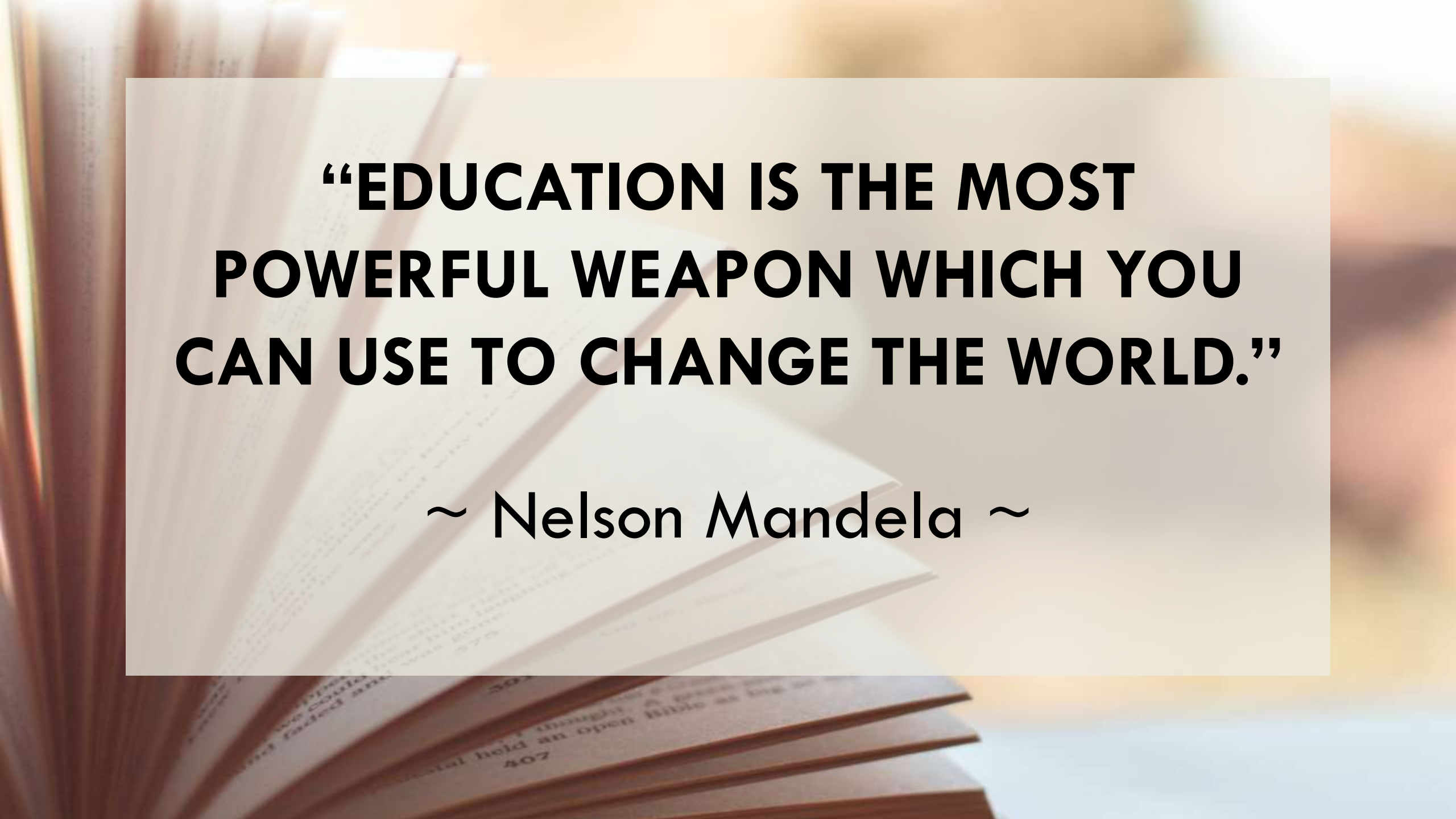
HOW DOES THIS APPLY TO LYONS CSD?

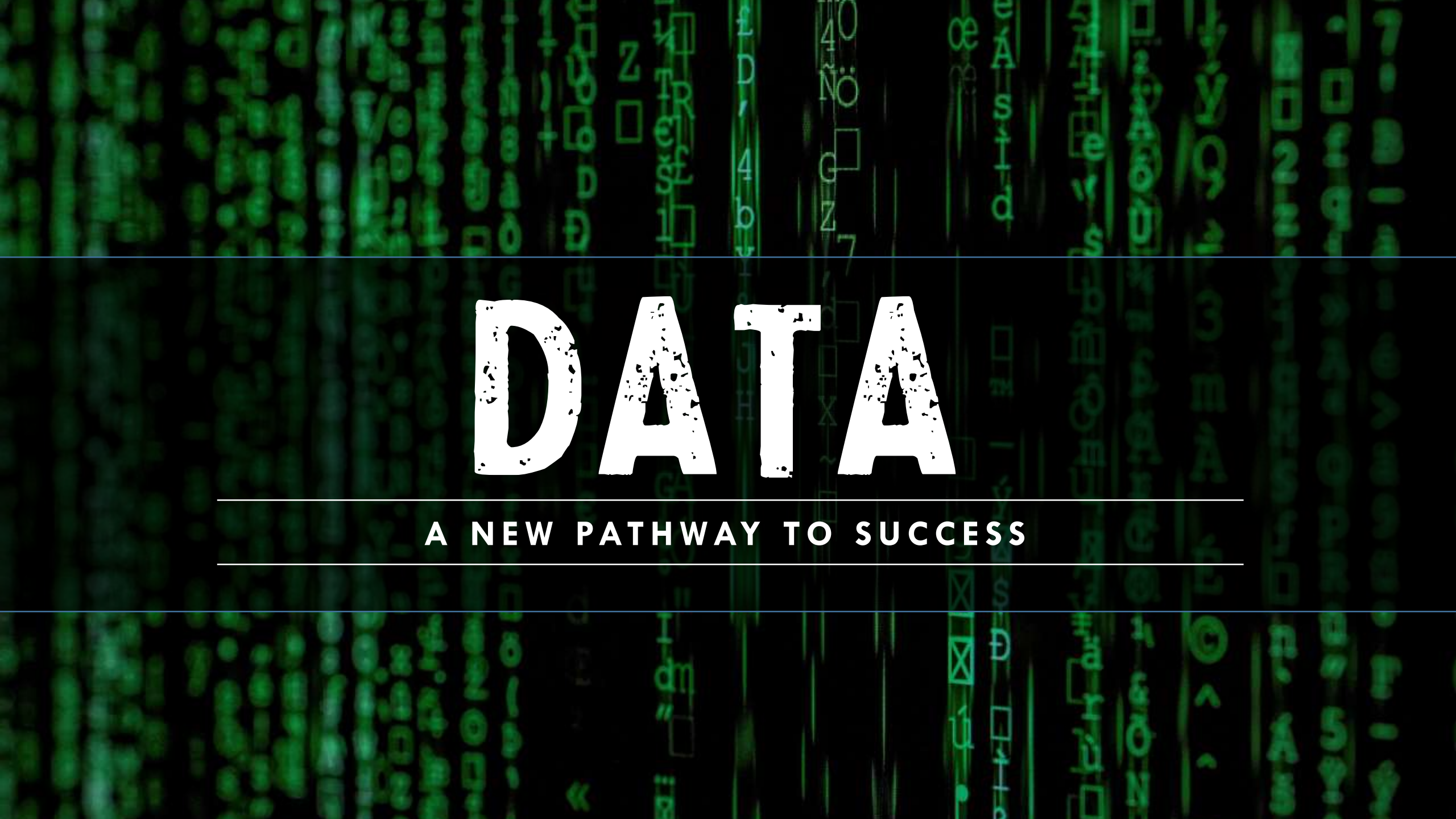
Bring Awareness to CTE Pathways

HOW DOES THIS APPLY TO LYONS CSD?

