

# The Maker Mindset



**Josh Ajima**  
**DesignMakeTeach.com**



# Bell Ringer

## What do you make?

(bonus for photos)

### Share

-with the person next to you and/or

<https://padlet.com/designmaketeach/ovffcvjwzywz>



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# Goal

Explore strategies for discovering and fostering the Maker Mindset in ourselves, students and fellow educators.

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Maker

Maker Educator

Maker Coach

# HANDOUTS & CONTACT INFO



[DesignMakeTeach.com/TCEA3](https://DesignMakeTeach.com/TCEA3)

**Josh Ajima**

**@DesignMakeTeach**

**DesignMakeTeach.com**

**youtube.com/designmaketeach**



# FEATURED PRESENTER



## **Digital Fabrication in the Classroom**

**Mon, February 5th, 8:00 AM – 11:00 AM, 9C**

## **Scaling Up the Makerspace**

**Mon, February 5th, 3:30 PM – 4:30 PM, Ballroom E**

## **The Maker Mindset**

**Tue, February 6th, 9:45 AM – 10:45 AM, Ballroom F**

## **Making with Head, Hands, and Heart**

**Tue, February 6th, 11:30 AM – 1:00 PM, 6B**

## **The Makerspace Chromebook**

**Wed, February 7th, 8:00 AM – 11:00 AM, 10A**

## **3D Printing Projects That Matter**

**Wed, February 7th, 3:30 PM – 5:00 PM, 9A**

# EDUCATOR



Instructional Facilitator for Technology  
-Dominion High School & Loudoun Academy of Science, Sterling, Virginia (2003-present)

Director of Instructional Technology  
-Clarke County Public Schools (1998-2003)

Teacher: Chemistry, 7th Life Science, 8th Physical Science, Cisco Networking  
-Clarke County Public Schools (1996-1998)



# MAKER



Make Magazine Review Team  
2014 & 2015

Featured: Thingiverse,  
Pinshape, Adafruit

World Maker Faire NY: Best in  
Class Ribbon

Outsider Art Fair NY: Tower  
Design Competition - 2nd  
Place



# MAKER EDUCATOR

CTE MAKEOVER  
CHALLENGE



**Construct**<sub>3D</sub>  
3D PRINTING & DIGITAL FABRICATION FOR EDUCATION



## Top Educational Model

The Top Educational Model Award goes to **DesignMakeTeach** for his design, Hidden Figures. This model integrates a number of educational concepts, including 3D modeling and the physics involved with light opacity. Congratulations and we hope the Wacom Cintiq and Adafruit and 3D Hubs gift cards help you continue your inspirational work!

US Department of Education's CTE  
Makeover Challenge Winner

Stanford FabLearn Fellow

Formlabs 3D Design Awards -Top  
Educational Model

Construct3D 2017 - K12 Program Chair

VSTE Innovative Educator of the Year

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Maker

Maker Educator

Maker Coach

# Maker

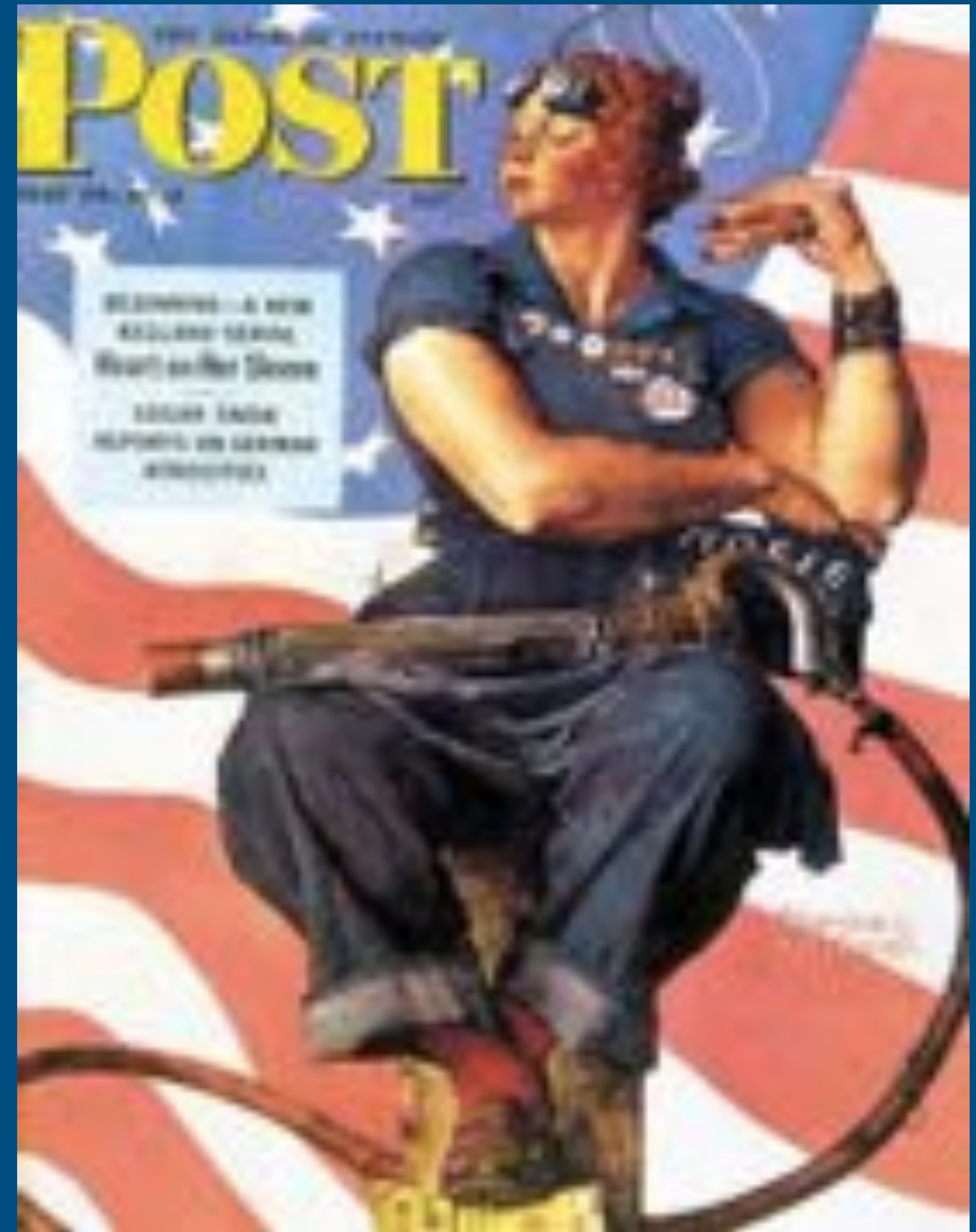
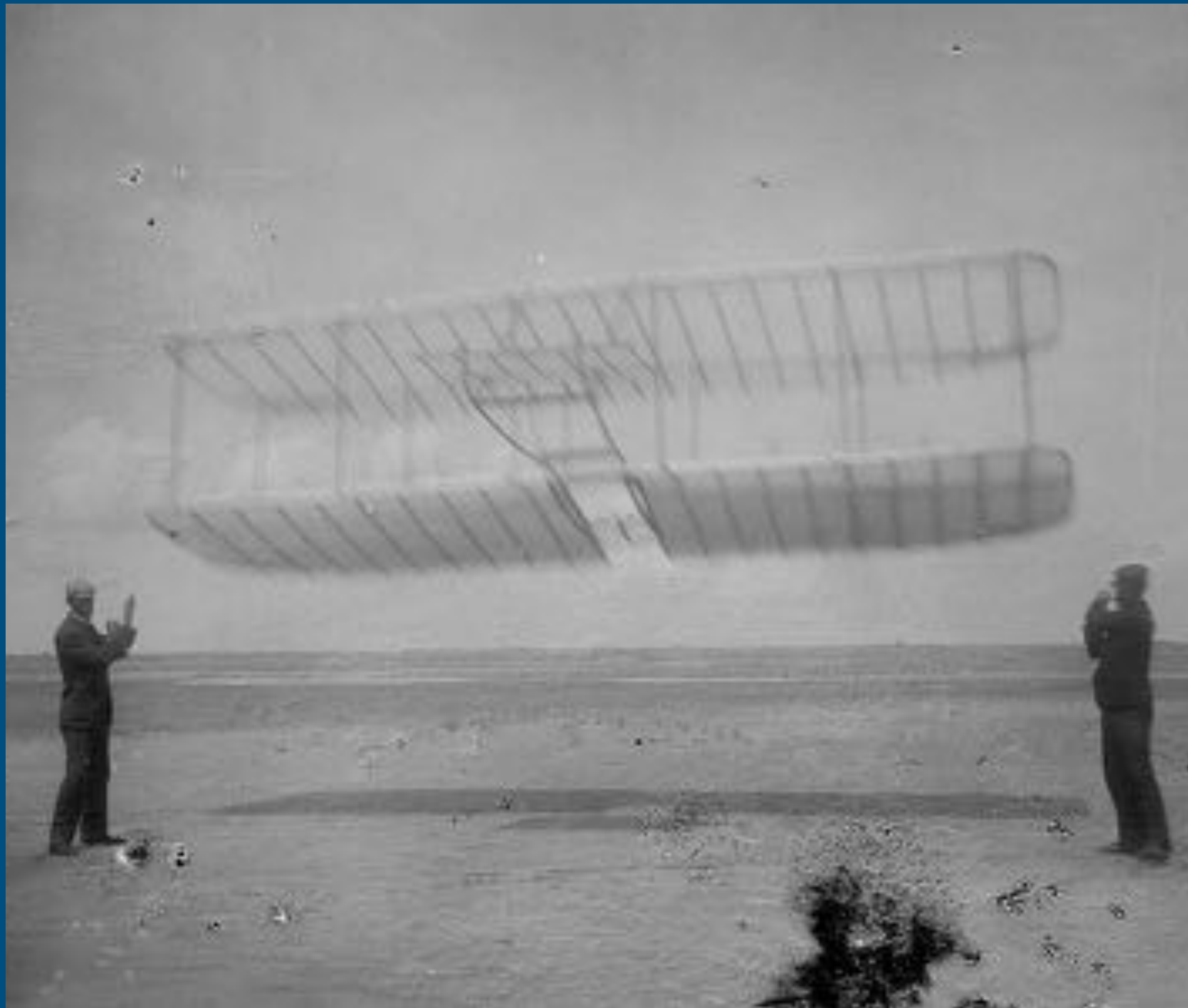
















Attribution: Matthew Yohe at en.wikipedia





# Maker Culture





# Maker Movement



**“We are all Makers.”**

**-Dale Dougherty**



**Dale Dougherty**

@dalepd

Follow



Replying to [@KirinDave](#) [@RealSexyCyborg](#) and 4 others

I am questioning who she really is. Naomi is a persona, not a real person. She is several or many people.

8:59 AM - 5 Nov 2017



16





DRONES \* ROBOTS \* VIRTUAL REALITY

# Make:



## CYBORG & THE SINO:BIT

BRINGING OPEN SOURCE HARDWARE TO CHINA

**MAKERS OF SHENZHEN**  
CHINA'S SILICON VALLEY  
OF HARDWARE, POP. 12M

**DIY  
DISASTER  
RELIEF**

**LOTS OF  
PROJECTS!**

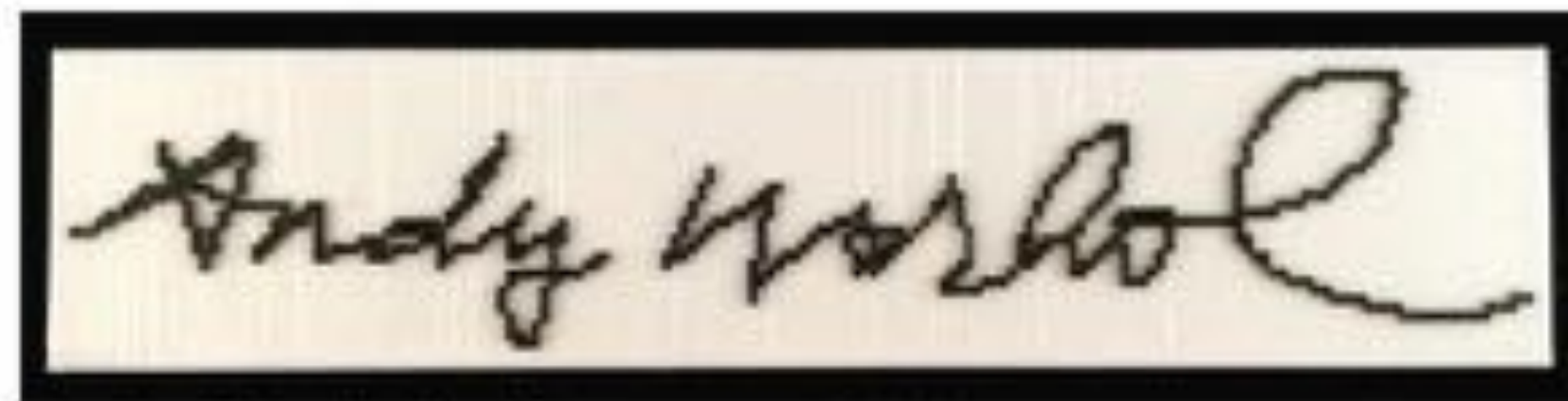
- DAZZLING  
RAINBOW  
LIGHTBOX
- DOGGIE TREAT  
DISPENSER
- BUDGET ROBOT  
RADAR
- TWIRL-A-SQUIRREL  
BIRD FEEDER
- BIGFACE BOX
- LED BROOM
- AND MORE

Naomi Wu  
aka @realn0xycyborg



**What do you Make?**





*Andy Warhol's Signature, 2014*  
 Josh Ajima (American, Born 1972)  
 3D Printed in PLA Plastic

## 3D Design Portfolio Remixes of Gimbal by DesignMakeTeach







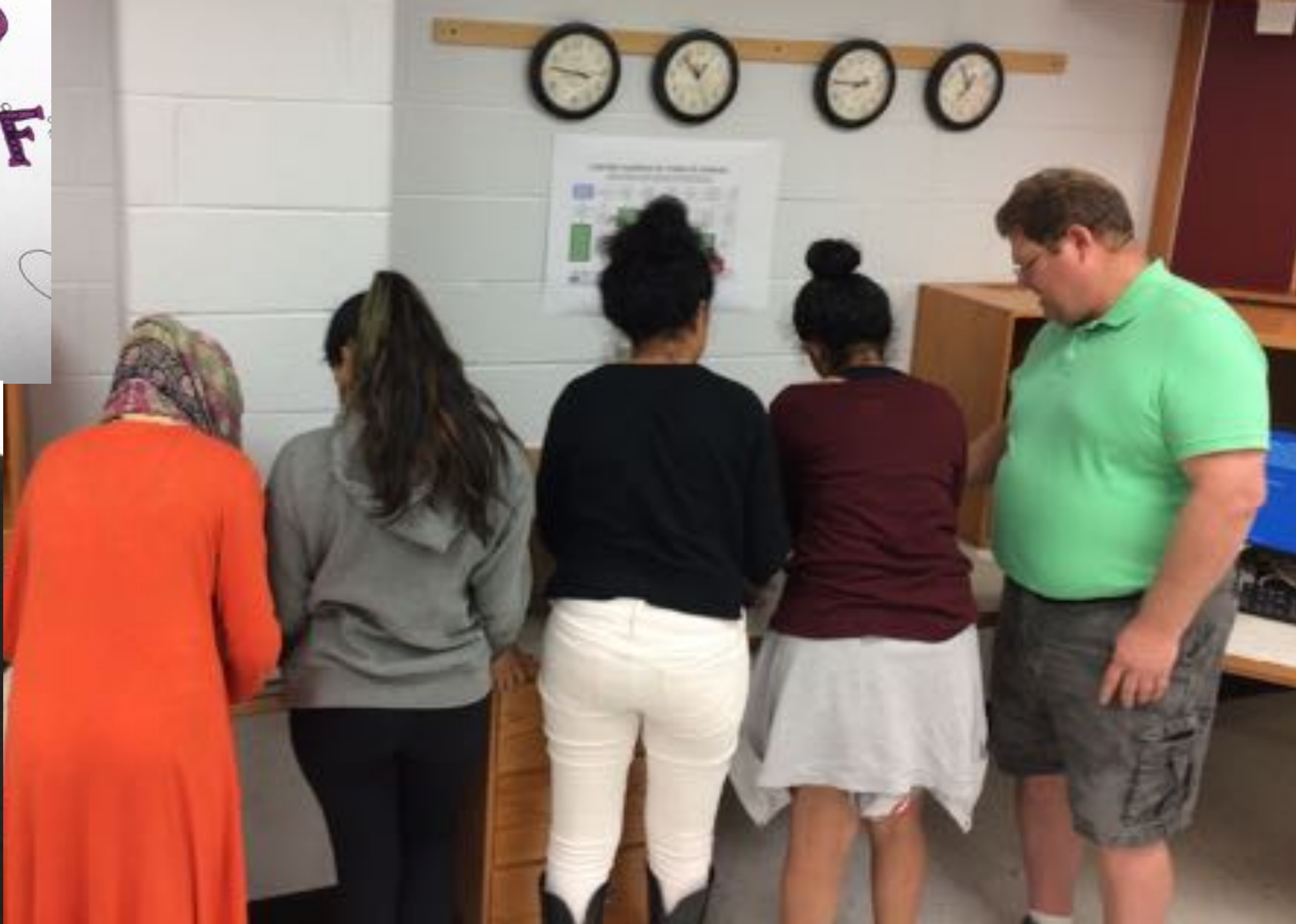
# ***3D PRINTED STARKILLER*** ***LIGHTSABER***