Bring Awareness to CTE Pathways

Parents, Advisors, Administrators, Manufacturers


“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%

http://www.p12.nysed.gov/irs/statistics/hsgrads/2010/table1.pdf

100 STUDENTS

17

WORKFORCE
MILITARY
BASEMENT MAN CAVE

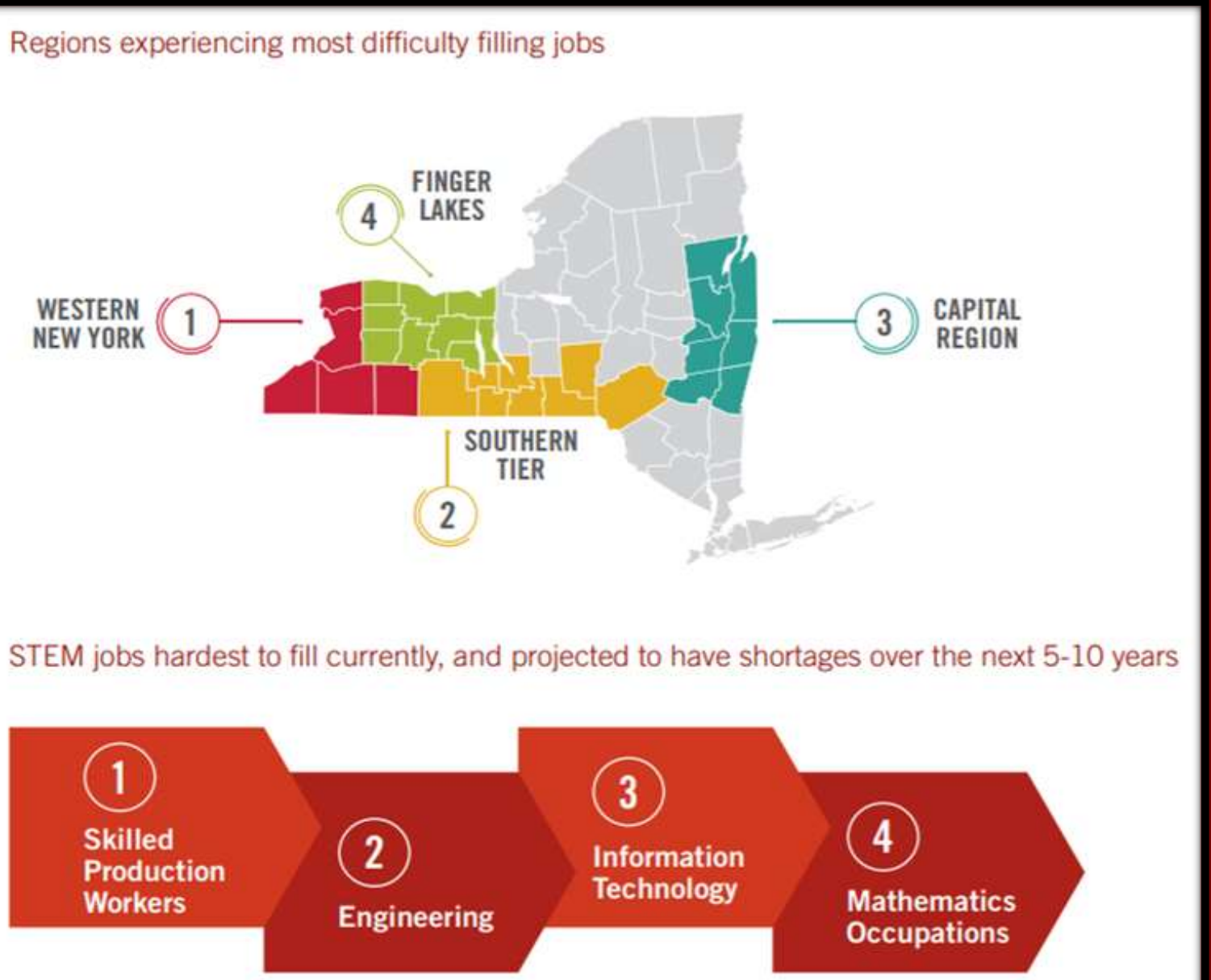
30

WORKFORCE
MILITARY
BASEMENT MAN CAVE

53!

Maybe it's time we rethink things.

COMMUNITY BANK, N.A.
24 Hour ATM
HEADING TO SCHOOL
60 COLLEGE LOCATIONS
GW LISK Co. Inc
NOW HIRING
Production Openings
• CNC Machinists
• Assembly/Operators
• Skilled Trades
Apply Online Today
www.gwlisk.com/lisk-careers



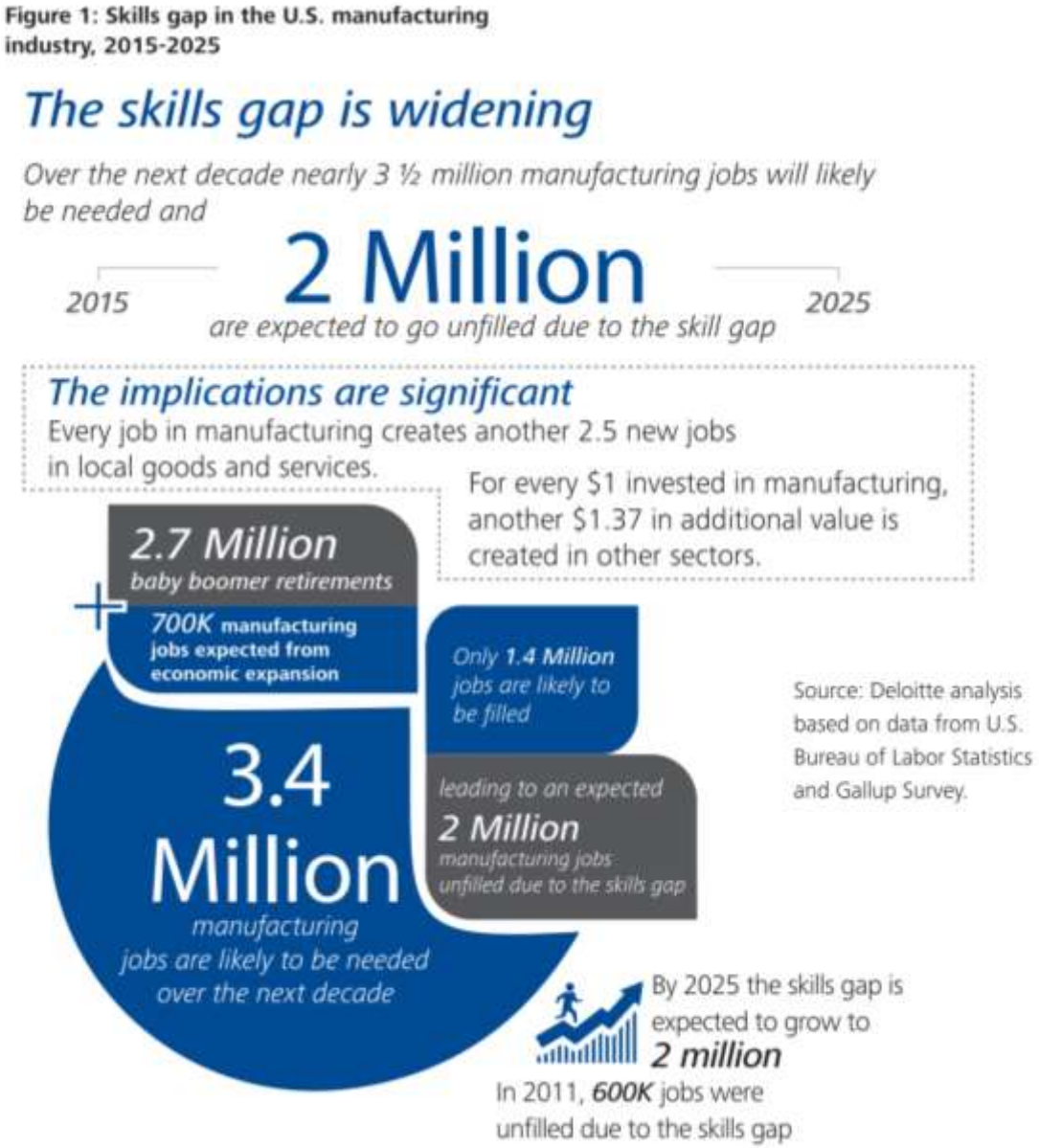
Bridging the STEM Skills Gap: Employer/Educator Collaboration in New York

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

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

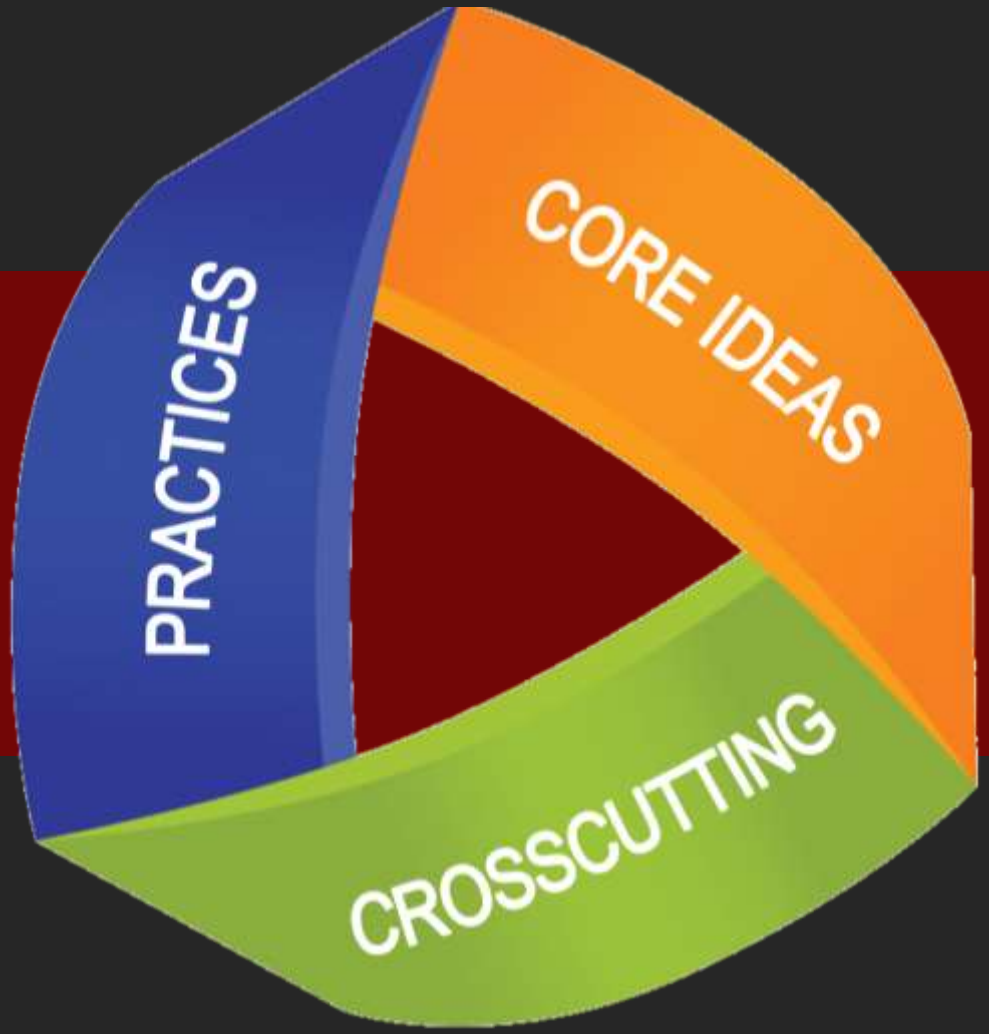
Manufacturing Institute

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



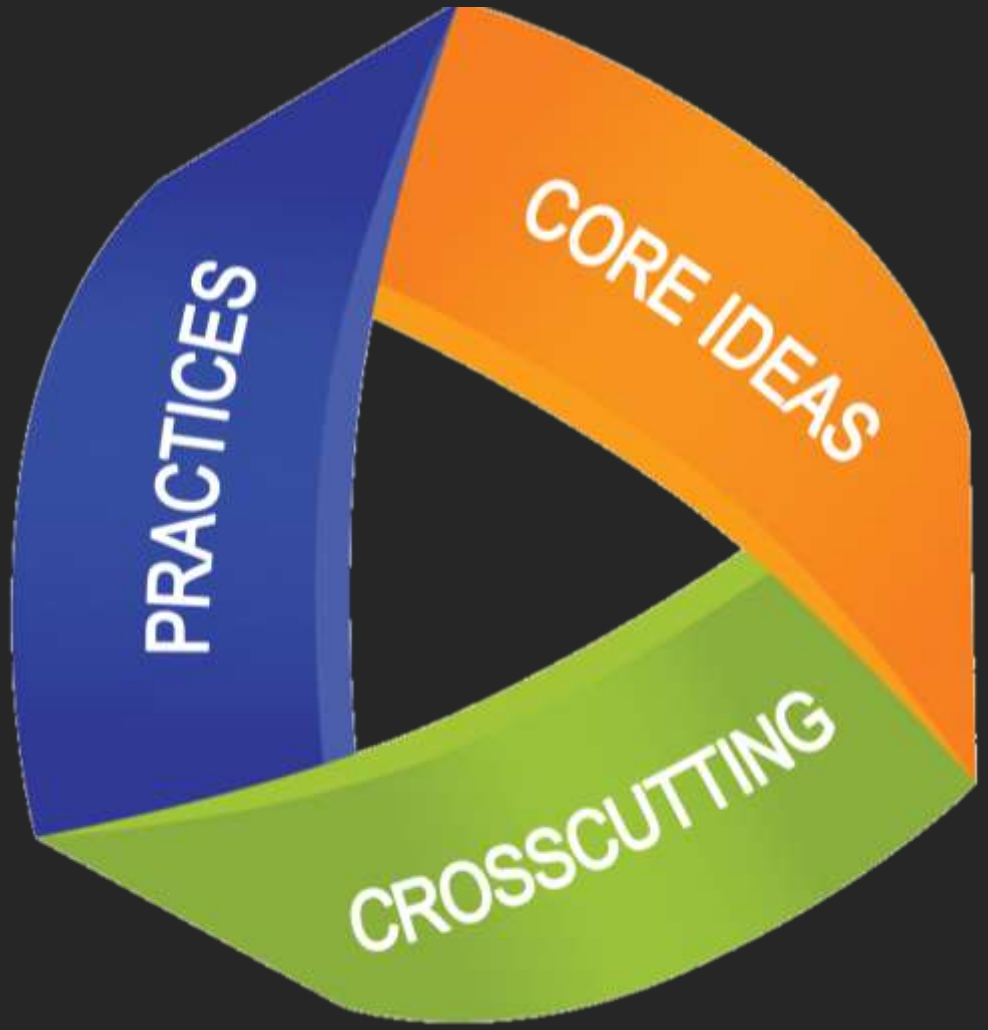
METHODS

THREE DIMENSIONAL TEACHING & LEARNING



THREE DIMENSIONAL LEARNING

NEXT GENERATION SCIENCE STANDARDS (NGSS)