**3D Printer Club**









## Hidden Student Makers



**Make a difference.**



# Maker Educator





富嶽三十六景 神奈川沖  
波裏

大波瀾の神奈川



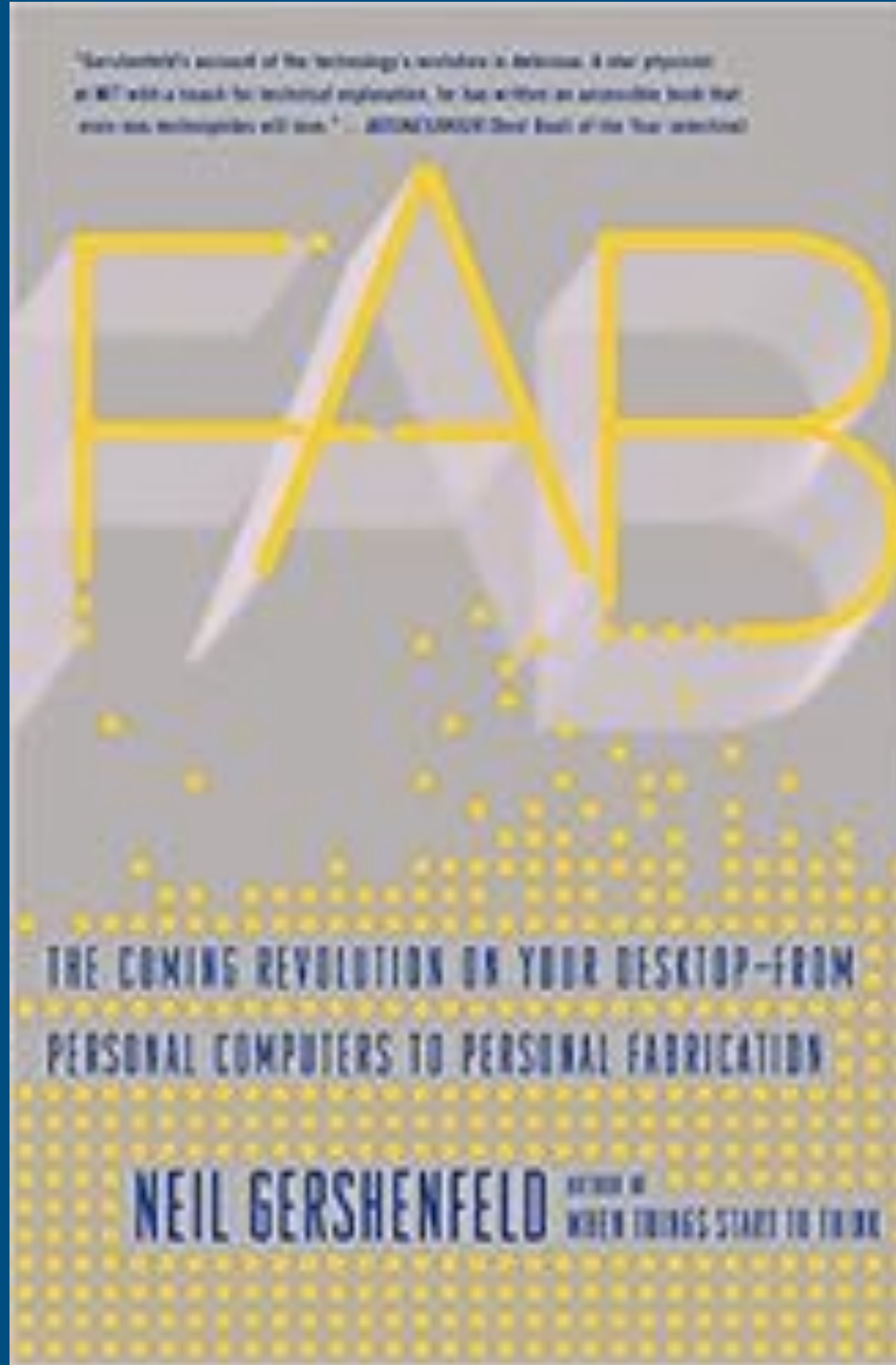
- Time
- Space
- Materials
- Resources



**Why are you  
a Maker Educator?**



# MY MAKER JOURNEY



Neil Gershenfeld: MIT Center for Bits and Atoms

- 2005 NSBA Conference

- How to Make (almost) Anything

- Personal Fabrication

- FabLabs



# UNIVERSAL DESIGN FOR LEARNING

- Multiple Means of Engagement
- Multiple Means of Representation
- Multiple Means of Action & Expression





# A MAKER EDUCATION MODEL





Name: FAIL

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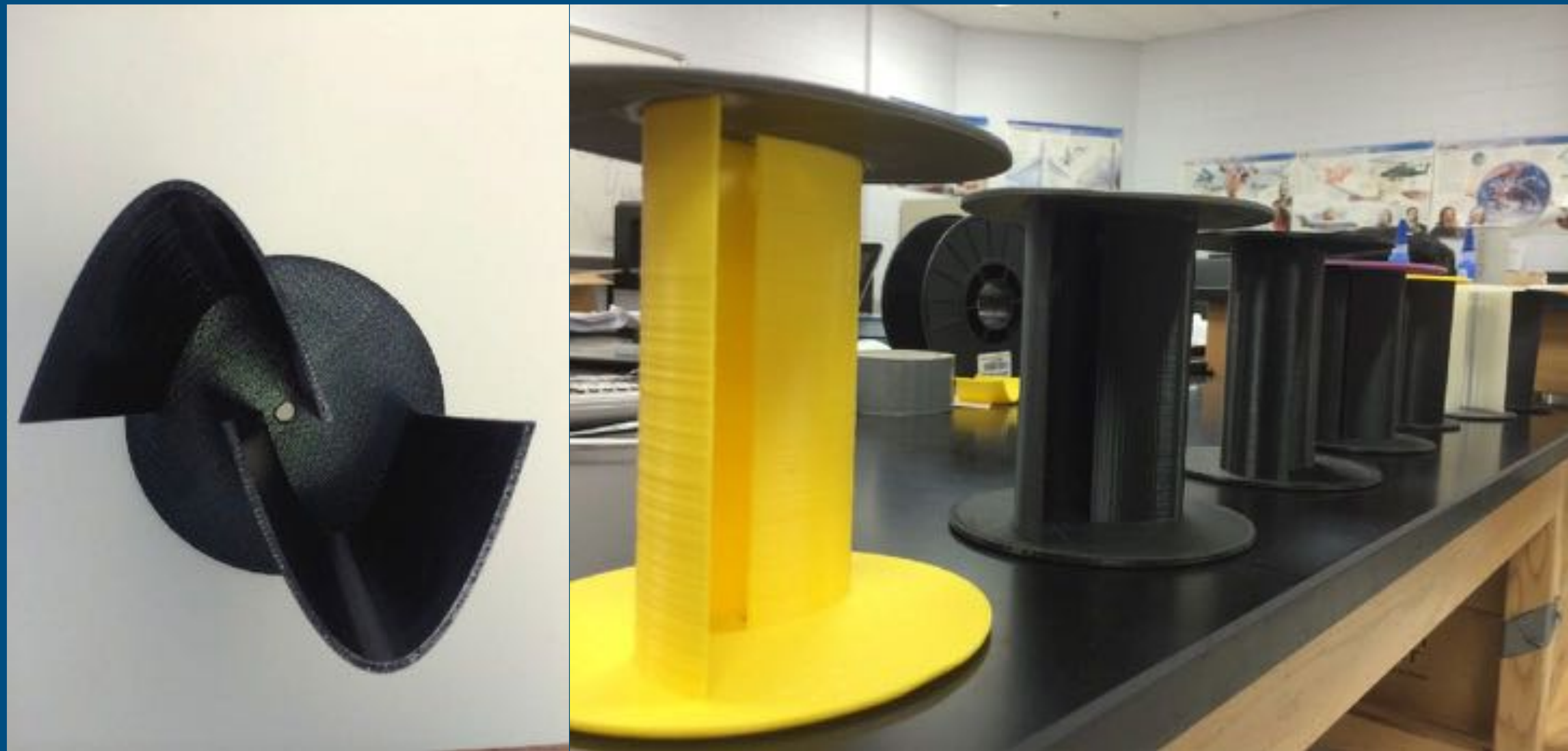
**S**cience