DO IT

Build something

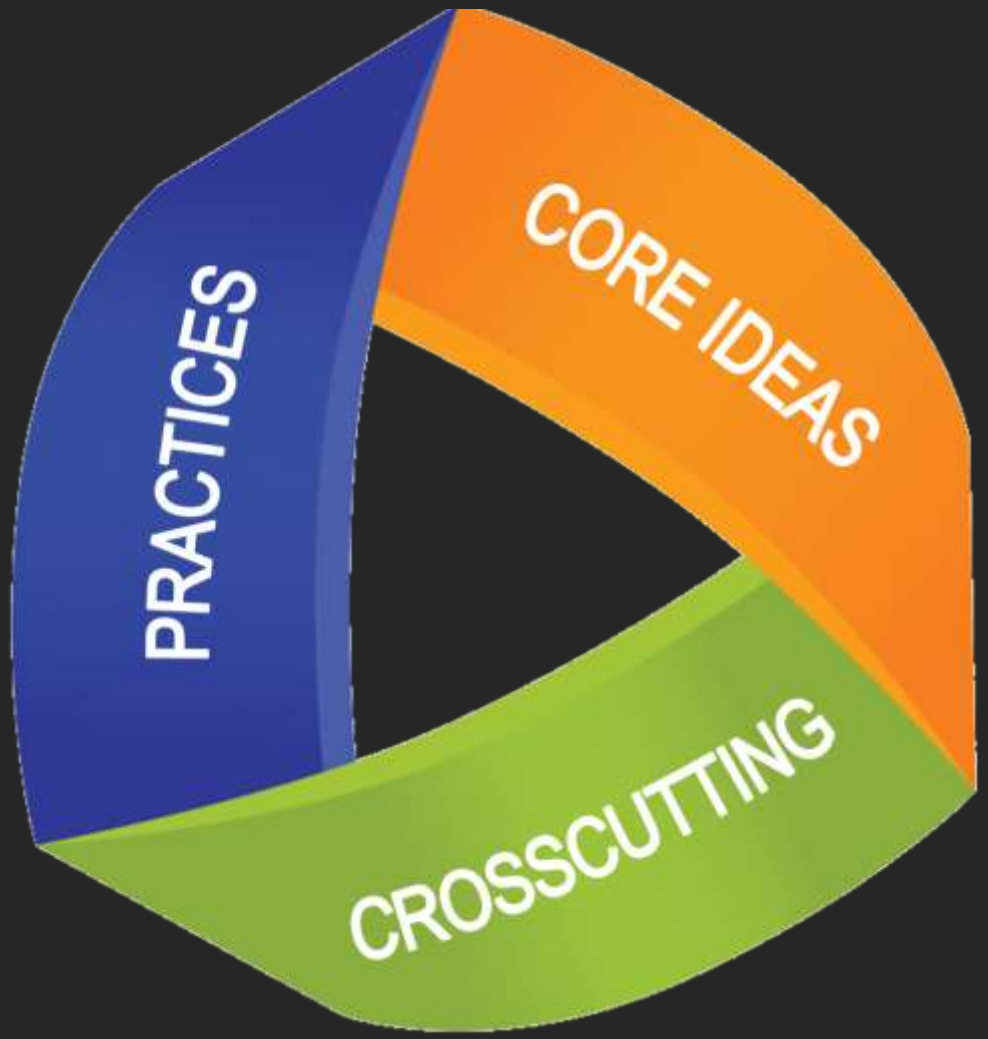
Design a solution

Job Shadowing

Take something apart

Fail

Try Again



SEE IT

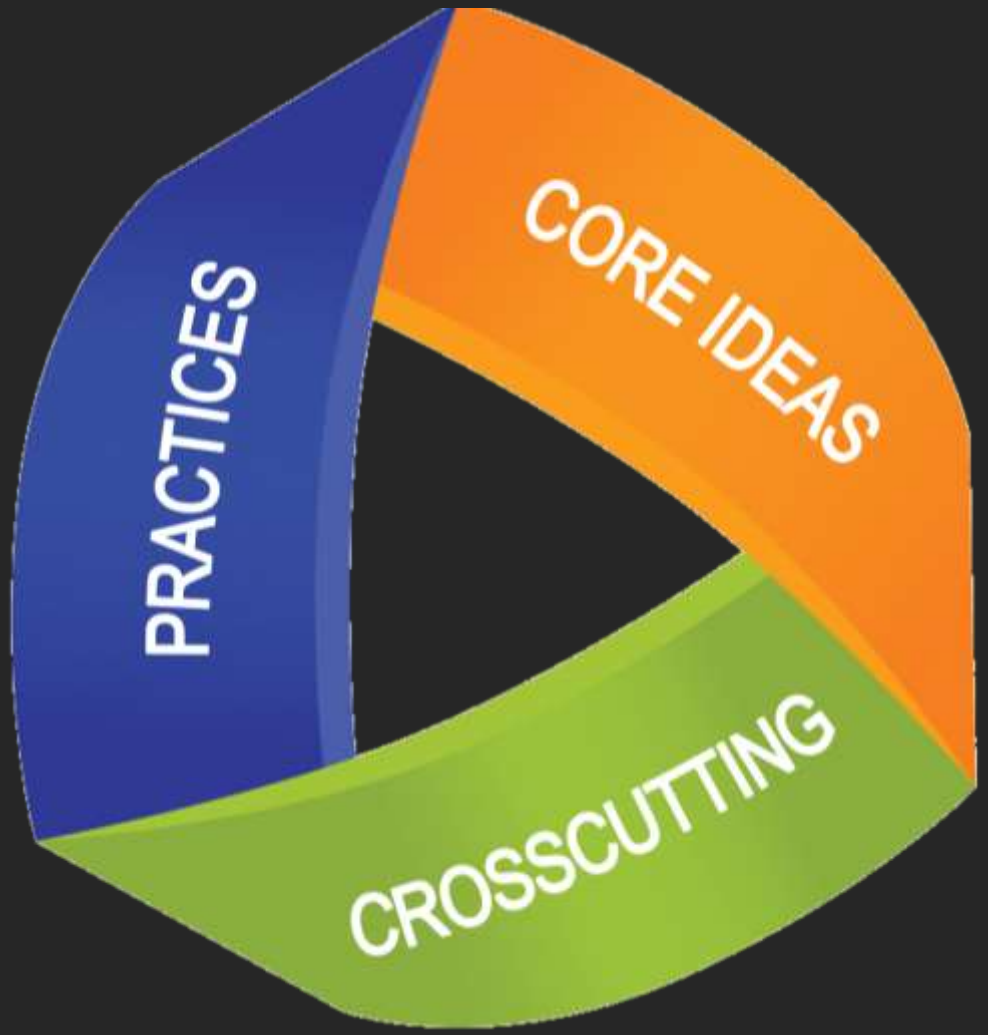
Go on field trips

Learn how things work

Discover

Explore

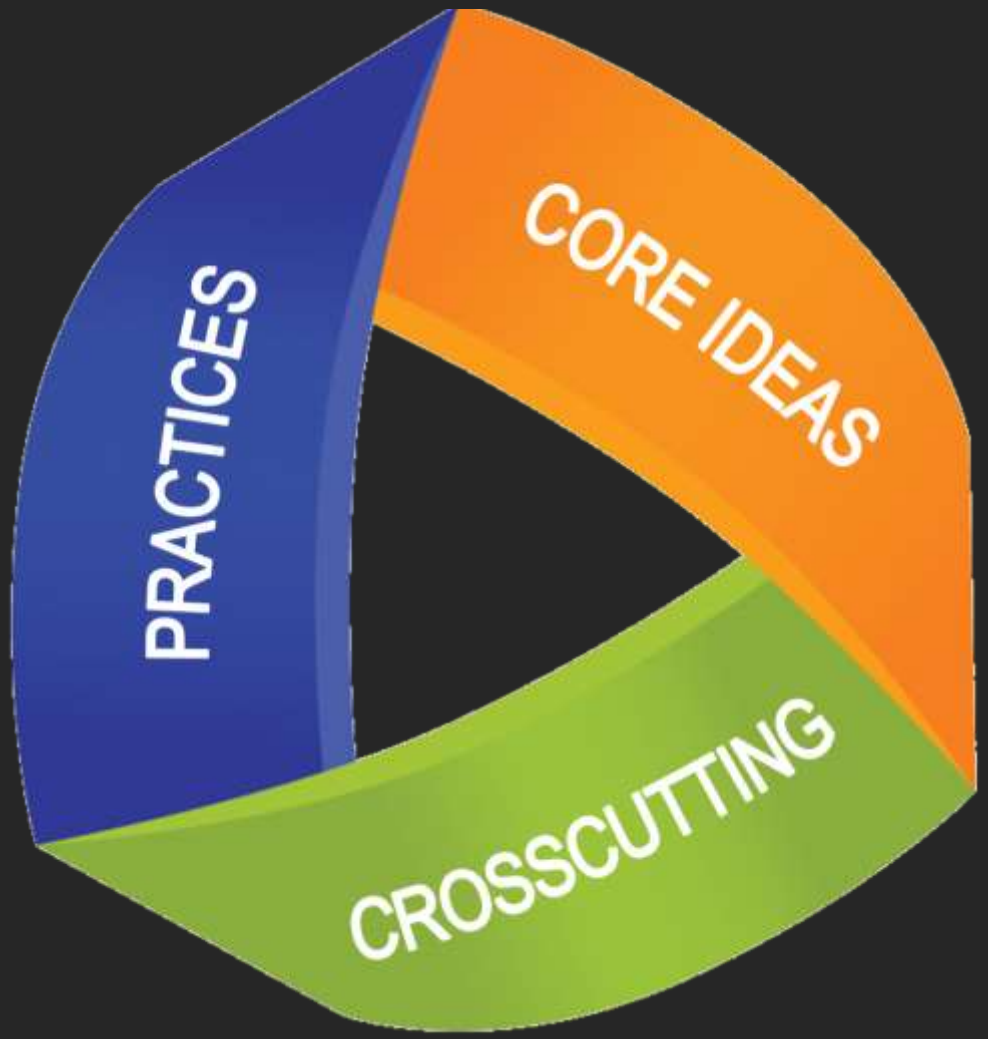
Field Trips and Job Shadowing



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 vocabularly

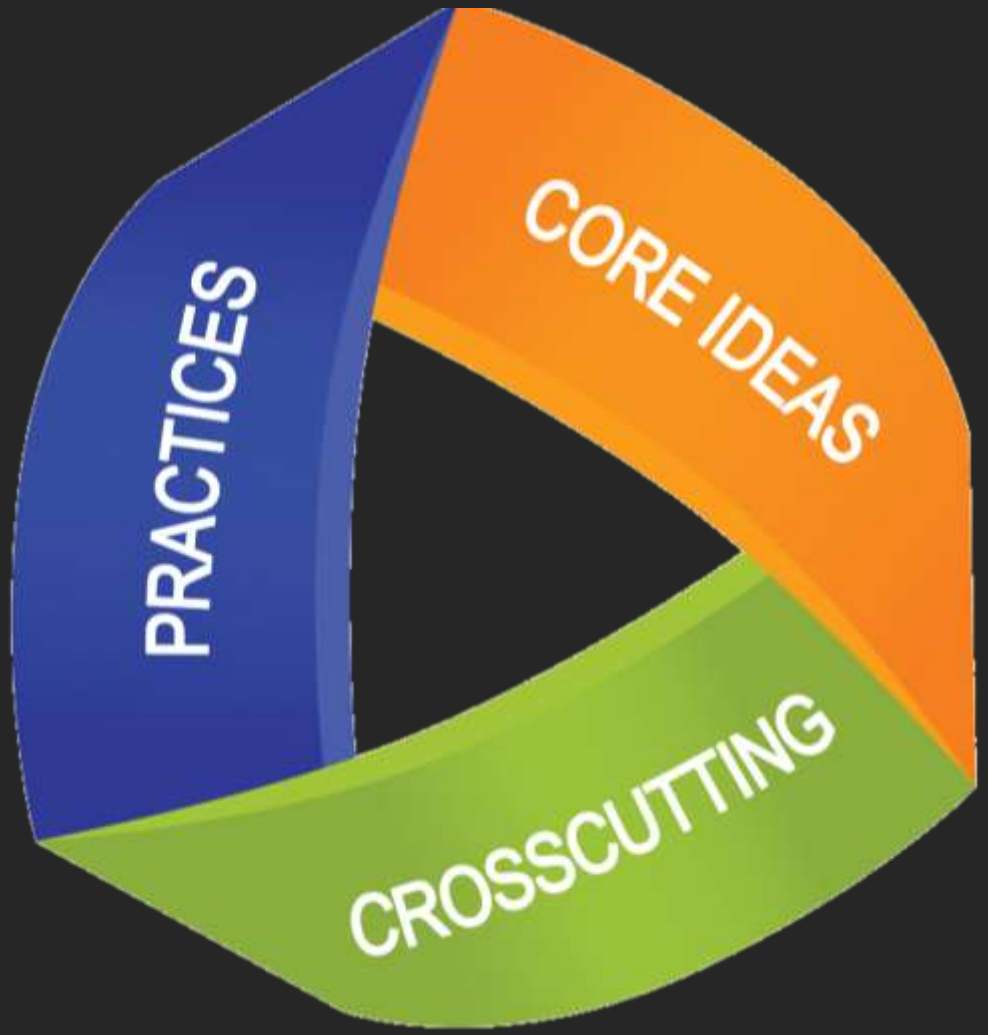
Accelerate
Adapt
Alleviate
Condense

Increase
Lighten
Maximize
Minimize

Decrease
Elevate
Eliminate
Improve

Optimize
Reinforce
Stabilize
Strengthen

ENGINEERING VERBS

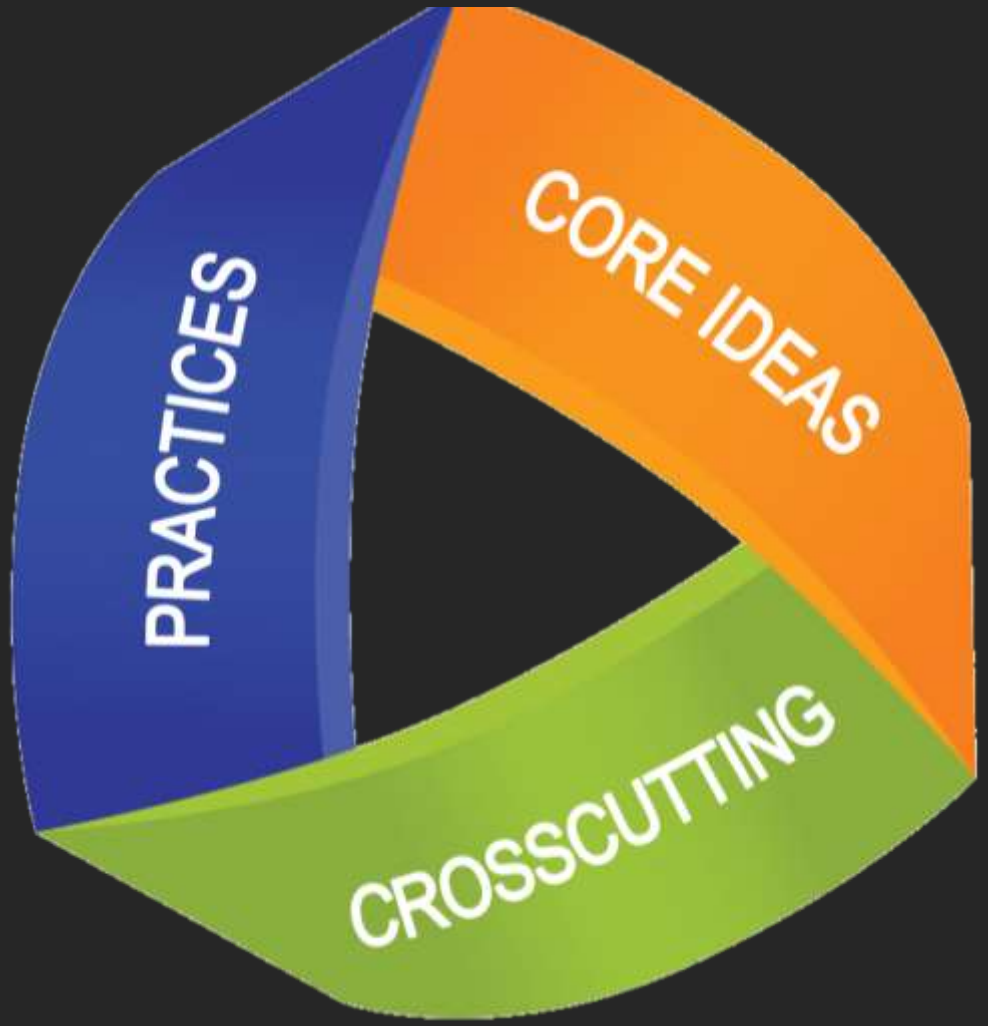


READ IT

Non-fiction

Picture book

Online research



WRITE IT

Make a list of materials

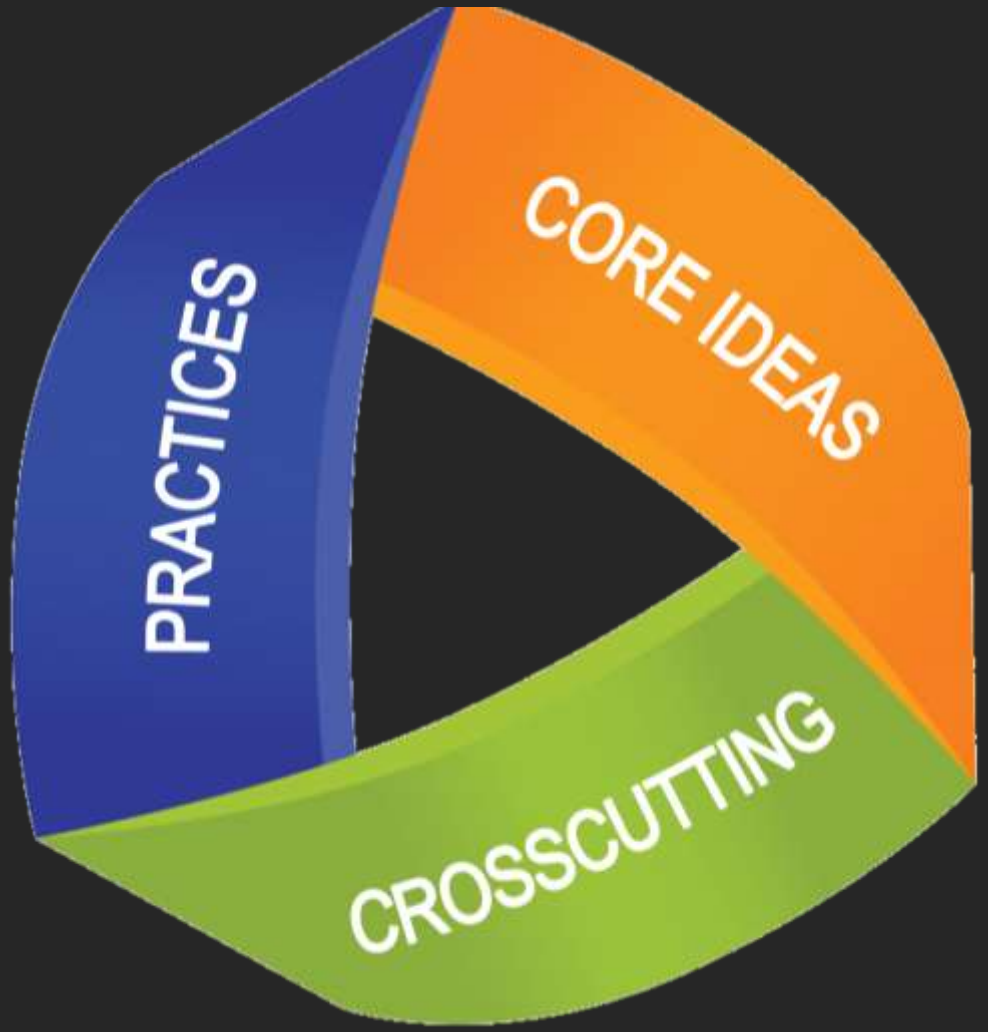
Draw a design

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

19th Century Speaking Tubes

Medical Man's Midnight Friend.

GUTTA PERCHA
SPEAKING TUBE.

Testimonials.

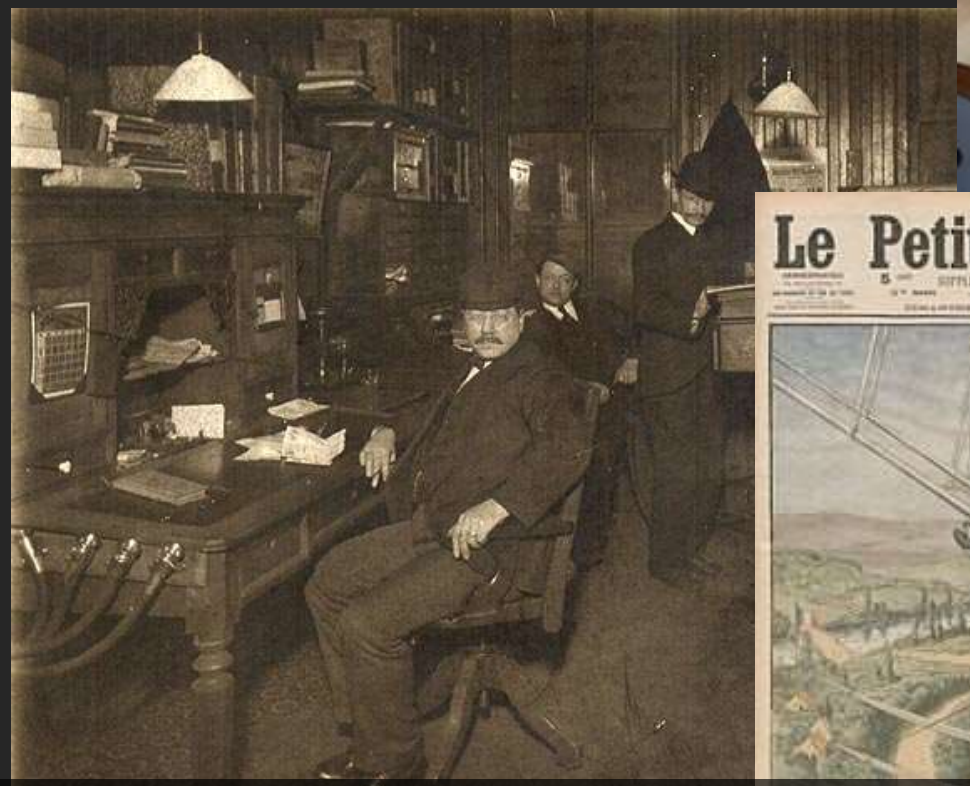
From HENRY ASHTON, Esq., Surgeon.
Walton, near Preston, Dec. 11th, 1850.

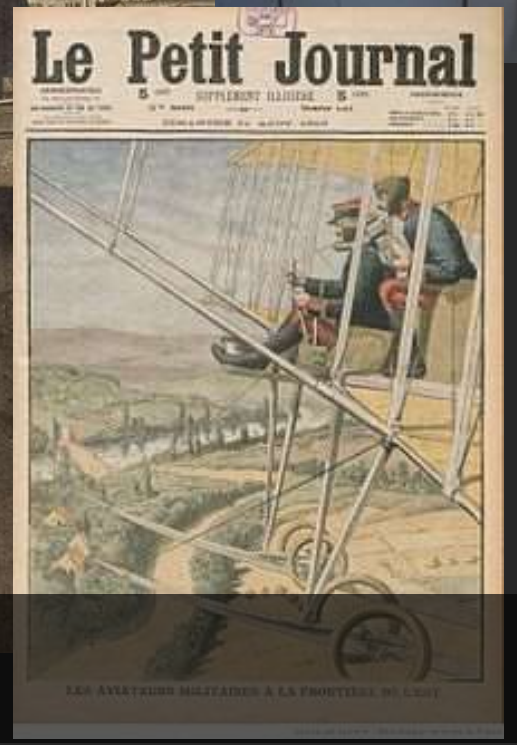
I have had Gutta Percha Tubing carried from my front door to my bedroom, for the transmission of communications from my patients *in the night*. I have it brought to my pillow, and am able with the greatest facility to hold any communication with the messenger in the street, without rising to open the 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.

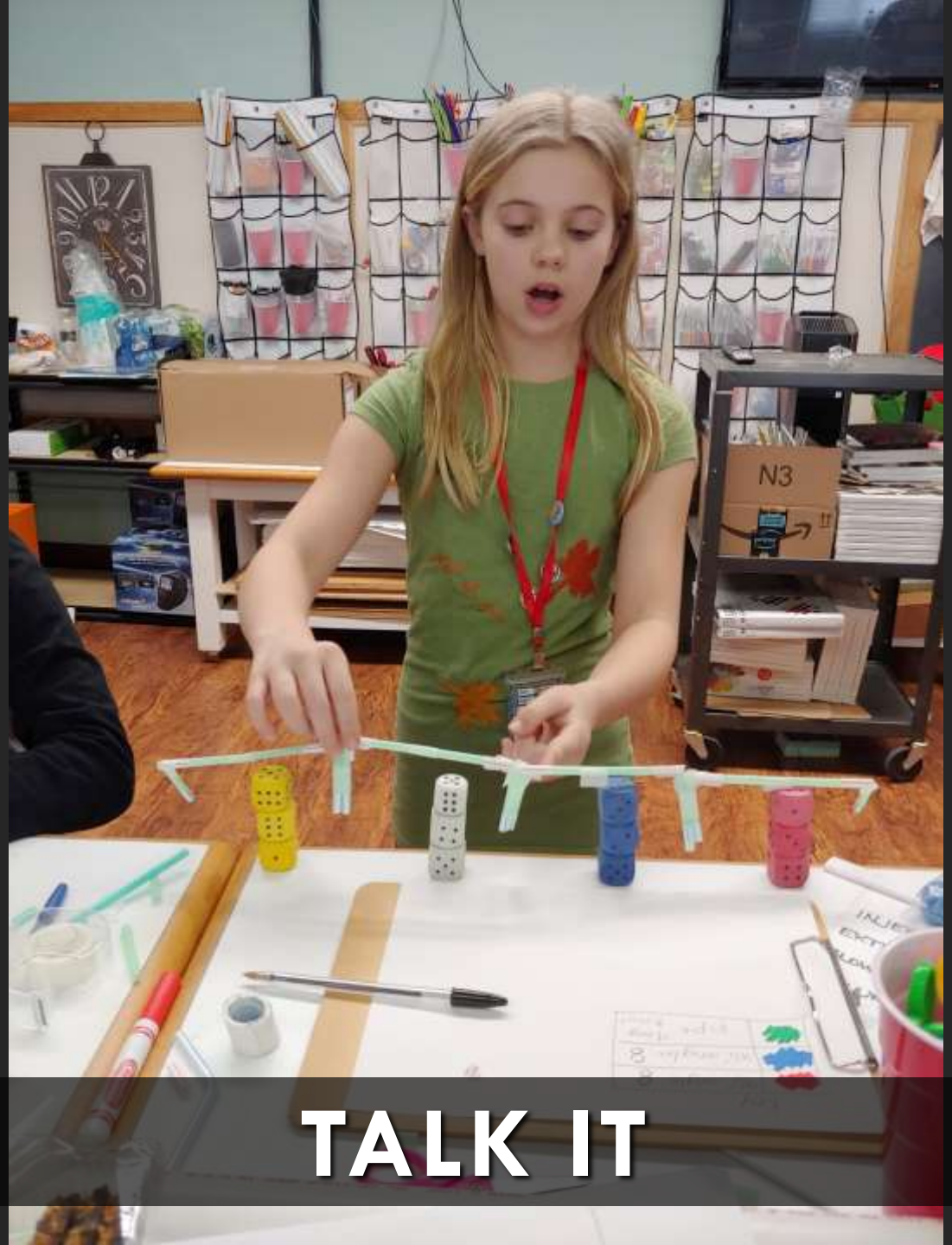
THE GUTTA PERCHA COMPANY, PATENTEES,
18, WHARF ROAD, CITY ROAD, LONDON.