**T**echnology

**E**ngineering

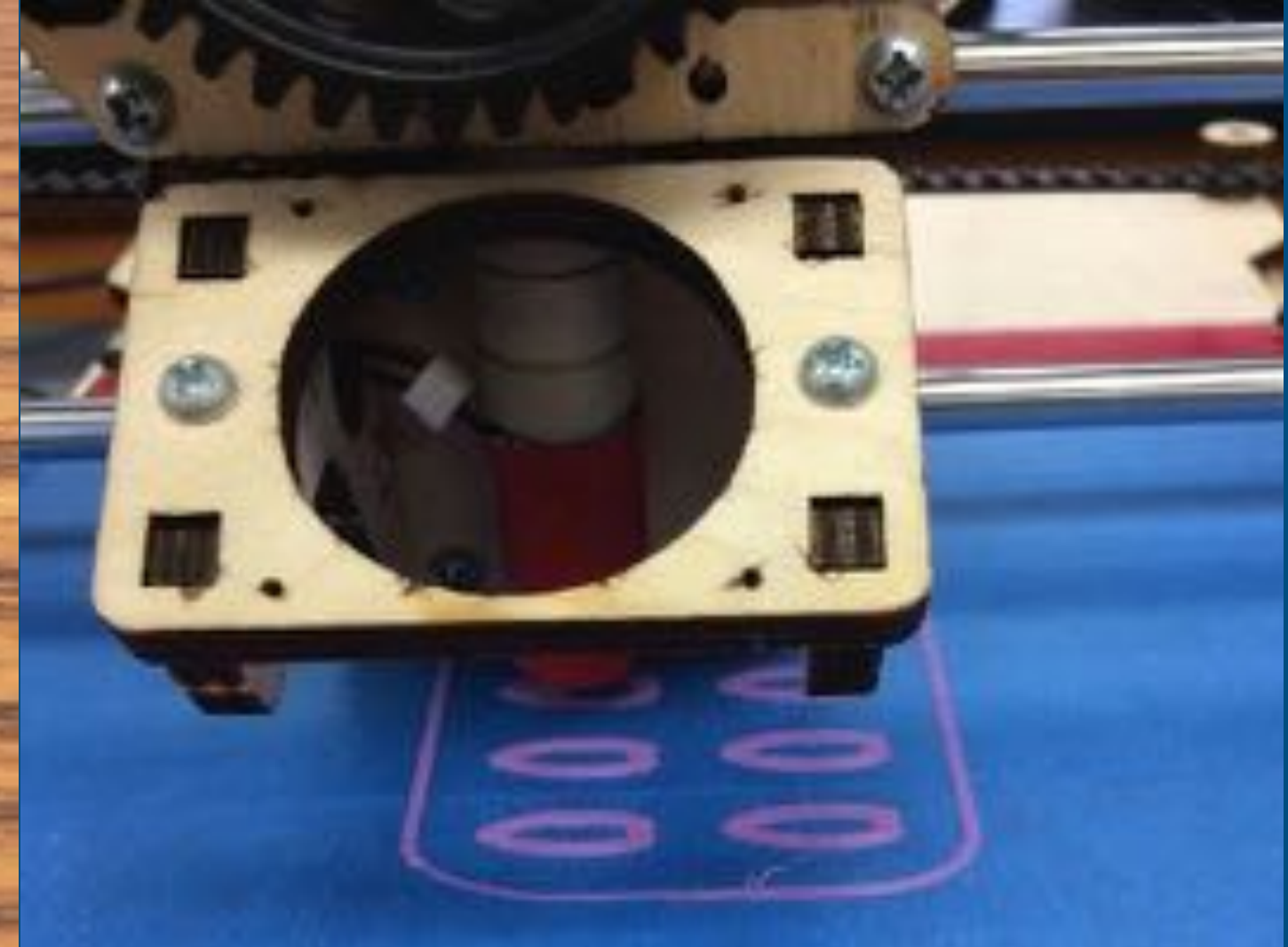
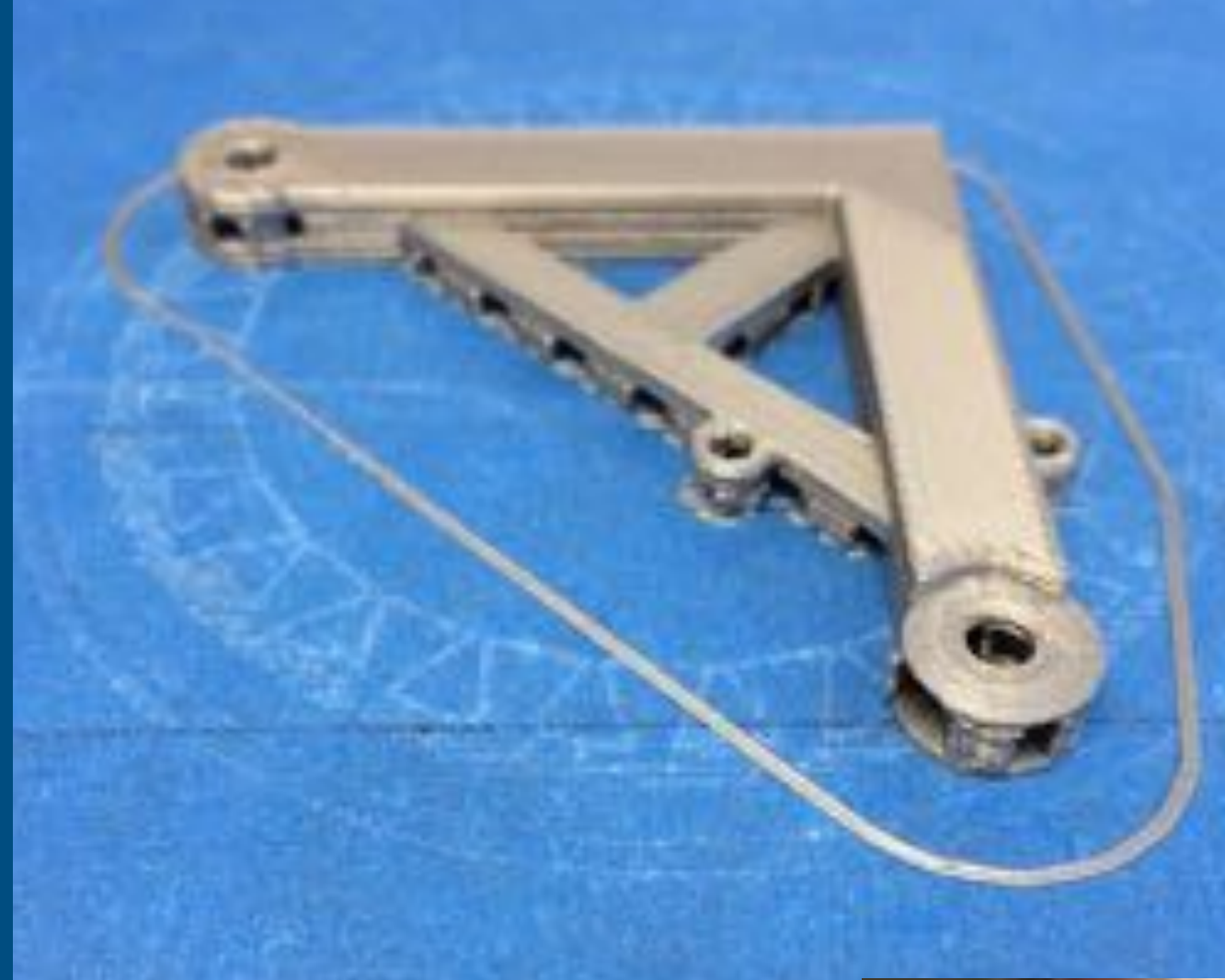
**M**ath