Le Petit Journal

READ IT



TALK IT

WRITE IT

SEE IT

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

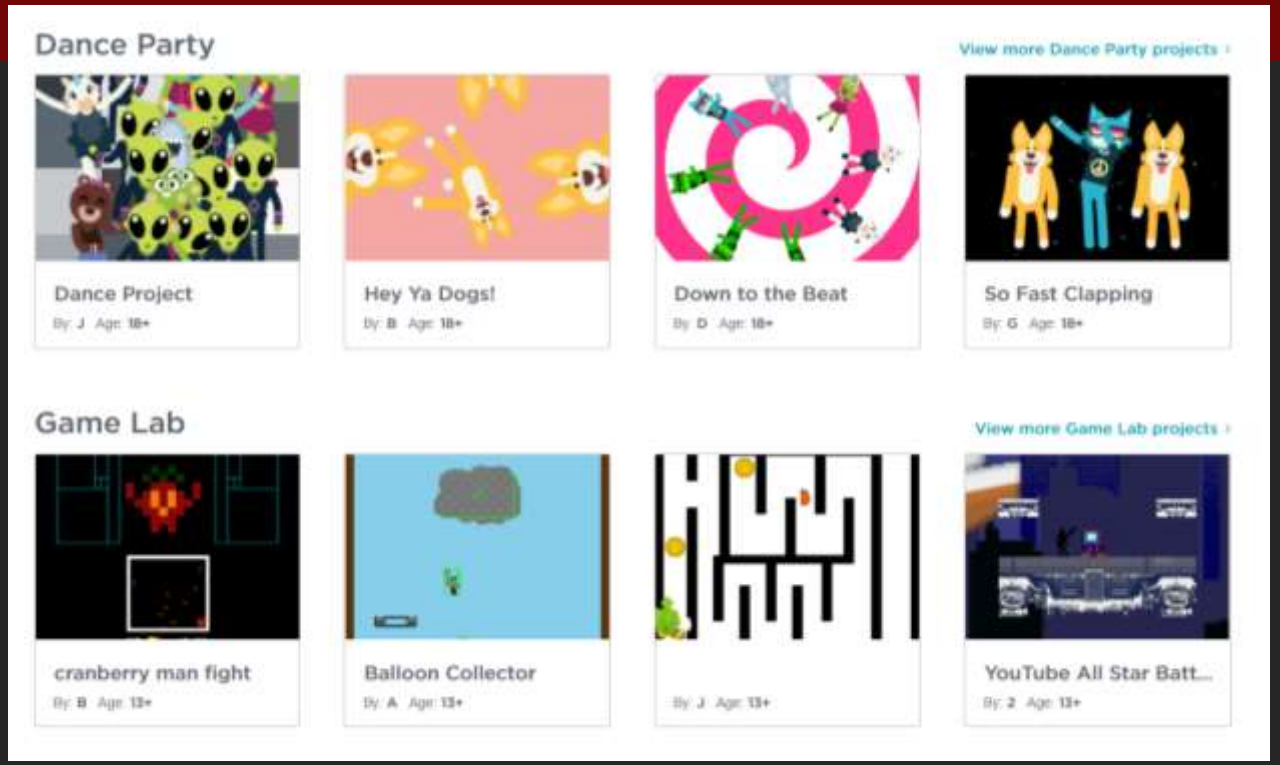
PROJECTS
MAKING IT COME TO LIFE

Globetrotting
Gabe Trionfi
Style for Him
Alexandra Bond

"STEM ACTIVITY"

"STEM ACTIVITY"
"ALUMINUM FOIL"

code.org

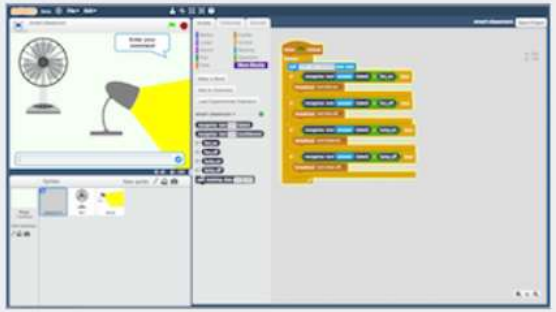

Dance Party
View more Dance Party projects
Dance Project
By: J Age: 18+
Hey Ya Dogs!
By: B Age: 18+
Down to the Beat
By: D Age: 18+
So Fast Clapping
By: G Age: 18+
Game Lab
View more Game Lab projects
cranberry man fight
By: B Age: 13+
Balloon Collector
By: A Age: 13+
By: J Age: 13+
YouTube All Star Batt...
By: 2 Age: 13+

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**

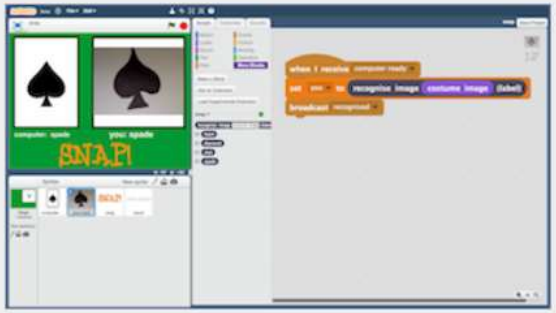
Tags: sentiment analysis, supervised learning

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

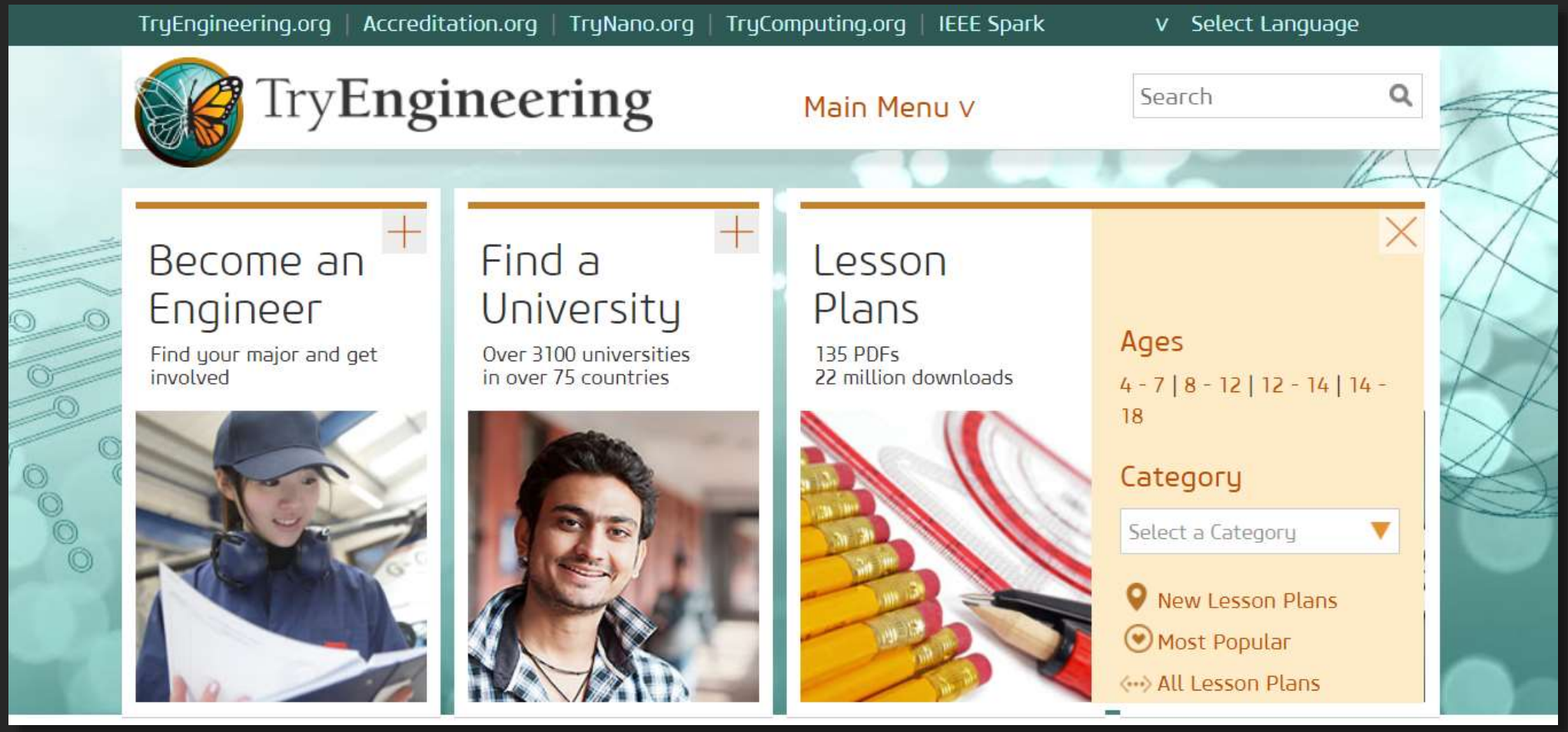
Difficulty: Beginner

Recognising: **images**

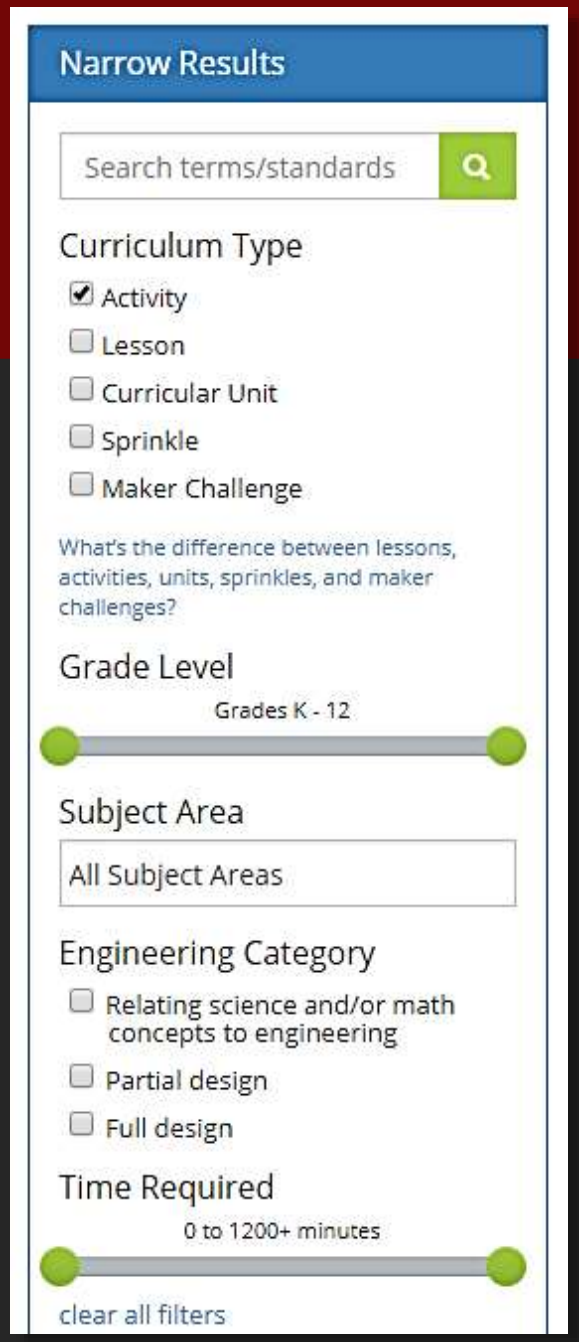
Tags: optical character recognition, handwriting recognition, image classification, supervised learning

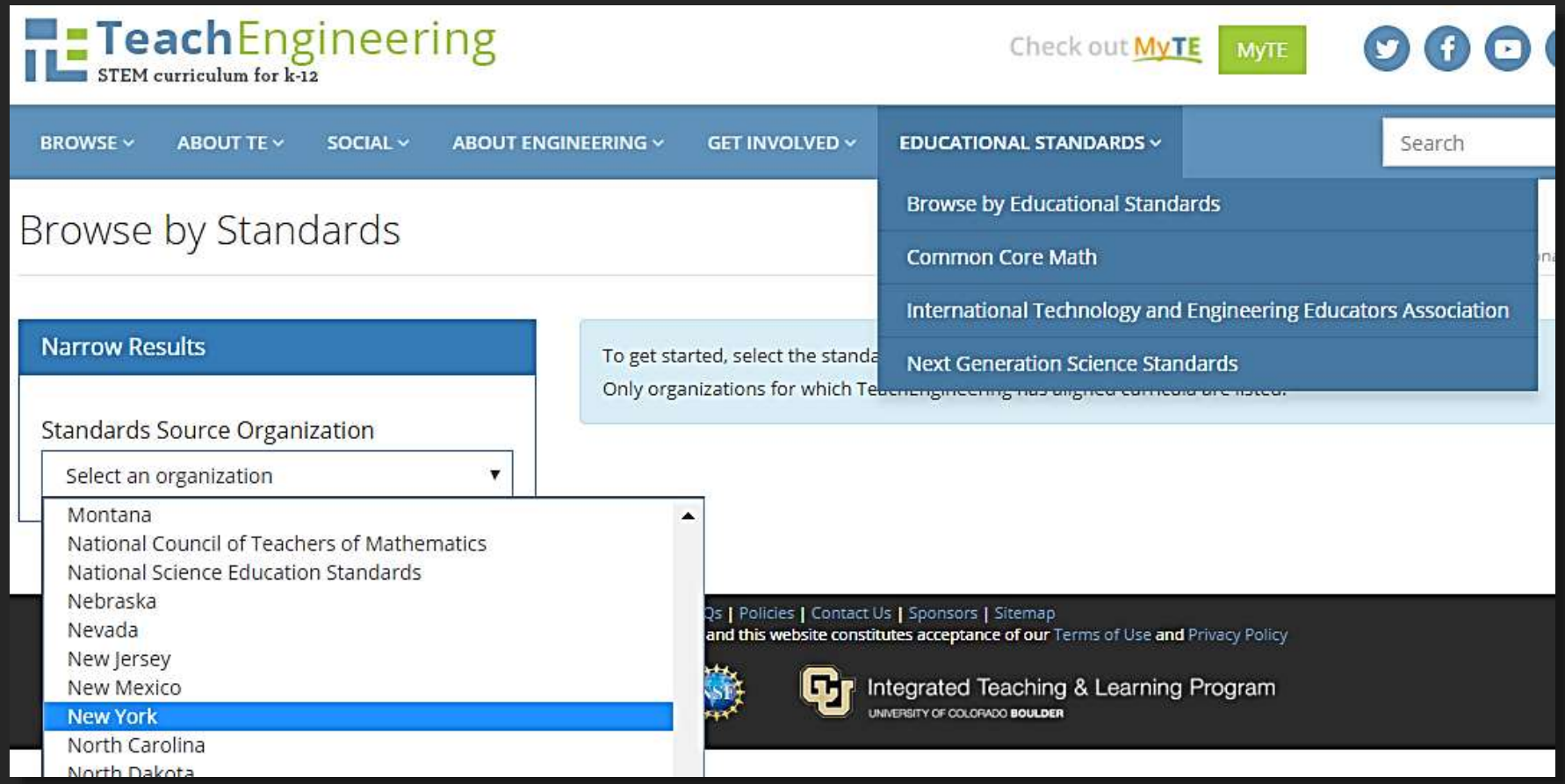
Download

tryengineering.org



teachengineering.org





www.nsta.org/

NSTA National Science Teachers Association
NGSS@NSTA STEM STARTS HERE
[Log In]
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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

STEM LEARNING

www.engineergirl.org

engineer girl

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

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

CAREER IN STEM

www.careerinstem.com

CAREERS BY STEM DISCIPLINE

- ENGINEERING
- MATH
- SCIENCE
- TECHNOLOGY

urban planner	chemical engineer	biomedical engineer
electrical engineer	computer hardware engineer	mechanical engineer
landscape architect	agricultural engineer	civil engineer
automotive engineer		aerospace engineer

www.cpb.org/americangraduate

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

THE PHELPS LIBRARY

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

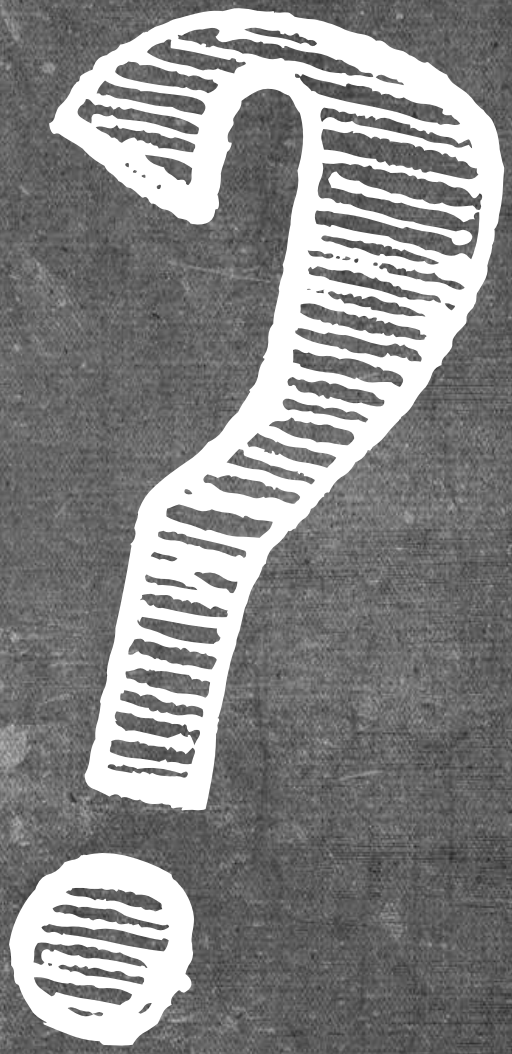
transform education.

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
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be.