**Design Iteration**





**Solving Real Problems**

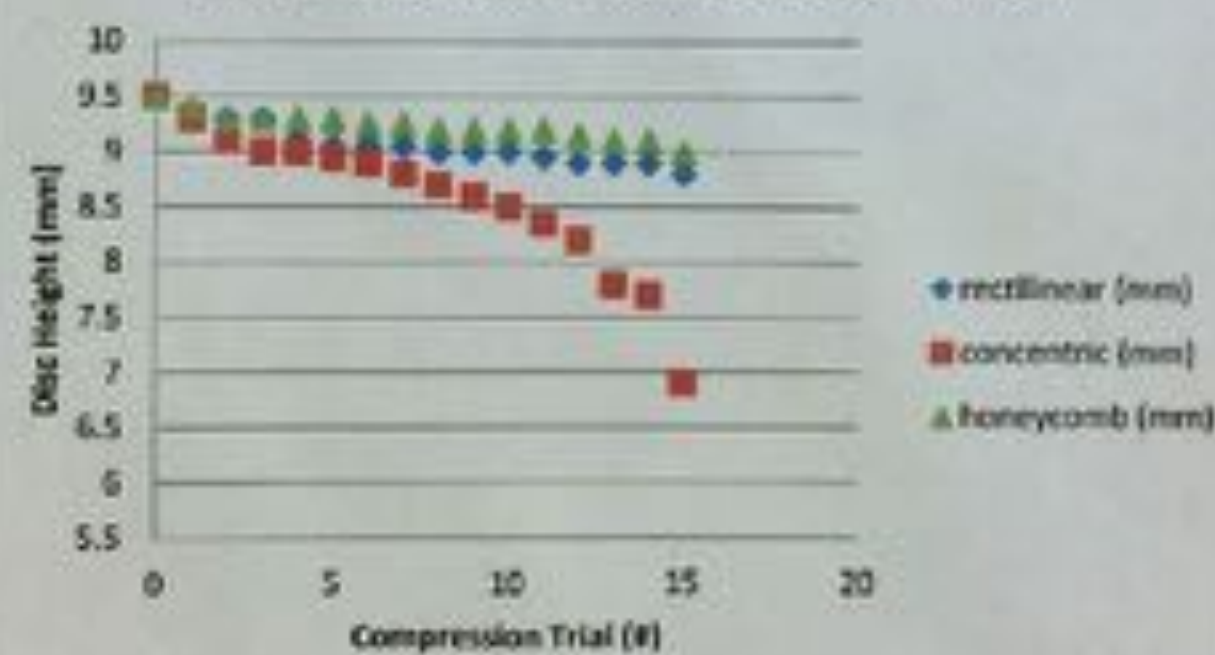




Top to bottom, left to right: Honeycomb, Concentric, Line, Rectilinear, Hilbert Curve, Archimedean Chords, Octogram Spiral

- 3D printers have been emerging in commercial markets for the last 30 years (Carossa, Fonda, & Zennaro, 2013)
- Most common type uses Fused Deposition Modeling (Haberty, 2009)
- Uses thermoplastics like poly (lactic acid)
- Fatigue testing has been conducted in the past (Moore & Williams, 2012)

Disc Height per Compression Trial



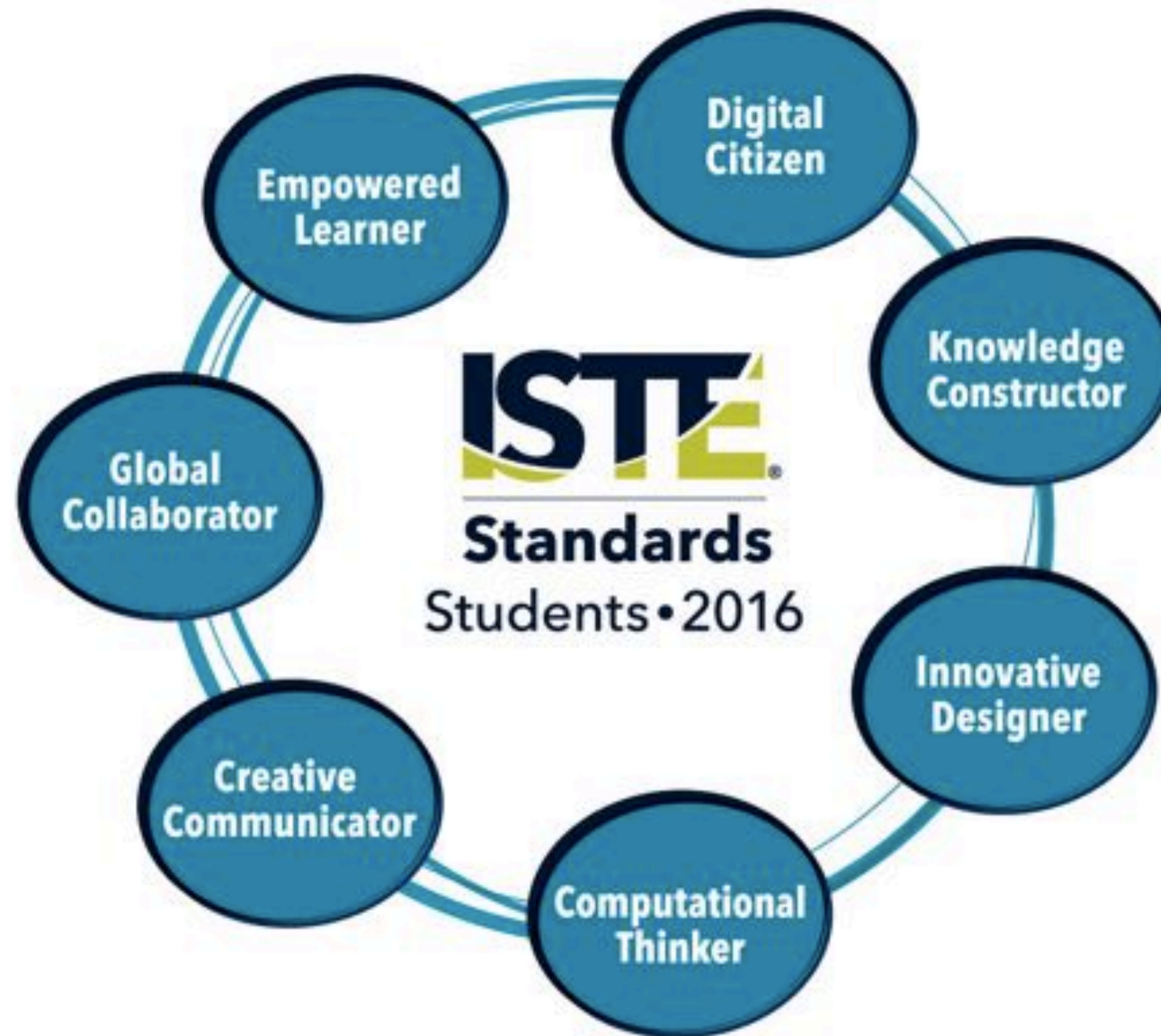
Honeycomb Infill



Concentric Infill

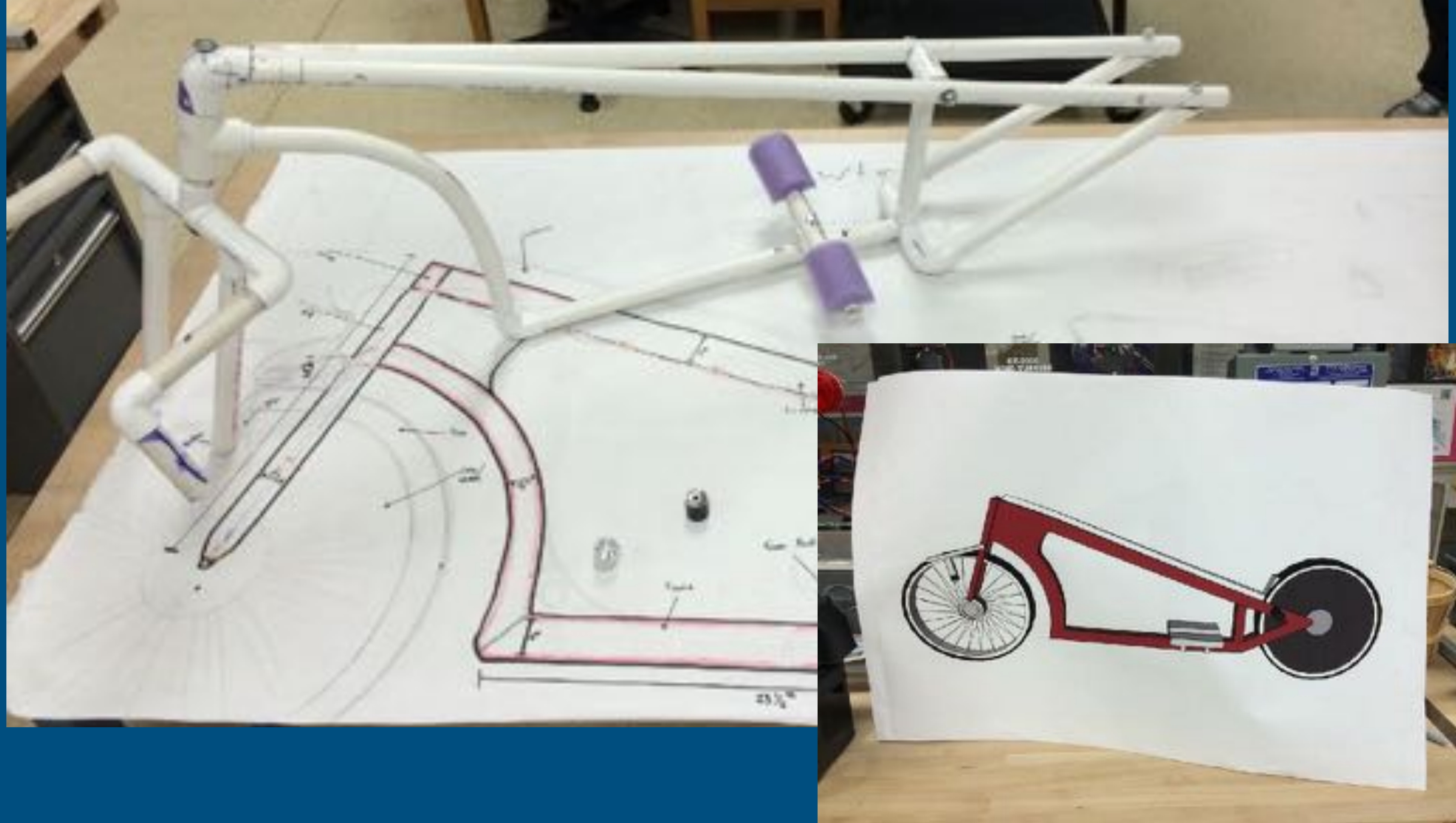
# Sharing Results





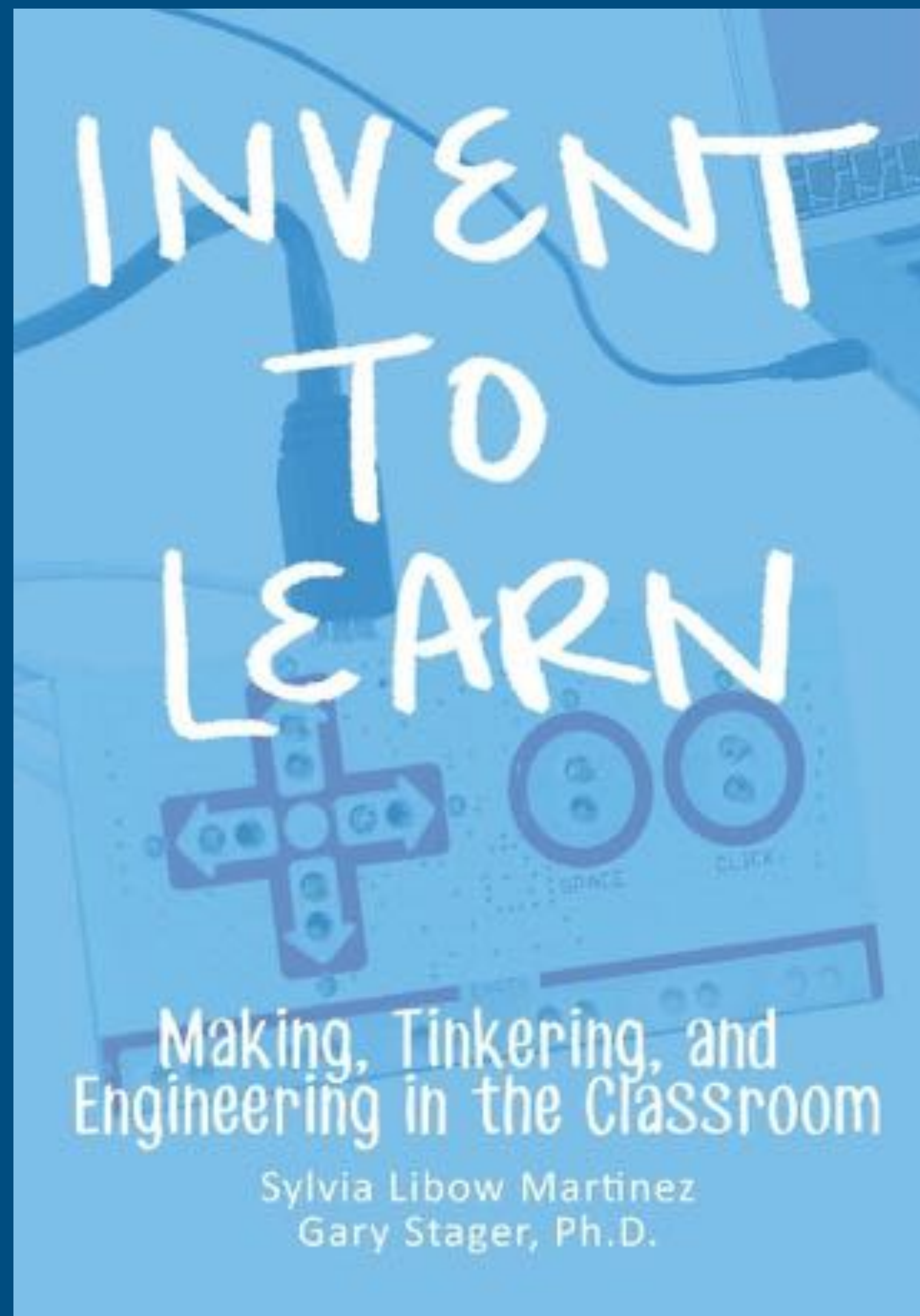
# ISTE Standards





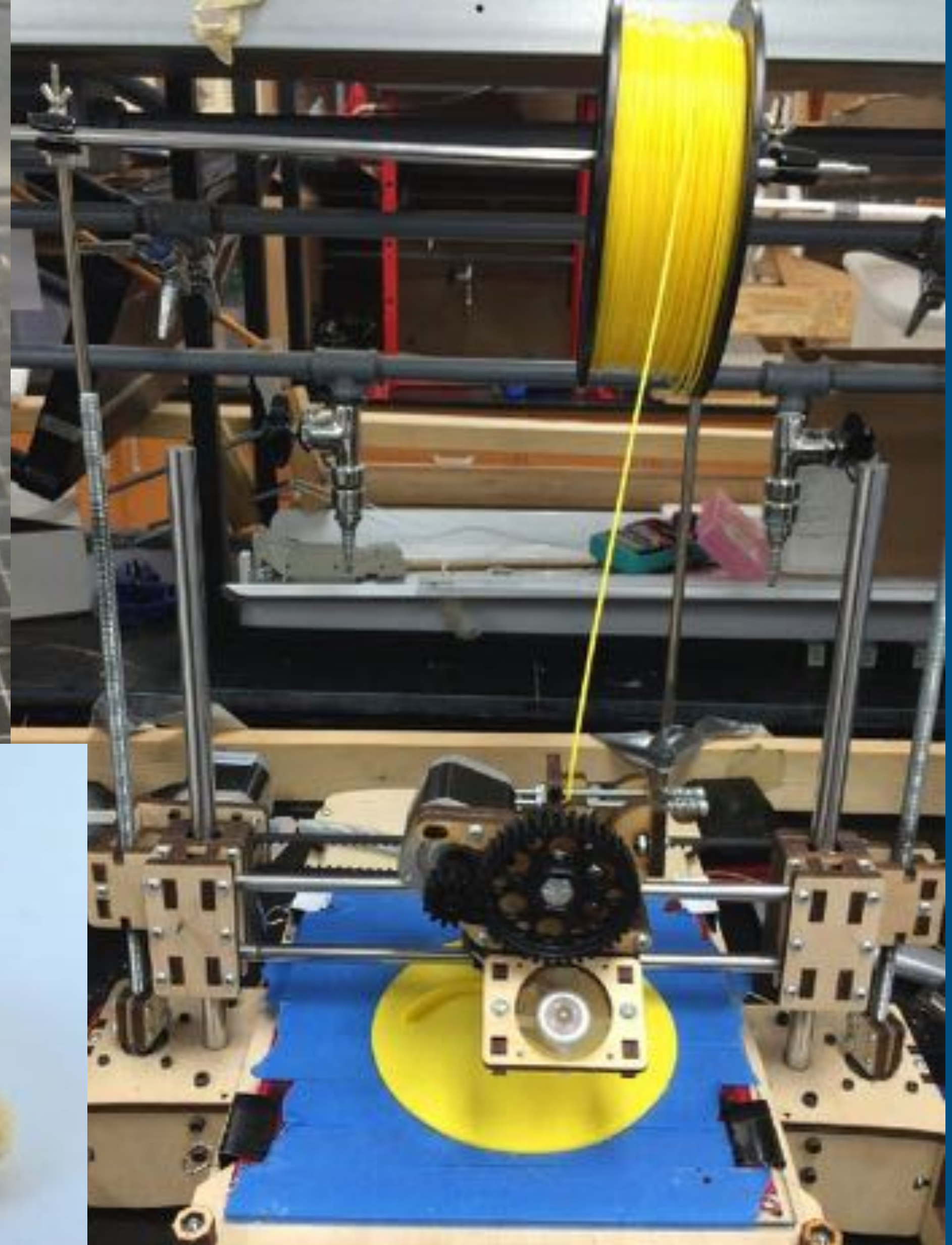
**Project Based Learning**





**Learn by Making**





# Digital Fabrication



HOUR  
OF  
CODE

RESOURCES FAQ PRIZES

English

WATCH THE NEW VIDEO



JOIN THE LARGEST  
LEARNING EVENT IN  
HISTORY, DEC 8-14, 2014

Students

Try it

Teachers

Host it

Everyone

Support it

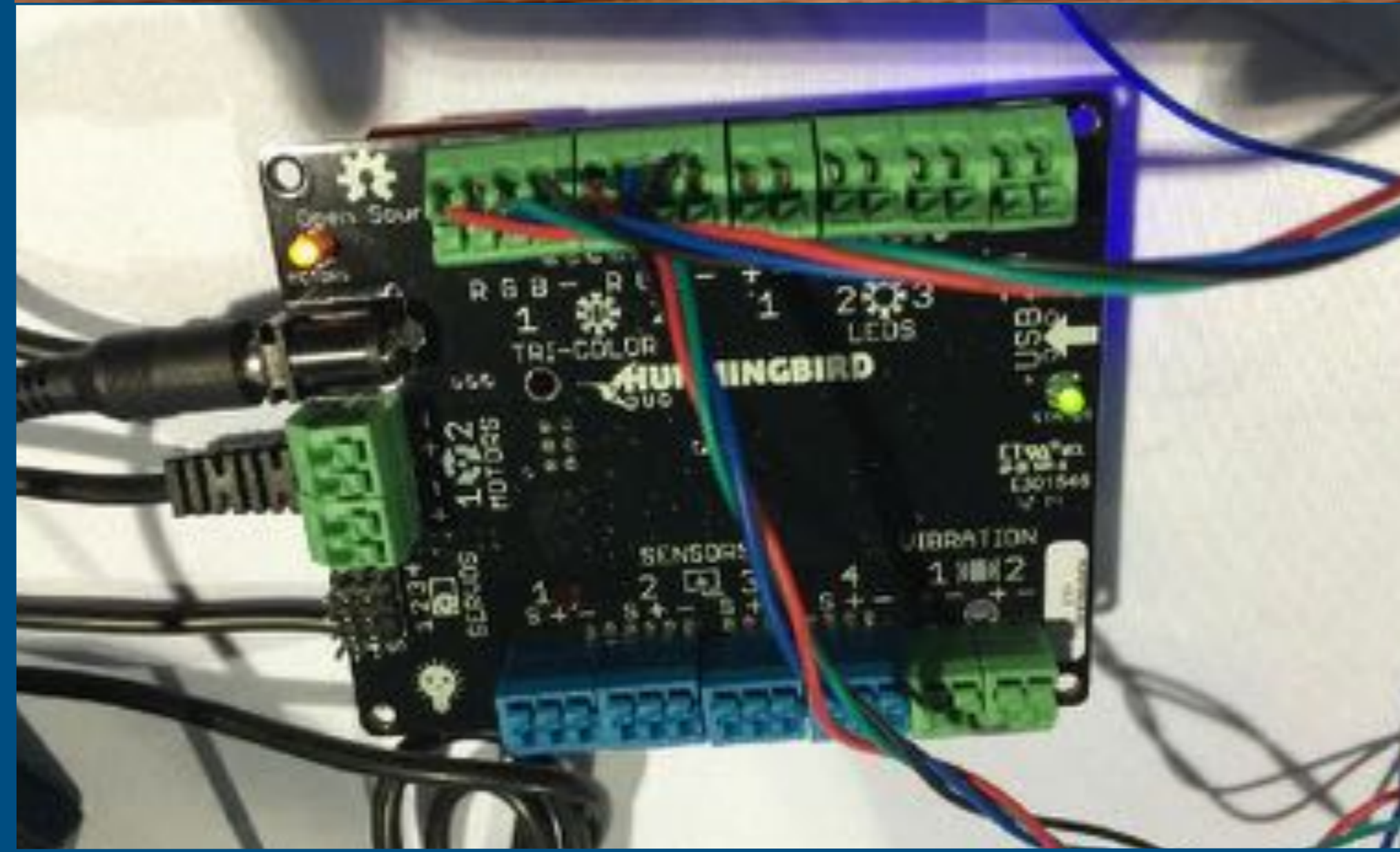
What is the Hour of Code?

f Share on Facebook

🐦 Share on Twitter

# Programming





# Physical Computing





**Diana Rendina** @DianaLRendina · Oct 20

Working on slides for Wednesday's webinar. This is an annotated layout of our #makerspace setup #ISTElib #Sketch [pic.twitter.com/HMb1fvYV0l](https://pic.twitter.com/HMb1fvYV0l)



# Library Makerspace



**Why are you  
a Maker Educator?**







and then...?



# Find Your Tribe





F A B **L E A R N** .org

## Where We Are









# K-12 Fab Labs and Makerspaces Group

<https://sites.google.com/site/k12makers/>

The screenshot shows the Google Group interface for "Resources for K-12 Fab Labs and Makerspaces". On the left is a navigation menu with links like "Group Discussions", "Project Ideas & Inspirations", "Stocking Your Space", "Vendors", "Software for Making", "Books & Other Readings", "Professional Development Events (ARCHIVE)", "Professional Development 2013", "Maker Contests, Challenges, Competitions (for students)", "Grants", "Member Blogs", and "Useful Links & Resources". The main content area has a header with "Google Group", "NEW