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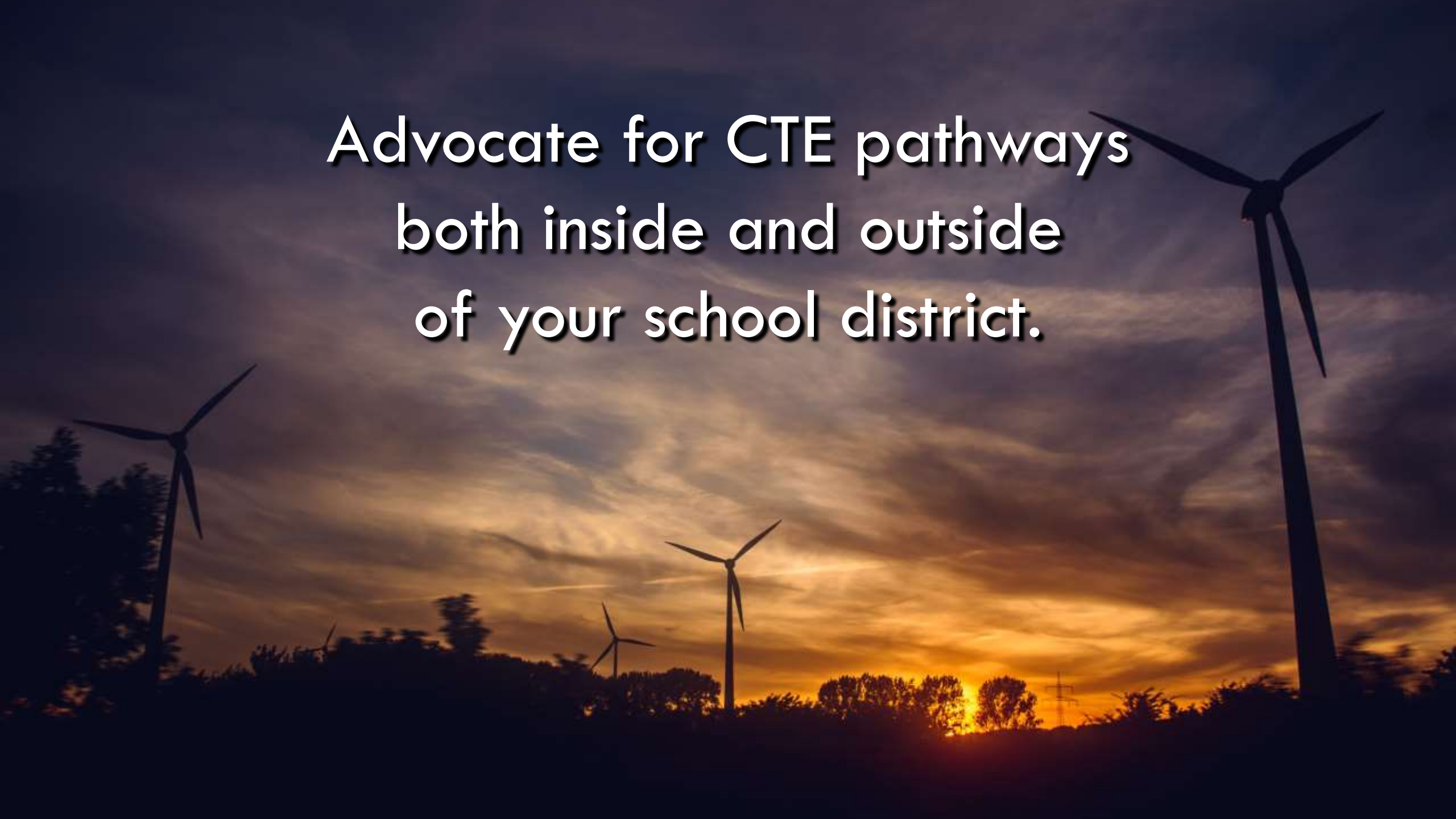
Remove all preconceived notions of what you can and/or can't do as an educator.

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.

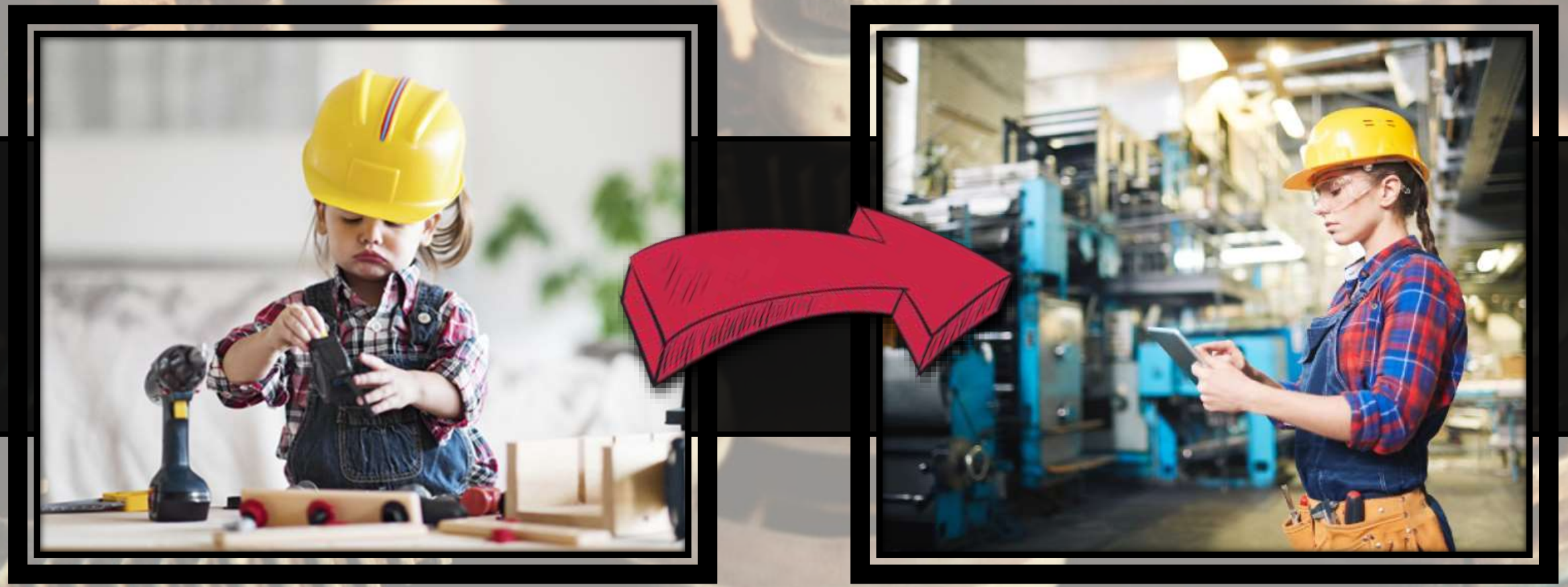
Advocate.

Enter through the back door.

Be brave.

Collaborate.
Collaborate.
Collaborate.

MACGYVER
HIS MIND IS THE ULTIMATE WEAPON



Leah Hamilton

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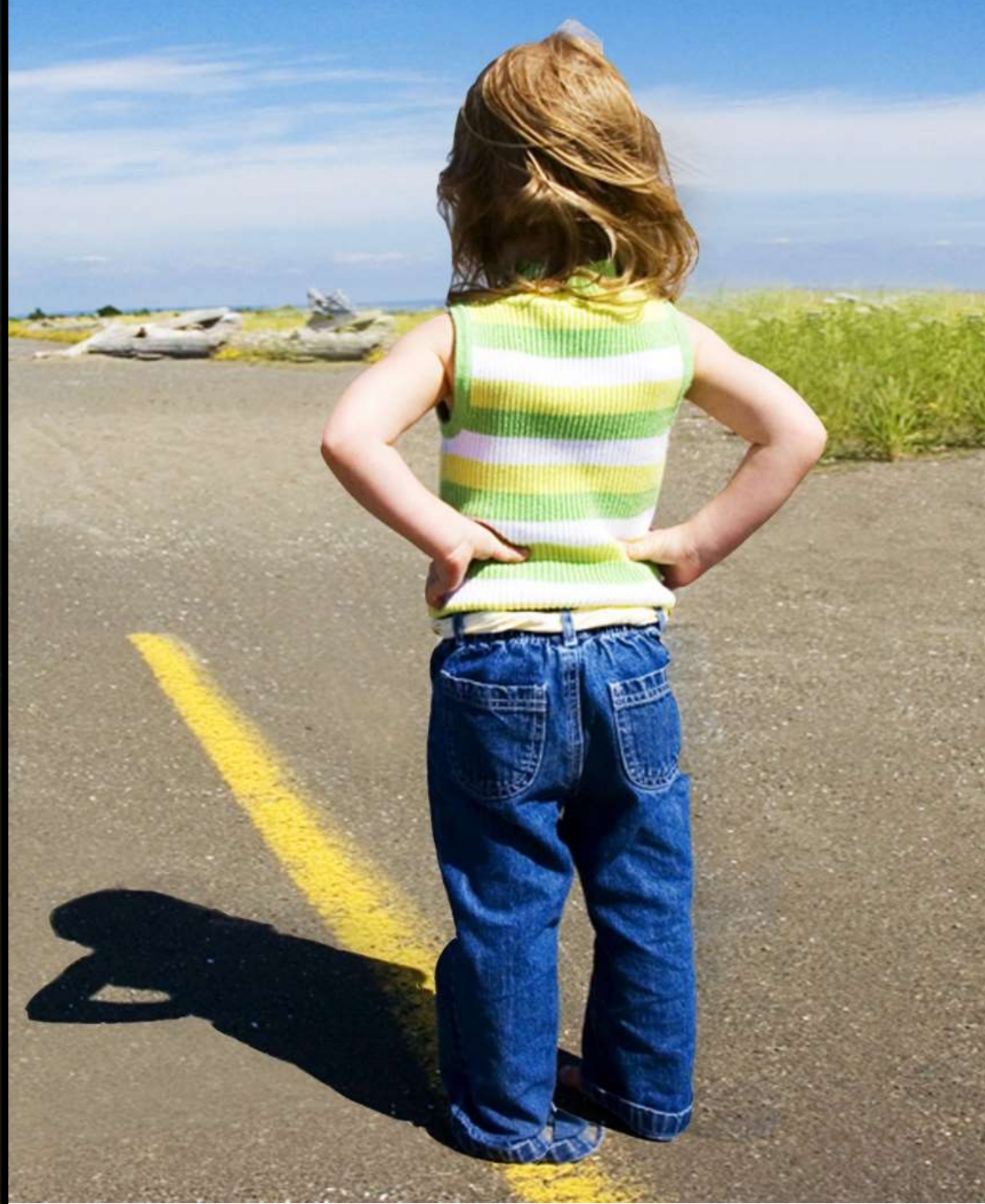
Presentation:

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