TOPIC", a refresh button, "Mark all as read", "Filters", and a "Search this site" box. Below this is a search bar and a "Search" button. The group name "K-12 Fab Labs and Makerspaces" is displayed with "Shared publicly" and "Membership and email settings" links. It shows "31 of 642 topics (75 unread)". A welcome message states: "world!) but are still rare enough that many of us aren't living in close vicinity to many other similar labs. Let's build a virtual community of lab directors/administrators/coordinators/enthusiasts so we can share our best practices, tips, tricks, challenges of managing and running such labs. Consider this a forum for all things about digital fabrication in K-12 education - equipment reviews, conference/workshop announcements, rumors about new gadgets, troubleshooting problems, advice about vendors, cool resources for projects, etc. Please take a moment to introduce yourself by replying to the 'Introductions' thread. (We've also been compiling resources mentioned here on a shared Google Site - check it out and contribute!)" A note follows: "Note: We are keeping this group vendor-free. If you work for a vendor, you are welcome to join us for your own interest in making/fabbing in K-12 education - please state this clearly in your join requests so we know this is your intention. And please refrain from sending any advertising messages to the group." At the bottom is a table of recent topics:

★	📎 Introductions - Please take a moment to introduce yourself by replying in this t...	227 posts	Nov 5
★	📎 An enchanting 4 minute film about making. (2)	3	7:22 PM
★	📎 "Stringy" prints on the Replicator 5th Gen (1)	10	12:47 PM
★	📎 A place for maker-educator exchanges	1	11:52 AM

## Community



# Maker Coach



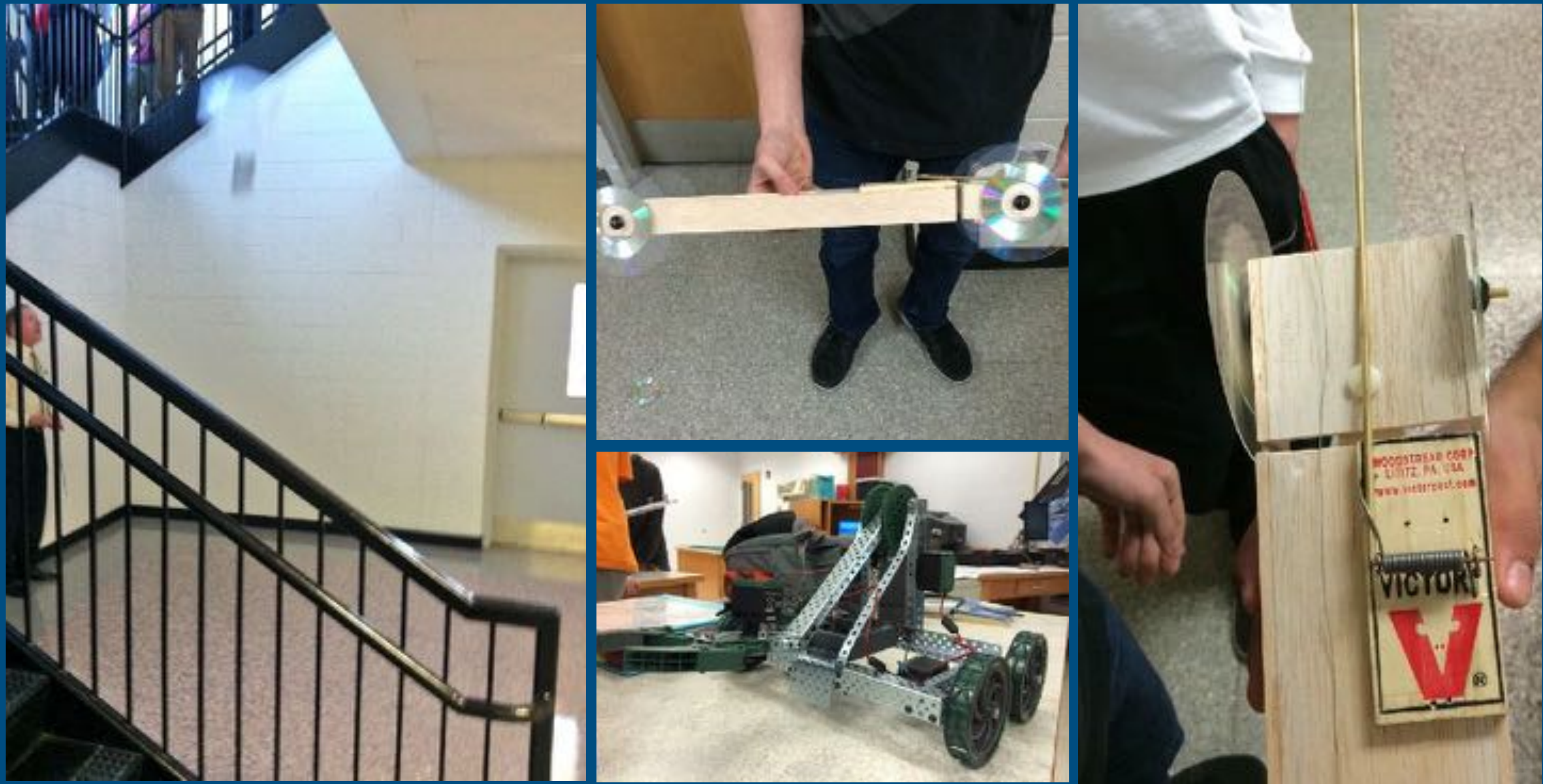


Photo by @aliharper20









# Hidden Maker Educators





# Professional Development







# WORLDS COLLIDE



## 4 KEY ELEMENTS

### SIGNIFICANT **CONTENT** & IMPORTANT **COMPETENCIES**

Through *One to the World* work, students develop as knowledgeable critical thinkers, communicators, collaborators, creators, and contributors. *One to the World* work ties directly to our curriculum.

### AUTHENTIC CHALLENGING PROBLEMS in **THE WORLD**

*One to the World* student work is framed by an authentic, challenging problem. The work features real-world context, tasks and tools or impact.

### PUBLIC PRODUCT *for* **THE WORLD**

Students make their work public by displaying and/or presenting it to people beyond the classroom. Students create and share products, performances, services, and exhibitions of work relating to authentic problems and tasks in the world.

### CONNECTED *with* **THE WORLD**

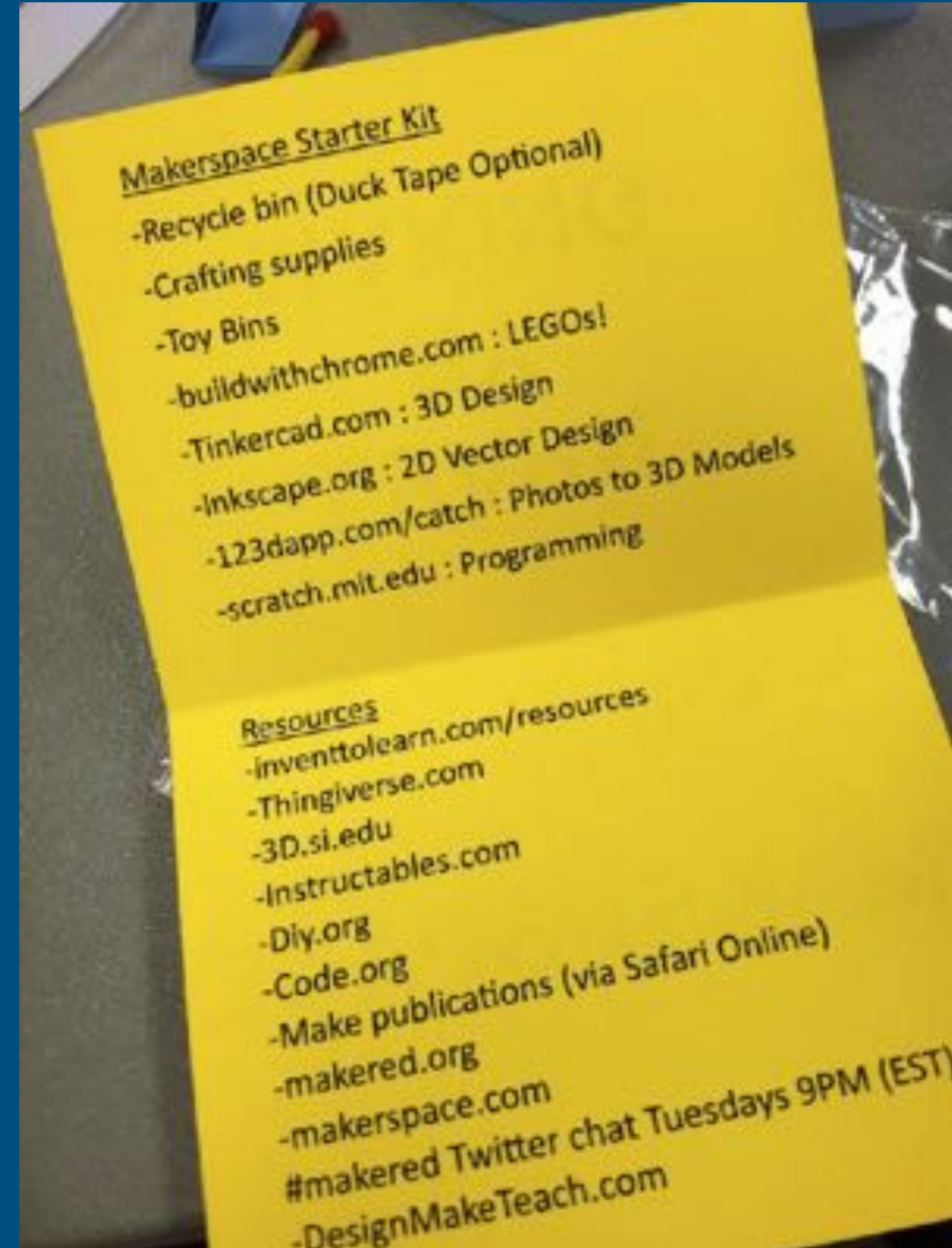
Students improve the quality of their work and amplify the impact of their work through three types of connections:

- connections to valuable tools and information;
- connections to others with whom they collaborate; and
- connections with an audience beyond the teacher.

When appropriate, students use technology to make these connections with the world.

Revised July 2015. The concepts and phrasing of the 4 key elements draws from the "Essential Project Design Elements" of Gold Standard Project Based Learning from the Buck Institute for Education. Alan November was an early user of the phrase, "One to the World."





# Makerspace Starter Kit



# Maker Education Initiative

• EVERY CHILD A MAKER •



[MakerEd.org](http://MakerEd.org)



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# Challenge

Create a 90 sec video describing your strategies for fostering Maker Mindset in yourself, students and fellow educators.

<https://flipgrid.com/60c2ea>





# HANDOUTS & CONTACT INFO



[DesignMakeTeach.com/TCEA](https://DesignMakeTeach.com/TCEA)

**Josh Ajima**

**@DesignMakeTeach**

**DesignMakeTeach.com**

**[youtube.com/designmaketeach](https://youtube.com/designmaketeach)**





# Provide Your Feedback

Remember to evaluate my session!

Complete this session's survey within the event in the TCEA Mobile App or visit [www.tcea.org/surveys](http://www.tcea.org/surveys).